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**Report:** 2022 Line Creek Operations Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek

**Overview:** The Line Creek Operation (LCO) Dry Creek Local Aquatic Effects Monitoring Program (LAEMP) was designed to assess potential effects of Phase II Project of Line Creek Operations (LCOII) on Dry Creek, Grace Creek, and Unnamed Creek (ENV 2013) and was initiated in 2014. This report focuses on data from 2022.

This report was prepared for Teck by Minnow Environmental Inc.

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# 2022 Line Creek Operations Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek

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

for Dry Creek

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# **EXECUTIVE SUMMARY**

The Line Creek Operation (LCO) Dry Creek Local Aquatic Effects Monitoring Program (LAEMP) was designed to assess potential effects of Phase II Project of Line Creek Operations (LCOII) on Dry Creek, Grace Creek, and Unnamed Creek and was initiated in 2014, prior to spoiling in the watershed (2015; ENV 2013). To comply with discharge requirements outlined in permit 5353 for total suspended solids, Teck constructed the Line Creek Operation (LCO) Dry Creek Water Management System (DCWMS), which began operation in 2015. In 2019, a pathway was theorized that described enhanced primary production in the DCWMS sedimentation ponds that promoted the generation of organic selenium compounds (specifically DMSeO and MeSe[IV]), leading to increased benthic invertebrate tissue selenium concentrations downstream of the DCWMS (Minnow 2020). As a response to this result, a seasonal bypass of the DCWMS was initiated in 2020 to mitigate selenium bioaccumulation in biota, only using the sedimentation ponds during freshet (i.e., higher-flow periods). Further mitigation strategies initiated in 2021 included the use (i.e., filling) of only one of the two available DCWMS sedimentation ponds. The bypass of the DCMWS was operational throughout most of 2022, except from May to July.

This report evaluates Dry Creek monitoring data up to the end of the 2022 calendar year to evaluate five study questions.

Study Question #1: Are aqueous concentrations of mine-related constituents elevated in relation to British Columbia Water Quality Guidelines (BCWQG) and Elk Valley Water Quality Plan (EVWQP) benchmarks, and are concentrations changing over time? Concentrations of many aqueous mine-related constituents have increased in Dry Creek since mining began in 2015. Despite these increases, in 2022, the majority of constituents were below water quality quidelines, SPOs, benchmarks and/or updated effects concentrations. Exceptions to this were total selenium which exceeded the SPO, nitrate which was above the updated effects concentrations, and nickel which was above the proposed benchmarks in 2022. Elevated organoselenium concentrations that were observed in 2018 and 2019 have decreased since that time due to the implementation of the DCWMS bypass. Constituent concentrations were greatest at areas immediately downstream of LCOII spoiling and downstream DCWMS and decreased at downstream locations, likely due to inputs of of the groundwater and surface water from non-mine affected areas between LC DC2 and LC DC4 (Golder 2019b). Similar increasing trends in aqueous constituents were generally not detected at the reference areas, in the Fording River downstream of Dry Creek, or in Grace Creek, however, except occasionally nitrate and selenium at the reference area and downstream of Dry Creek in the Fording.



Study Question #2: Is acute or chronic toxicity occurring from water collected at the outlet of the DCWMS (LC\_SPDC) or within Dry Creek (LC\_DCDS), and is toxicity changing over time? Acute toxicity testing of water from the outlet of the DCWMS as well as within Dry Creek showed no test failures in 2022. Chronic toxicity is monitored in Dry Creek directly downstream of the DCWMS (LC\_DCDS), under the regional chronic toxicity program. In 2022, nickel and/or nitrate were identified as potentially causing the observed effects on water fleas and amphipods. All chronic toxicity on rainbow trout and fathead minnow in 2022 were categorized as no effect. Overall, chronic toxicity results have shown a low proportion of adverse responses over time within Dry Creek (LC\_DCDS), with a frequency and magnitude of responses that was similar between 2019 to 2022 for most endpoints, and responses have been mostly limited to invertebrate endpoints.

Study Question #3: Are benthic invertebrate community endpoints within normal ranges based on samples collected at regional and local reference areas within the Elk River as part of the Regional Aquatic Effects Monitoring Program (RAEMP), and are the endpoints changing over time? Total abundance and taxonomic richness were generally within regional and site-specific normal ranges at all areas in Dry Creek in 2022. Over the 2019 to 2022 monitoring period, there have been decreases in benthic community endpoints used to evaluate changes in watershed health, at all areas along Dry Creek. Proportions of Ephemeroptera measured at the mine-exposed areas were almost always significantly lower than those associated with the community in the Dry Creek reference area. It is therefore likely that mining activities are contributing to changes in some benthic invertebrate community endpoints in some areas of Dry Creek. Between 2021 and 2022 there was also a decrease in total abundance at all stations on Dry Creek, including the reference station. Currently, there are no water quality parameters that point to a cause of this decrease in 2022. The community in Dry Creek upstream of the DCWMS headpond most frequently had endpoints outside of normal ranges. In 2022, benthic invertebrate communities located upstream and downstream of the mouth of Dry Creek in the Fording River differed from each other; however, community endpoints were generally within regional normal ranges and show no temporal variation in the mainstem.

Study Question #4: How do selenium concentrations in benthic invertebrate tissue compare to normal ranges and BCWQG or EVWQP benchmarks, and are they changing over time? In most areas of Dry Creek downstream of the DCWMS, benthic invertebrate tissue selenium concentrations were the same in 2022 as 2021 and lower than 2020, although were occasionally higher than regional normal ranges and reference concentrations (most often in May). Downstream of the DCWMS the decreases in benthic invertebrate tissue selenium concentrations measured in 2022 and 2021 relative to earlier years (2020) were primarily attributable to changes in the water management of the DCWMS (i.e., bypass the sedimentation ponds throughout most

of the year and limiting use of the DCWMS to one rather than two sedimentation ponds). Within the Fording River, benthic invertebrate tissue selenium concentrations upstream and downstream of Dry Creek were generally similar to each other and have remained unchanged in 2022 relative to earlier years (2019 to 2021), indicating that Dry Creek water quality has had limited or no influence on benthic invertebrate tissue selenium concentrations in area of the Fording River mainstem. Additionally, a quarterly benthic invertebrate mean tissue selenium concentrations limit at the monitoring station downstream of the DCWMS (LC\_DCDS) will come into effect on April 1, 2023 (ENV 2022).

Study Question #5: Are changes in fish and fish habitat (including instream flow and calcite index) occurring within Dry Creek as a result of mine operations? The fish-bearing portion of Dry Creek (i.e., downstream of the East Tributary) is a coldwater stream with water temperatures that may pose challenges to fish growth and recruitment. Overall, the available observations indicate that all locations in Dry Creek in 2022 had water temperatures that may have limited fish recruitment; that is, growing season degree days were less than the minimum threshold of 800. Streamflow trends were generally consistent with historical records in 2022, with the exception of average flows during rearing and early incubation periods being 22% higher than the previous record high in 2013. Fewer redds were observed in 2022 than in 2021 in the UFR, including in Dry Creek, which may be associated with the cold early season water temperatures in 2022. The number of redds counted is similar to the number counted in the years from 2015 to 2017 in Dry Creek. Body condition and densities of age-1 and age-2+ fish were similar to previous years. Based on a limited dataset, age-0 fish were shorter in 2022 compared to previous years (2015 and 2016). This may be related to a decrease in water temperatures after the seasonal sediment pond by-pass was put into operation in 2020. Similar to previous years, in 2022, calcite concretion was not observed in Dry Creek during the Regional Calcite Monitoring Program. Calcite levels in Dry Creek continue to be below those expected to result in measurable biological effect, although there is a trend toward increased calcite presence.

The results from the Dry Creek LAEMP provide information that supports Teck's Adaptive Management Plan (AMP). The monitoring and management of the DCWMS are adaptive management responses that have been and continue to be actively adjusted to develop our understanding of the watershed and how changes to water management (particularly with respect to the DCWMS) can improve conditions in Dry Creek. The results from this study also support the evaluation of biological triggers, which are intended to identify unexpected monitoring results that may lead to additional monitoring or mitigation responses under the AMP response framework.

# **TABLE OF CONTENTS**

| EXEC       | CUTIVE SUMMARY   | i  |
|------------|--|----|
| 1 IN       | TRODUCTION   |    |
| 1.1        | Background   | 1  |
| 1.2        | Study Questions  | 4  |
| 1.3        | Dry Creek Water Management System (DCWMS) Operations                   |    |
| 1.4        | Linkage to the Adaptive Management Plan                                | 8  |
| 2 ME       | THODS  | 12 |
| 2.1        | Overview   |    |
| 2.2        | Study Question 1: Water Quality  | 16 |
|            | 2.1 Routine Water Quality  |    |
|            | 2.2 Laboratory and Data Analysis                                       |    |
| 2.3        | , , , , , , , , , , , , , , , , , ,                                    |    |
| 2.4        | <b>y</b>   |    |
|            | 4.1 Overview   |    |
|            | 4.2 Study Question 3: Benthic Invertebrate Community                   |    |
|            | 4.3 Study Question 4: Benthic Invertebrate Tissue Selenium             |    |
| 2.5        |  |    |
|            | 5.1 Physical Habitat, Temperature, Flow, Calcite, and Dissolved Oxygen |    |
|            | 5.2 Fish Abundance, Density and Condition5.3 Redd Surveys              | ∠0 |
|            | 5.4 Dip net surveys  |    |
|            | 5.5 Data Analysis  |    |
|            | •  |    |
|            | JDY QUESTION 1: WATER QUALITY  |    |
| 3.1        | Background   |    |
| 3.2        | Nitrate  |    |
| 3.3        | Total Cadmium  |    |
| 3.4        | Total Selenium   |    |
| 3.5        | OrganoseleniumNutrient Status  |    |
| 3.6<br>3.7 | Summary  |    |
|            | •  |    |
| 4 STL      | JDY QUESTION 2: AQUEOUS TOXICITY                                       | 45 |
| 5 STL      | JDY QUESTION 3: BENTHIC INVERTEBRATE COMMUNITY                         | 49 |
| 5.1        | Background   |    |
| 5.2        | Dry Creek  |    |
| 5.         | 2.1 Fording River and Grace Creek                                      | 58 |
| 5.3        | Spatiotemporal Changes and Biological Trigger Assessment               | 62 |
| 5.4        | Correlation Analysis   |    |
| 5.5        | Summary  | 67 |
| 6 STL      | JDY QUESTION 4: BENTHIC INVERTEBRATE TISSUE SELENIUM                   | 69 |
| 6.1        | Background   |    |
| 6.2        | Normal Ranges, Benchmarks and Biological Trigger Evaluation            | 69 |
| 6.3        | Spatiotemporal Trends  |    |
| 6.4        | Summary  |    |
| 7 STI      | JDY QUESTION 5: FISH AND FISH HABITAT                                  | Ω1 |
| 7.1        | Background   |    |
| 7.1        | Daving out in  |    |

| 7.2.1 Water Tem 7.2.2 Dissolved 7.2.3 Instream F 7.2.4 Calcite Co 7.3 Fish 7.3.1 Redd Surv 7.3.2 Density 7.3.3 Length free 7.3.4 Length-at-a 7.3.5 Condition 7.3.6 Summary | nperature  Oxygen  low verage  eys  quency age-0 |     |
|--|--|-----|
|  | IENTS  |     |
|  | IEN15  |     |
| 10 REFERENCES  |  | 115 |
| APPENDIX A   | METHODS AND DATA ANALYSIS                        |     |
| APPENDIX B   | DATA QUALITY REVIEW (DQR)                        |     |
| APPENDIX C   | WATER QUALITY                                    |     |
| APPENDIX D   | TOXICITY   |     |
| APPENDIX E   | BENTHIC INVERTEBRATE COMMUNITY                   |     |
| APPENDIX F   | BENTHIC INVERTEBRATE TISSUE CHEMISTRY            |     |
| APPENDIX G   | FISH AND FISH HABITAT                            |     |
| APPENDIX H   | BIOLOGICAL TRIGGERS                              |     |
| APPENDIX I   | SUPPORTING INFORMATION                           |     |
| APPENDIX J   | LABORATORY REPORTS                               |     |
|  |  |     |

# **LIST OF FIGURES**

| Figure 1.1: | Teck's Coal Mine Operations within the Elk River Watershed, Southeast  |   |
|-------------|--|---|
|             | British Columbia   | 2 |
| Figure 1.2: | Overview of Line Creek Operation   | 3 |
| Figure 1.3: | Overview of LAEMP and Supplemental Sampling Events in Relation to Operational Phases of the Dry Creek Water Management System Operation, |   |
|             | 2020 to 2022   | 6 |



| Figure 1.4:<br>Figure 2.1: | LCO Dry Creek Water Management SystemLCO Dry Creek LAEMP Sampling Locations, 2022   |    |
|----------------------------|---|----|
| Figure 2.2:                | LCO Dry Creek Fish Population Monitoring Study Area Sample Sites and Survey Areas   |    |
| Figure 3.1:                | Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022   | 35 |
| Figure 3.2:                | Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022  |    |
| Figure 3.3:                | Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022   |    |
| Figure 3.4:                | Selenium Species Concentrations from LCO Dry Creek LAEMP Sampling Areas, 2017 to 2022   | 42 |
| Figure 5.1:                | Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022 | 50 |
| Figure 5.2:                | Benthic Invertebrate Community Abundance (# of Organisms / 3 m Kick) from Dry Creek LAEMP Sampling Areas, 2012 to 2022  | 54 |
| Figure 5.3:                | Benthic Invertebrate Community Richness (# of taxa) from Dry Creek LAEMP Sampling Areas, 2012 to 2022   | 55 |
| Figure 5.4:                | Benthic Invertebrate Community % EPT from Dry Creek LAEMP Sampling Areas, 2012 to 2022  | 56 |
| Figure 5.5:                | Benthic Invertebrate Community % Ephemeroptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022  | 57 |
| Figure 5.6:                | Benthic Invertebrate Community % Plecoptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022   |    |
| Figure 5.7:                | Benthic Invertebrate Community % Chironomidae from Dry Creek LAEMP Sampling Areas, 2012 to 2022   |    |
| Figure 5.8:                | Benthic Invertebrate Community % Non-Chironomidae Diptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022   | 61 |
| Figure 6.1:                | Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2018 to 2022   |    |
| Figure 6.2:                | Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2022   |    |
| Figure 6.3:                | Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December 2022                           | 76 |
| Figure 6.4:                | Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December                                |    |
| Figure 7.1:                | 2022  Daily Mean Water Temperature from June 2016 to October 2022 at Stations in the Upper Portion of the Dry Creek Watershed   |    |
| Figure 7.2:                | Daily Mean Water Temperature from June 2016 to October 2022 at Stations in the Lower Portion of the Dry Creek watershed and Dry Creek Tributary 5                           |    |
| Figure 7.3:                | Mean Weekly Maximum Temperatures (MWMxT) at Monitoring Stations in Dry Creek Watershed Upstream of Influence of the Sedimentation Ponds                                     |    |
| Figure 7.4:                | Mean Weekly Maximum Temperatures (MWMxT) at Monitoring Stations in Lower Dry Creek and Fording River Overlayed on Westslope Cutthroat Trout Optimum Temperature Ranges      |    |
| Figure 7.5:                | Annual Hydrograph at Dry Creek (LC_DC1) for Each Year from 2011 to 2022 on Normal (upper) and Log Scale (lower)   |    |
| Figure 7.6:                | Annual Hydrograph for WSC 08NK018 from 1970 to 2022 on Normal (upper) and Log Scale (lower)   |    |

| Figure 7.7:              | Densities of Fish Captured during Electrofishing in LCO Dry Creek on the First Pass by Year, Sampling Site, and Life Stage                        | 105   |
|--------------------------|---|-------|
| Figure 7.8:              | Number of Fish Captured by Electrofishing in LCO Dry Creek by Fork Length and Period  |       |
| Figure 7.9:              | Estimated Fork Length of Age-0 Westslope Cutthroat Trout on 1 October in a Typical Year in LCO Dry Creek (with 95% CIs)                           |       |
| Figure 7.10:             | Body Condition in LCO Dry Creek Shown as the Percent Change in the Body Weight of a 100 mm Fish in a Typical Year Relative to a Typical Stream in |       |
| Figure 7.11:             | the UFR Watershed (with 95% CIs)  |       |
| LIST OF TAB              | ,   | . 100 |
| LIOT OF TAB              |   |       |
| Table 1.1:               | Dry Creek Water Management System Operational Phases, 2020 to 2022  |       |
| Table 2.1:               | Monitoring Areas Associated with LCO Dry Creek LAEMP, 2022  |       |
| Table 2.2:               | Summary of Water Quality Monitoring for Permit 107517   |       |
| Table 2.3:               | Benthic Invertebrate Community Sampling for Dry Creek LAEMP, 2022 Benthic Invertebrate Composite-Taxa Tissue Sampling for Dry Creek               |       |
| Table 2.4:               | LAEMP, 2022   |       |
| Table 2.5:               | Summary of Water Temperature Monitoring Stations in Dry Creek   |       |
| Table 2.6:               | Summary of Water Temperature Metrics, Calculation Methods and Treatment   |       |
| Table 0.7.               | of Data GapsSummary of Electrofishing Sites Sampled in 2022   |       |
| Table 2.7:<br>Table 3.1: |   | ∠1    |
| Table 3.1.               | Criteria for Detailed Evaluation of Water Quality Endpoints in 2022 LCO Dry Creek LAEMP   | 33    |
| Table 3.2:               | Summary of Water Quality Statistical Results and Comparison with  | 00    |
|                          | Benchmarks and Guidelines, Dry Creek LAEMP, 2022  | 36    |
| Table 4.1:               | Summary of Acute Toxicity Test Results for LCO Dry Creek LAEMP  | 46    |
| Table 4.2:               | Monitoring Stations, 2022 (Teck 2023)   | 46    |
| 1 abie 4.2.              | 2015 to 2022a (Golder 2016, 2017a, 2018, 2019, 2020a, 2021, 2022, 2023)   | 47    |
| Table 5.1:               | Spearman's Correlation Relationships between Benthic Invertebrate   | 71    |
|                          | Community Metrics and Physical and Chemical Parameters, Dry Creek, 2019   |       |
|                          | to 2022   | 66    |
| Table 7.1:               | Duration and Intensity of the Growing Season (defined in Table 2.6) for   |       |
|                          | Monitoring Sites in Dry Creek and Fording River from June or September  |       |
|                          | 2016 through October 2021   | 88    |
| Table 7.2:               | Monthly Mean Dissolved Oxygen Concentrations (mg/L) in Dry Creek, 2022  | 91    |
| Table 7.3:               | Mean Daily Flow at LC_DC1 during Key Westslope Cutthroat Trout Activity   | 0.E   |
| Table 7.4:               | Periods as Defined in Teck (2021)   | 95    |
| Table 7.4:               | Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual Discharge (MAD), at LC_DC1 and WSC 08NK018 from 2011 to 2022             | 96    |
| Table 7.5:               | Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual  | 90    |
| Table 7.0.               | Discharge (MAD), at LC DC1 and WSC 08NK018 from 2011 to 2022  | 99    |
| Table 7.6:               | Date of Minimum and Maximum Daily Average Streamflow per Year from  | 00    |
|                          | 2001 to 2022 Recorded at LC DC1   | 99    |
| Table 7.7:               | Indication of Whether the Historical Flows at LC_DC1 Exceeded the Flushing  | -     |
|                          | Flow Threshold of 1.0 m <sup>3</sup> /s for a 2-Day Duration (threshold proposed in West  |       |
|                          | et al. 2021)  | 100   |

| Table 7.8:  | Calcite Index Values for Dry Creek, Grace Creek, and Fording River Areas, LCO Dry Creek LAEMP 2015 to 2022                  | 102 |
|-------------|---|-----|
| Table 7.9:  | Total Redds Counted (2015 to 2020) and Total Definitive Nests Counted (2021 to 2022) in LCO Dry Creek Between 2015 and 2022 |     |
| Table 7.10: | Summary of Fish Captured by Sampling Site, Kilometre (km), and Age-Class  | 104 |
|             | in 2022   | 104 |
| Table 7.11: | Length Categories for Life Stages of WCT in LCO Dry Creek   | 105 |
| Table 8.1:  | Summary of Findings, Responses, and Adjustments Related to the Dry Creek  |     |
|             | LAEMP, 2022   | 113 |



#### **ACRONYMS AND ABBREVIATIONS**

**%E** – relative proportion of Ephemeroptera

%EPT - relative proportion of Ephemeroptera, Plecoptera, and Trichoptera

**AMP** – Adaptive Management Plan

**ANOVA** – Analysis of Variance

**BC** – British Columbia

**BCWQG** – British Columbia Water Quality Guidelines

**BRN** – Burnt Ridge North

**CABIN** – Canadian Aquatic Biomonitoring Network

CI - Calcite Index

**CMM** - Coal Mountain Mine

**COSEWIC** – Committee on the Status of Endangered Wildlife in Canada

**DCFFHMP** – Dry Creek Fish and Fish Habitat Monitoring Program

**DCWMS** – Dry Creek Water Management System

**DFO** - Fisheries and Oceans Canada

**DMSeO** – Dimethyl Selenoxide

DO - Dissolved Oxygen

**DQR** – Data Quality Review

**Ecofish** – Ecofish Research Limited

**EMC** – Environmental Monitoring Committee

EMPR – British Columbia Ministry of Energy, Mines, and Petroleum Resources

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

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

**EVO** – Elkview Operation

**EVFFHC** – Elk Valley Fish and Fish Habitat Committee

**EVWQP** – Elk Valley Water Quality Plan

**DCWMP** – Dry Creek Water Management Plan

dw - Dry Weight

FHAP – Fish Habitat Assessment Procedure

**FLNRORD** – Ministry of Forests, Lands, Natural Resource Operations, and Rural Development

**FRO** – Fording River Operation

**GHO** – Greenhills Operation

**GSDD** – Growing Season Degree Days

**HSD** - Honestly, Significant Difference



ICP-MS – Inductively Coupled Plasma Mass Spectrometry

IFRs - Instream Flow Requirements

**K-M** – Kaplan-Meier

**KNC** – Ktunaxa Nation Council

**LAEMP** – Local Aquatic Effects Monitoring Program

**LCO** – Line Creek Operations

**LCOII** – Line Creek Operations Phase II

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

**LRL** – Laboratory Reporting Limit

**MBCM** – Million Bank Cubic Meters

**MCT** – Measure of Central Tendency

MeSe(IV) - Methylseleninic Acid

**MOD** – Magnitude of Difference

**MOE** – Mistry of the Environment

**MWMP** – Mine Water Management Plan

**MWMxT** – Mean weekly maximum water temperature

**NCD** – non-Chironomidae Diptera

Nupqu – Nupqu Resource Limited Partnership

**PC** – Principal Components

**PCA** – Principal Components Analysis

**Qx** – referring to calendar quarters

**QA/QC** – Quality Assurance / Quality Control

**RAEMP** – Regional Aquatic Effects Monitoring Program

**SDM** – Structured Decision Making

**SPO** – Site Performance Objective

Teck - Teck Coal Limited

**TSS** – Total Suspended Solids

**UEC** – Updated Effects Concentration

**UFR** – Upper Fording River

**WCT** – Westslope Cutthroat Trout

# 1 INTRODUCTION

## 1.1 Background

Teck Coal Limited (Teck) currently operates four steelmaking coal mines in the Elk River watershed in southeastern British Columbia (BC) which are the Line Creek Operation (LCO), Fording River Operation (FRO), Greenhills Operation (GHO), and Elkview Operation (EVO; Figure 1.1). A fifth mine, Coal Mountain Mine (CMm), is also owned by Teck and located in the Elk River watershed; however, it is no longer in operation and has been moved into the care and maintenance designation. Teck received a conditional Environmental Assessment Certificate in September 2013 for the LCO Phase II Project (LCOII) and development began in February 2014. The initial placement of waste rock in the Dry Creek watershed occurred in 2015, although minimal spoiling occurred in 2015 (<1 million bank cubic meters [MBCM]) by year increasing up to a current maximum of < 34 MBCB in 2022. The LCOII is expected to continue to 2035 and result in a disturbance of approximately 1,940 ha, with placement of waste rock over approximately 5 km of upper LCO1 Dry Creek, a second order mountainous tributary to the Fording River at the north end of LCO property (Figure 1.2). Since 2015, surface and shallow groundwater from mine-influenced areas of the upper Dry Creek watershed have been managed through the Dry Creek Water Management System (DCWMS; Figure 1.2), briefly, the DCWMS collects and re-directs mine-influenced surface flow from upper Dry Creek through the sedimentation ponds prior to returning to Dry Creek downstream of the ponds (see Section 1.3 for details).

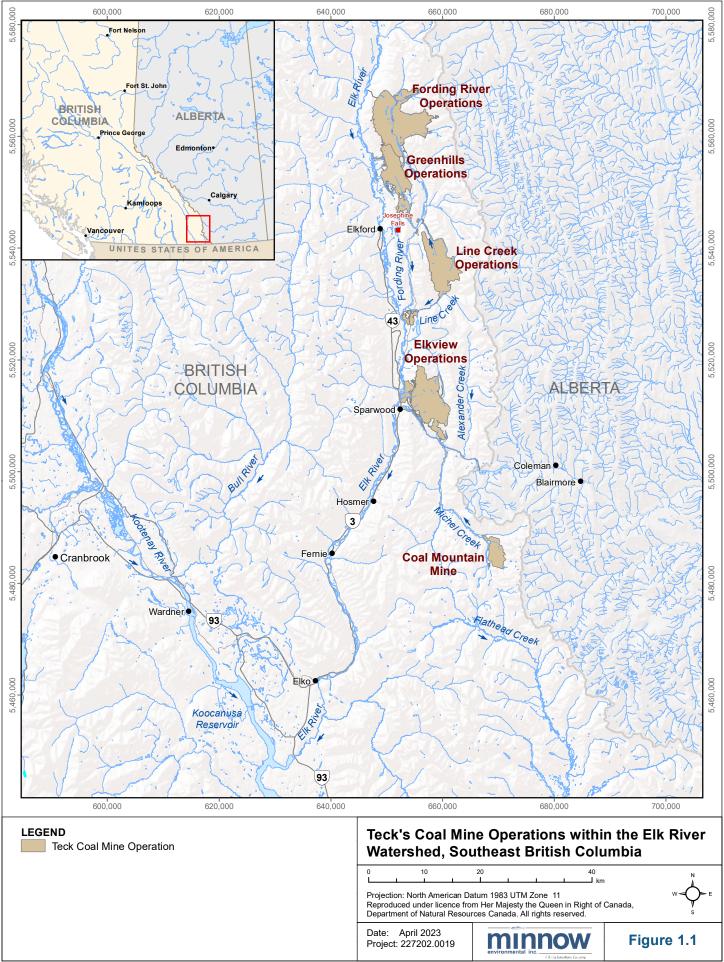
Section 8.3.1.2 of Permit 107517 (version January 27, 2023; ENV 2023) outlines the requirements for the LCO Dry Creek Local Aquatic Effects Monitoring Program (LAEMP) as follows:

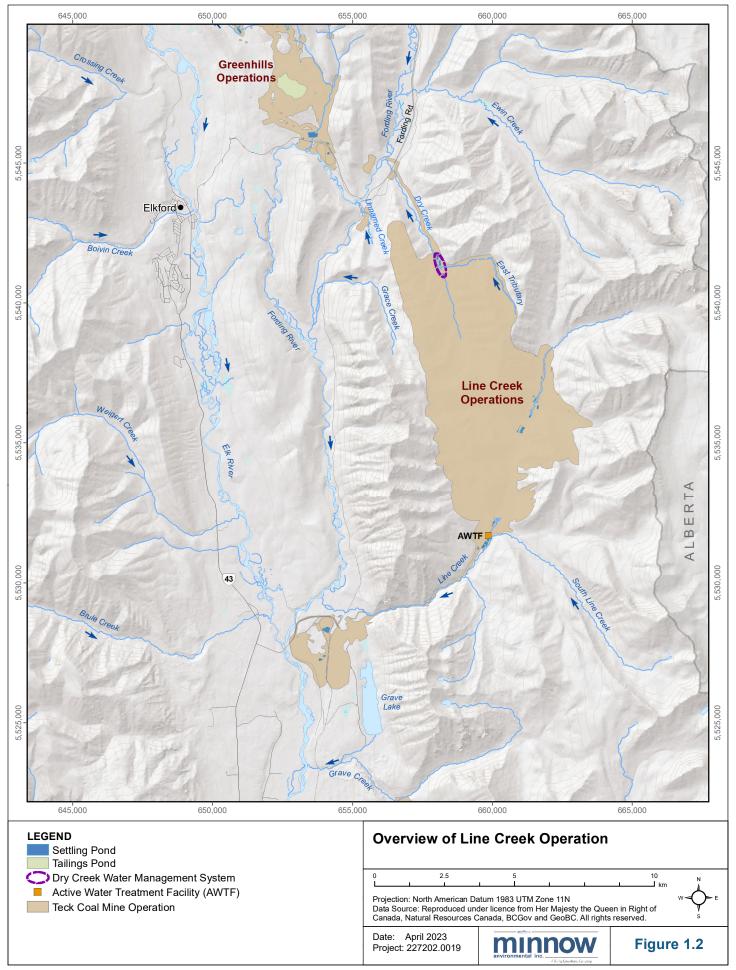
"The Permittee must develop and implement a Local Aquatic Effects Monitoring program to determine the effects of mining activities from Line Creek Phase II in the LCO Dry Creek, Grace Creek and Unnamed Creek receiving environments. An annual study design for the program must be prepared in consultation with the EMC<sup>2</sup> and submitted to the Director for approval by May 1 each year.".

<sup>&</sup>lt;sup>2</sup> EMC refers to the Environmental Monitoring Committee, which Teck was required to form under Permit 107517. The EMC consists of representatives from Teck, BC Ministry of Environment and Climate Change, the Ministry of Energy and Mines, Environment Canada, the Ktunaxa Nation Council, Interior Health Authority, and an independent scientist. Environment Canada has agreed to provide input on a case-by-case basis when requested by the other members of the EMC but has not yet been called upon to participate. The EMC reviews submissions and provides technical advice to Teck and the ENV Director regarding monitoring programs.



<sup>&</sup>lt;sup>1</sup> The creek is referred to as LCO Dry Creek to distinguish it from another Dry Creek associated with Teck's Elkview Operation (i.e., EVO Dry Creek).





Also, Section 9.5 of Permit 107517 states:

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

Concurrent with the LAEMP, site performance objectives (SPOs), instream flow requirements (IFRs), and environmental flow needs (EFNs) for Dry Creek have been proposed through an updated LCO Dry Creek Mine Water Management Plan (DCWMP) which was submitted to ENV May 2021 (as per the permit requirements) that outlined the water management objectives, strategies, and mitigation options to achieve the SPOs and IFRs (Teck 2021c). The updated DCWMP includes proposed SPOs for selenium, nitrate, sulphate, and cadmium and proposed in-stream flow requirements, which include flushing flows and ramping flows (Teck 2021c). In addition, a limit applicable to quarterly benthic invertebrate tissue selenium concentrations at LC\_DCDS will come into effect on April 1, 2023, and concurrent benthic invertebrate community sampling will be completed (ENV 2023). Although the tissue selenium limit does not come into effect until April 1, 2023 reporting requirements and sampling began in Q2 2022.

The 2022 LAEMP period of study includes all biological and water quality sampling conducted in LCO Dry Creek from January 2022 through December 2022. The sections below describe the setting in more detail and provide further context for the LCO Dry Creek LAEMP report.

#### 1.2 Study Questions

In consideration of Permit 107517 requirements, the conceptual site model (see Minnow 2020b for details), previous LCO Dry Creek LAEMP reports (Minnow 2015, 2016, 2017, 2018b, 2019, 2020a, 2021a), and input from the Environmental Monitoring Committee (EMC), the following overarching study question has been developed:

 Has there been a change in condition since previous monitoring years with respect to mine-related constituents in water quality, benthic invertebrate community endpoints and tissue selenium concentrations, calcite, fish, fish habitat, and/or flow?

Five specific questions were further developed to help answer the above question and guide data evaluation:

- Are aqueous concentrations of mine-related constituents elevated in relation to British Columbia Water Quality Guidelines (BCWQG) and Elk Valley Water Quality Plan (EVWQP) benchmarks, and are concentrations changing over time?
- 2. Is acute or chronic toxicity occurring from water collected at the outlet of the DCWMS (LC\_SPDC) or within Dry Creek (LC\_DCDS), and is toxicity changing over time?



- 3. Are benthic invertebrate community endpoints within normal ranges derived based on samples collected at regional and local reference areas within the Elk River as part of the Regional Aquatic Effects Monitoring Program (RAEMP), and are the endpoints changing over time?
- 4. How do selenium concentrations in benthic invertebrate tissue compare to normal ranges and BCWQG or EVWQP benchmarks, and are they changing over time?
- 5. Are changes in fish and fish habitat (including instream flow and calcite index) occurring within Dry Creek as a result of mine operations?

## 1.3 Dry Creek Water Management System (DCWMS) Operations

As outlined in Section 1.1, surface and shallow groundwater from mine-influenced areas of the upper Dry Creek watershed (at and above area LC\_DC3) have been managed through the DCWMS since 2015 (Figures 1.3 and 1.4). The DCWMS is currently designed to treat total suspended solids (TSS) to meet discharge limits, as outlined in Permit 5353 in Section 1.10. The DCWMS collects and re-directs mine-influenced surface flow from upper Dry Creek through the sedimentation ponds prior to returning to Dry Creek at area LC\_SPDC, directly upstream of area LC\_DCDS. The upstream end of the DCWMS collects flow from upper Dry Creek into the headpond where it is then piped over the East Tributary to a splitter box (Figure 1.4). At the splitter box (or in 2021 and 2022, upstream of the headpond) flocculant is added, as required, to enhance sediment removal and reduce the amount of TSS in the effluent (Teck 2018b, 2019). The splitter box manages flow to the two sedimentation ponds (i.e., parallel ponds) that are referred to as Sedimentation Pond 1 and Sedimentation Pond 2 (Figure 1.4).

Sampling for the LCO Dry Creek LAEMP began in September 2014, prior to initial commissioning of the DCWMS and supporting infrastructure in 2015 (Figure 1.3). Annual monitoring for the Dry Creek LAEMP in 2014 to 2017 focused on two areas downstream of the DCWMS in Dry Creek (LC\_DCDS, LC\_DC1) and upstream and downstream of Dry Creek in the Fording River (LC\_FRUS, and LC\_FRB; Minnow 2015, 2016, 2017, 2018b). In 2018, aqueous concentrations of mine-related constituents in Dry Creek (e.g., nitrate and total selenium), were greater than previously observed (Minnow 2019) and the rate of change was greater than predicted in the LCOII project application (Teck 2011) or in Regional Water Quality Model updates; given this observation, additional monitoring stations were added to help capture the spatial extent in Dry Creek.

Elevated selenium concentrations in benthic invertebrate tissue samples downstream of the DCWMS (i.e., LC\_SPDC and LC\_DCDS; Figure 1.4) were observed in 2018 and early 2019

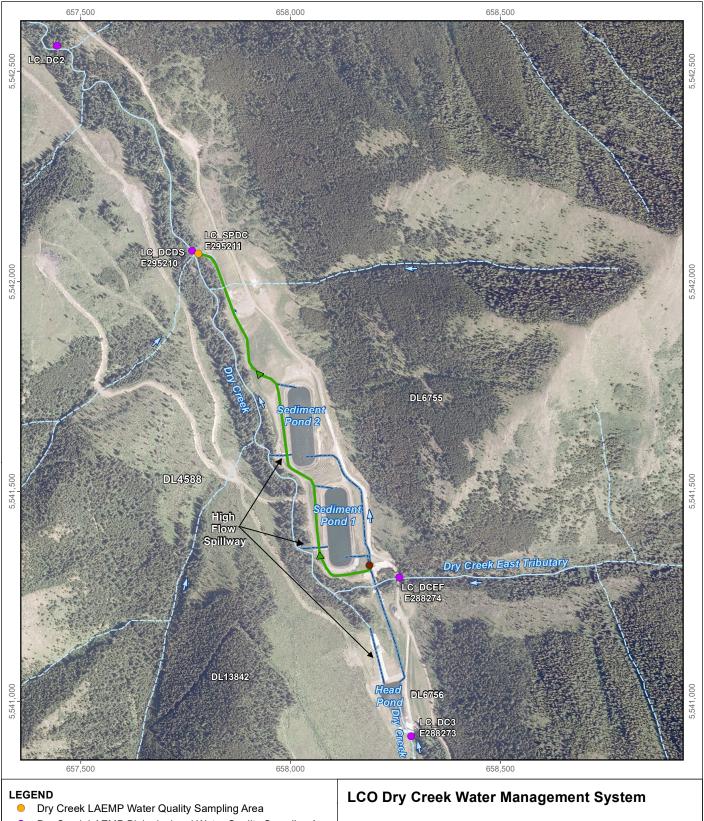
| Dry Creek Water Management System Operational<br>Phase                  |  | 2020 |  |     |   |   |   |   |   |   | 2021 |     |    |    |     |   | 2022 |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     |   |     |
|---|--|------|--|-----|---|---|---|---|---|---|------|-----|----|----|-----|---|------|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|-----|---|-----|
|   |  | F    |  | / A | М | J | J | Α | s | 0 | N    | D . | JI | FI | M A | M | J    | J | Α | s | o | N | D | J | F | М | Α | М | J | J | A S | s c | N | l D |
| Dry Creek Water Management System (DCWMS)<br>Operational (Pond 1 and 2) |  |      |  |     | • | • |   |   |   |   |      |     |    |    |     |   |      |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     |   |     |
| DCWMS Pond Dewatering   |  |      |  |     |   |   |   | • |   |   |      |     |    |    |     |   |      |   |   |   |   |   |   |   |   |   |   |   |   |   |     |     |   |     |
| DCWMS Operational (Pond 1)  |  |      |  |     |   |   |   |   |   |   |      |     |    |    |     | - | •    | • |   |   |   |   |   |   |   |   |   | • | • |   |     |     |   |     |
| DCWMS Bypass Operational  |  |      |  |     |   |   |   |   | • | • | •    | •   |    |    | •   | • |      |   |   | • |   |   | • |   |   |   |   |   |   |   | •   |     |   | •   |

<sup>• =</sup> Sampling associated with the Dry Creek LAEMP. Collection of Benthic Invertebrate Community and Tissue Samples as well as water quality samples.

Figure 1.3: Overview of LAEMP and Supplemental Sampling Events in Relation to Operational Phases of the Dry Creek Water Management System Operation, 2020 to 2022

Note: Shading represents changes in DCWMS operational phases

<sup>=</sup> Supplemental Collection of Benthic Invertebrate Tissue and Periphyton Community.



- Dry Creek LAEMP Biological and Water Quality Sampling Area
- Splitter Box
- DCWMS Bypass
- Water Management Structure Piping
- Watercourse
- Intermittent Watercourse

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Date: April 2023 Project: 227202.0019



Figure 1.4

(Minnow 2019, 2020a). In response to these results, a detailed investigation was undertaken in 2019 (particularly during growing season) to better understand the processes and location of organoselenium species generation in Dry Creek thought to be resulting in the enhanced selenium bioaccumulation in benthic invertebrates (Lorax 2020). The investigation concluded that the higher-than-expected concentrations of aqueous and tissue selenium downstream of the DCWMS were occurring due to algal bioaccumulation and reduction of selenium in the sedimentation ponds from selenate to more bioavailable selenite and organoselenium during the growing season (Lorax 2020, Minnow 2020a). As outlined in the LCO Mine Water Management Plan, the operation of the DCWMS was modified (starting in 2020) to bypass the sedimentation ponds seasonally, only filling them during higher-flow periods (e.g., freshet; Figures 1.3 and 1.4; Teck 2020c). The DCWMS bypass diverts water from the DCWMS headpond directly to LC SPDC3, therefore it is active only when the sedimentation ponds are not operational. The ponds are dewatered into Dry Creek at LC SPDC (Figure 1.4). In 2022, DCWMS operation was similar to 2021, the bypass was operational through most of the year (except May to July) and only pond 1 was used rather than both ponds 1 and 2 (which were both used in 2020; Table 1.1).

#### 1.4 Linkage to the Adaptive Management Plan

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

<sup>&</sup>lt;sup>3</sup> Prior to October 2020, effluent discharge (i.e., combined mine-impacted water from the two sedimentation ponds) was released into a man-made sedimentation pond discharge channel with artificial boulder substrate area prior to entering lower Dry Creek (i.e., LC\_SPDC; Figure 1.4). This area was permanently modified in October of 2020 with removal of the pool immediately upstream LC\_SPDC as well as the discharge channel itself, and replacement with a culvert pipe conveying water from the sedimentation ponds into Dry Creek upstream of LC\_DCDS (Minnow 2021a). The spillway downstream of the DCWMS (LC\_SPDC) was removed and replaced with a pipe to mitigate potential dietary uptake of benthic invertebrates by WCT (Teck 2021c).



Table 1.1: Dry Creek Water Management System Operational Phases, 2020 to 2022

| Operational Phase                        | Start Date | End Date  |
|--|------------|-----------|
| DCWMS Pond 1 & 2 Operational             | 15-Jul-15  | 15-Jul-20 |
| Bypass Operational                       | 16-Jul-20  | 3-Aug-20  |
| Dewatering Pond 1 & 2/Bypass Operational | 4-Aug-20   | 4-Sep-20  |
| Bypass Operational                       | 5-Sep-20   | 4-May-21  |
| Bypass Operational/Pond 1 Refilling      | 5-May-21   | 18-May-21 |
| DCWMS Pond 1 Operational                 | 18-May-21  | 12-Jul-21 |
| Bypass Operational                       | 13-Jul-21  | 26-Jul-21 |
| Dewatering Pond 1/Bypass Operational     | 27-Jul-21  | 13-Aug-21 |
| Bypass Operational                       | 14-Aug-21  | 1-May-22  |
| Bypass Operational/Pond 1 Refilling      | 2-May-22   | 12-May-22 |
| DCWMS Pond 1 Operational                 | 13-May-22  | 13-Jul-22 |
| Bypass Operational                       | 14-Jul-22  | 17-Jul-22 |
| Dewatering Pond 1/Bypass Operational     | 18-Jul-22  | 26-Jul-22 |
| Bypass Operational                       | 27-Jul-22  | 31-Dec-22 |

The LCO Dry Creek LAEMP was designed to monitor aquatic conditions in Dry Creek, Grace Creek, and Unnamed Creek receiving environment and to answer specific questions on an annual basis (Section 1.2). Each annual LAEMP cycle (results are reported on April 30 of each year for the preceding calendar year) are also used for tracking issues for which a potential need for an adjustment, using the response framework, has been identified, including biological trigger assessments. Biological triggers are intended as a simple and consistent way to flag potential unexpected monitoring results that may require additional investigation and adjustment. In the current report, percent EPT (Ephemeroptera [mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]) and composite-taxa benthic invertebrate tissue selenium concentrations in 2022 were assessed against their respective biological triggers (additional information and methods pertaining to this analysis can be found in Appendix H).

As an example of adaptive management in Dry Creek, benthic invertebrate tissue selenium elevated concentrations were and concentrations of mine-related constituents (primarily selenium, nitrate, and sulphate) were increasing more quickly than expected in 2018 downstream of sedimentation ponds. The benthic invertebrate tissue selenium concentrations were not consistent with what would be expected based on the water quality concentrations (Teck 2020a). These results led to additional monitoring, as a potential need for a response was identified via the AMP response framework. Actions associated with the AMP response to elevated benthic invertebrate tissue selenium concentrations in 2019 focused on investigations of temporal duration, spatial extent, and magnitude, all of which are outlined in detail in the 2019 Annual AMP report (Teck 2020d). The investigation of cause identified blasting residue on waste rock as the source of selenium, nitrate, and sulphate in Dry Creek and conditions in the DCWMS sedimentation ponds as a contributing factor to enhanced selenium bioaccumulation downstream of the DCWMS (Teck 2021a). Adjustments implemented as part of the AMP response framework (Stage 6: Adjust) included the addition of more monitoring areas and sampling events to increase the understanding of spatial resolution and seasonality of conditions, replacement of area LC SPDC and the pool upstream of LC SPDC with a discharge pipe (Minnow 2021a), and implementation of the DCWMS bypass in 2020. Additionally, the LCO nitrate compliance action plan is under development alongside an updated LCO DCWMP, and the DCWMP outlines a proposed Site Performance Objectives (SPO) for Nitrate (Teck 2021b).

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

Results from this report will also be used to determine whether a biological trigger has been reached. Reaching a trigger may lead to an adjustment (Stage 6: Adjust) using the response framework. This is the main report for conveying biological trigger results for LCO Dry under the AMP (Section 8). Implementation of management actions is not constrained to the AMP or LAEMP annual reporting cycles but may be (and have been) triggered at any time during the monitoring and reporting cycle.

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

Aquatic health monitoring results relevant to MQ 5 and KU 5.1 are discussed in Sections 3 to 7. Please refer to the 2021 AMP Update (Teck 2021a) for more information on the adaptive management framework, including Management Questions, key uncertainties, continuous improvement; linkages between the AMP and other EVWQP programs; and AMP reporting. Progress on gaining new knowledge and reducing KUs is described in annual AMP reports (submitted July 31) and evaluating the answers to MQs are reported in MQ evaluation reports (various submission dates).

# 2 METHODS

#### 2.1 Overview

The general approach for the LCO Dry Creek LAEMP includes analysis and interpretation of data in relation to the each of the study questions. This report includes data collected up to the end of 2022 calendar year for all study parameters. Historical data are also presented where appropriate.

Water quality and/or biological samples were collected from established monitoring areas in Dry Creek, the Dry Creek East Tributary, Grace Creek, Unnamed Creek, and the Fording River<sup>4</sup> (Table 2.1, Figure 2.1). Monitoring areas sampled in 2022 included mine-exposed areas upstream and downstream of the DCWMS in Dry Creek, upstream and downstream of Dry Creek in the upper Fording River, Grace Creek, and reference areas (Dry Creek East Tributary, Unnamed Creek). It should be noted that water from the east tributary to Dry Creek (LC\_DCEF) enters Dry Creek channel either upstream of LC\_DCDS as surface water input (approximately 20% of LC\_DCEF flow) or enters Dry Creek further downstream as groundwater input (upstream of LC\_DC4; approximately 80% of LC\_DCEF flow; Golder 2019b). Results from the flow accretion study are used to help interpret water quality and aquatic health results in the Dry Creek LAEMP.

Collection of benthic invertebrate tissue and community samples continued at LC\_GRCK in 2022, as the aqueous selenium concentration threshold required for biological monitoring at that area (50% of samples in a given year >2  $\mu$ g/L) was met in 2021 (62%; Minnow 2021a). The same threshold applies to LC\_UC; however, it was not met in 2021 (Minnow 2021a) so biological sampling was not conducted at LC\_UC in 2022.

Water quality monitoring and acute and chronic toxicity testing results presented in this report represent requirements specified under Permit 107517 (ENV 2013 and 2021, respectively; Table 2.2). Biological sampling in 2022 was completed in accordance with the 2022 LCO Dry Creek LAEMP study design (Minnow 2022b).

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

<sup>&</sup>lt;sup>4</sup> Areas DC1, DCDS, FRB and FRUS have been sampled since 2014. Areas LC\_DC3, LC\_DCEF, LC\_DC2, and LC\_DC4 were not sampled for the LCO Dry Creek LAEMP prior to December 2018. Biological sampling was not conducted at area LC\_SPDC prior to December 2018.

Table 2.1: Monitoring Areas Associated with LCO Dry Creek LAEMP, 2022

|                  |              | Sampling Location    |                          |   |  |         |                 |  |  |  |  |  |  |  |
|------------------|--------------|----------------------|--------------------------|---|--|---------|-----------------|--|--|--|--|--|--|--|
| Area             | Area Type    | Teck<br>Location     | Biological Sampling Area | Environmental<br>Monitoring<br>Station Number | Location Description   | _       | TM<br>Zone 11U) |  |  |  |  |  |  |  |
|                  |              | Code                 | (Alternative Names)      | (EMS #)                                       |  | Easting | Northing        |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_DC3               | -                        | E288273                                       | Dry Creek upstream of Headpond                                       | 658294  | 5540918         |  |  |  |  |  |  |  |
|                  | Reference    | LC_DCEF              | -                        | E288274                                       | East Tributary near confluence with Dry Creek                        | 658260  | 5541295         |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_SPDC <sup>a</sup> | -                        | E295211                                       | Dry Creek sediment ponds outlet; effluent to Dry Creek               | 657821  | 5542042         |  |  |  |  |  |  |  |
| Dry<br>Creek     | Mine-exposed | LC_DCDS              | -                        | E295210                                       | Dry Creek downstream of sediment ponds outlet                        | 657766  | 5542073         |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_DC2               | -                        | -   | Dry Creek approximately 0.6 km downstream from sediment ponds outlet | 657445  | 5542561         |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_DC4               | -                        | -   | Dry Creek 1.6 km downstream from the sediment ponds outlet           | 657172  | 5543327         |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_DC1               | LC_DC1<br>(DRCK)         | E288270                                       | Dry Creek upstream of Fording Mine Road                              | 656519  | 5544658         |  |  |  |  |  |  |  |
|                  | Mine-exposed | FR_FR5 <sup>b</sup>  | -                        | -   | Fording River upstream of Dry Creek and Ewin Creek, and downstream   | 657173  | 5548723         |  |  |  |  |  |  |  |
| Fording<br>River | Mine-exposed | _b                   | LC_FRUS<br>(FO28)        | E295232                                       | of Chauncey Creek  | 656307  | 5545255         |  |  |  |  |  |  |  |
|                  | Mine-exposed | LC_FRB               | LC_FRB<br>(FO29)         | -   | Fording River downstream of Dry Creek                                | 655275  | 5543711         |  |  |  |  |  |  |  |
| Unnamed<br>Creek | Reference    | LC_UC°               | -                        | E295213                                       | Unnamed Creek  | 655351  | 5543087         |  |  |  |  |  |  |  |
| Grace<br>Creek   | Mine-exposed | LC_GRCK              | -                        | E288275                                       | Grace Creek upstream of the CP rail tracks                           | 654303  | 5540755         |  |  |  |  |  |  |  |

Historical Sampling Areas for LCO Dry Creek LAEMP (Minnow 2019).

Note: "-" indicates no data available.

<sup>&</sup>lt;sup>a</sup> LC\_SPDC was discontinued as a biological sampling location when the DCWMS pipe was extended in 2020. 2021 samples were collected for antiscalant addition system monitoring.

<sup>&</sup>lt;sup>b</sup> The requirement to sample water at LC\_FRUS was removed from Permit 106970 in late summer of 2015. FR\_FR5 has been included as an alternative station. FR\_FR5 is not a permitted water monitoring station, therefore, sampling location and frequency may change.

<sup>&</sup>lt;sup>c</sup> Unnamed Creek is currently not included as a biological sampling area as it did not trigger the mine effect level necessitating additional monitoring in 2022 (Minnow 2022).

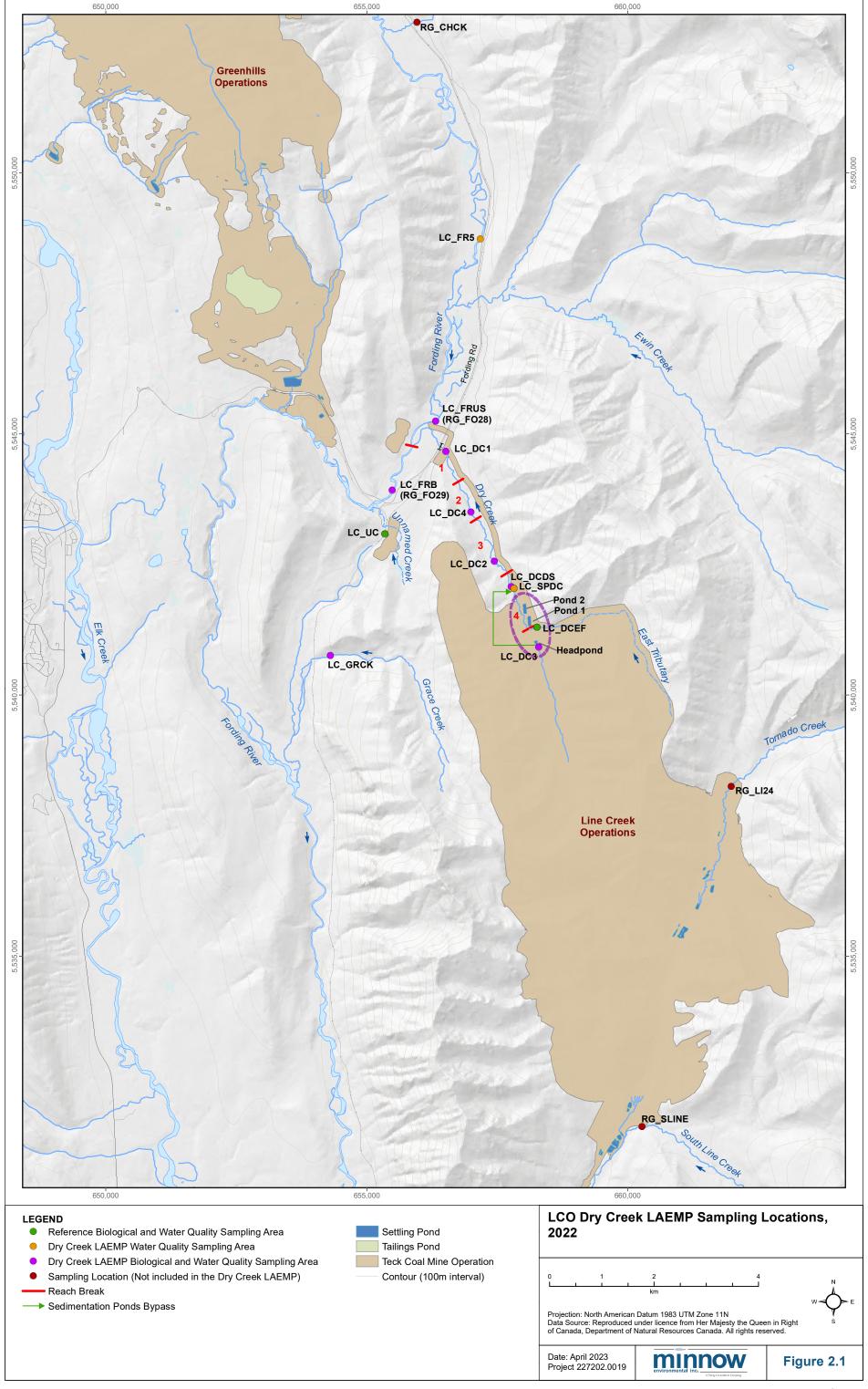


Table 2.2: Summary of Water Quality Monitoring for Permit 107517

|                  |              |                           |                   |  | U         | ТМ        |                         | Water Quality                               | Samples                             |       |                     |
|------------------|--------------|---------------------------|-------------------|--|-----------|-----------|-------------------------|---|-------------------------------------|-------|---------------------|
| Area             | Area Type    | Teck Water Station Code   | EMS               | Location Description   | (NAD83, 2 | Zone 11U) | Field                   | All Other Parameters                        | Selenium                            | Tox   | cicity <sup>d</sup> |
| 700              | 700 1360     | (Biological Station Code) | Number            | 2000.011 200011ption   | Easting   | Northing  | Parameters <sup>a</sup> | Required Under Mine<br>Permits <sup>b</sup> | Speciation<br>Sampling <sup>c</sup> | Acute | Chronic             |
|                  | Mine-exposed | LC_DC3                    | E288273           | Dry Creek upstream of<br>Headpond  | 658294    | 5540918   | BP-W/M                  | BP-W/M                                      | BP-W/M                              | -     | -                   |
|                  | Reference    | LC_DCEF                   |                   | Dry Creek East Tributary near confluence with Dry Creek                                    | 658260    | 5541295   | М                       | М   | -                                   | -     | -                   |
|                  | Mine-exposed | LC_SPDC <sup>e</sup>      | I - 705711        | Dry Creek sediment ponds outlet; effluent to Dry Creek                                     | 657821    | 5542042   | М                       | М   | -                                   | Q     | -                   |
| Dry<br>Creek     | Mine-exposed | LC_DCDS                   |                   | Dry Creek downstream of sediment ponds outlet  | 657766    | 5542073   | BP-W/M                  | BP-W/M                                      | BP-W/M                              | -     | Q/SA <sup>f</sup>   |
|                  | Mine-exposed | LC_DC2                    |                   | Dry Creek approximately 0.6 km downstream from sediment ponds outlet                       | 657445    | 5542561   | -                       | -   | Q                                   | -     | -                   |
|                  | Mine-exposed | LC_DC4                    | _                 | Dry Creek 1.6 km downstream from the sediment ponds outlet                                 | 657172    | 5543327   | -                       | -   | Q                                   | -     | -                   |
|                  | Mine-exposed | LC_DC1<br>(DRCK)          |                   | Dry Creek upstream of Fording<br>Mine Road   | 656519    | 5544658   | W/M                     | W/M   | -                                   | -     | -                   |
| Fording<br>River | Mine-exposed | LC_FRUS <sup>9</sup>      |                   | Fording River upstream of Dry<br>Creek and Ewin Creek, and<br>downstream of Chauncey Creek | 656307    | 5545255   | М                       | М   | -                                   | -     | -                   |
| Rivei            | Mine-exposed | LC_FRB<br>(FO29)          | ı                 | Fording River downstream of Dry<br>Creek   | 655275    | 5543711   | М                       | М   | ı                                   | 1     | -                   |
| Unnamed<br>Creek | Reference    | LC_UC <sup>h</sup>        | E295213           | Unnamed Creek  | 655351    | 5543087   | М                       | М   | -                                   | 1     | -                   |
| Grace<br>Creek   | Mine-exposed | LC_GRCK                   | 1 <b>-</b> 7887/5 | Grace Creek upstream of the CP rail tracks   | 654303    | 5540755   | М                       | М   | -                                   | -     | -                   |

Notes: "-" indicates no data available; BP-W/M = Weekly frequency March 15 to at least August 31 during bypass of the LCO Dry Creek Water Management System, monthly during the rest of the year; W/M = weekly from March 15 to July 15, monthly for the remainder of the year; M = monthly; SA = semi-annually; Q = quarterly.

<sup>&</sup>lt;sup>a</sup> Dissolved oxygen, water temperature, specific conductance, conductivity, and pH (see Table A.1).

<sup>&</sup>lt;sup>b</sup> Parameters consistent with Permit 107517 (see Table A.1 for details).

<sup>&</sup>lt;sup>c</sup> Samples for selenium speciation analysis collected in April, June, September, and December within a week of biological sampling.

<sup>&</sup>lt;sup>d</sup> Acute toxicity testing as per permit 107517 requirement. Chronic toxicity testing as per permit 107517 requirement.

<sup>&</sup>lt;sup>e</sup> LC SPDC was discontinued as a biological sampling location when the DCWMS pipe was extended in 2020. Sampled as part of antiscalant addition system monitoring.

f Quarterly chronic toxicity tests: Ceriodaphnia dubia and algae. Semi-annual tests: fathead minnow (Q1 & Q3), rainbow trout (Q2 & Q4), and Hyalella azteca (Q2 & Q4).

<sup>&</sup>lt;sup>9</sup> The requirement to sample water at LC\_FRUS was removed from Permit 106970 in late summer of 2015. FR\_FR5 has been included as an alternative station. FR\_FR5 is not a permitted water monitoring station, therefore, sampling location and frequency may change.

h Unnamed Creek is currently not included as a biological sampling area as it has not triggered the mine effect level necessitating additional monitoring (Minnow 2020b).

### 2.2 Study Question 1: Water Quality

### 2.2.1 Routine Water Quality

Water quality data assessed as part of the LCO Dry Creek LAEMP included data collected for routine monitoring managed by Teck, as well as data collected concurrently with benthic invertebrate sampling at unpermitted biological monitoring areas (Tables 2.1, 2.2).

#### 2.2.2 Laboratory and Data Analysis

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

Studies conducted to progressively reduce uncertainty in benchmarks have included additional chronic toxicity studies of nitrate, sulphate, cadmium, and selenium individually and in mixtures, annual evaluation of water quality under the regional chronic toxicity monitoring program, updates to selenium bioaccumulation models in 2017 and 2022, development of new tools to predict bioaccumulation in relation to selenium speciation, and most recently an extensive program of validation and updates to the science-based benchmarks under Teck's Adaptive Management Plan (AMP). This program was undertaken to answer Management Question (MQ) 2 under the AMP: Will the aquatic ecosystem be protected by meeting the long-term site performance objectives? and associated key uncertainty 2.1: How will the science based benchmarks be validated and updated? The MQ2 program was developed with input from the Elk Valley Environmental Monitoring Committee (EMC) and results have been shared with the EMC on an ongoing basis since the program began.

A key outcome of the MQ2 program was the development of an updated compilation of chronic toxicity information for nitrate, sulphate, and selenium, including information available at the time of the EVWQP and studies conducted after the EVWQP. For nitrate and sulphate, the updated compilation represented a substantial increase in available toxicity information for key test species. This updated compilation was used to validate the EVWQP benchmarks and,

where warranted, to derive updated effects concentrations that incorporate this new information (WSP Golder 2022). As in the EVWQP, the objective was to derive scientific best estimates of concentrations associated with no effects or defined levels of potential chronic, sublethal effect to sensitive species and life stages relevant to the Elk Valley. The analysis in WSP (2022) concluded that the updated effects concentrations for nitrate and sulphate are supported by a larger dataset covering a wider range of conditions than was available at the time of the EVWQP, and thereby provide an improved basis for evaluating potential effects of these constituents.

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

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

Water quality data were downloaded from Teck's EQuIS database and included both routine monitoring results collected by Teck and samples collected concurrently with biological sampling. Analyses of water quality data were completed using the following approaches (see Appendix A.1 for detailed methodology):

- Tabular and graphical comparison to applicable benchmarks<sup>5</sup>, concentration effects limits,
   SPOs, and BCWQGs;
- Principal Component Analysis (PCA) to condense water quality results for use in benthic invertebrate community correlation analysis;
- Evaluation of temporal trends in monthly mean water quality concentrations using two tests:
  - o Non-parametric seasonal Kendall test;
  - Two-way censored regression Analysis of Variance (2-way ANOVA);

Following the completion of the statistical analyses (Appendix A1.4), the following four criteria were applied to the water quality results to focus data interpretation for the present report. Those water quality constituents that met each of criteria 1 to 3 listed below and those that met criteria 4 (either independently of or in addition to meeting criteria 1 to 3 below) were selected

<sup>&</sup>lt;sup>5</sup> In 2022, potential risks to aquatic life associated with selenium were assessed by evaluation of tissue selenium results in biota as compared to primarily using EVWQP benchmarks for aqueous selenium.



as the focus for data interpretation. The four criteria applied to the water quality results are as follows:

**Criteria 1:** Constituents had concentrations that were above applicable BCWQGs and/or exceeded site-specific effect benchmarks in the majority (> 50%) of samples in a year at the majority ( $\geq$  50%) of the mine-exposed areas on Dry Creek in 2022 (i.e.,  $\geq$  3 areas);

**Criteria 2:** Seasonal Kendall trend analysis indicated significant increases in concentration with a trend slope (average percentage change in concentration per year) > 50% at the majority (≥ 50%) of the mine-exposed areas on Dry Creek in 2022 (i.e., ≥ 3 areas);

**Criteria 3:** 2-way ANOVA analysis indicated concentrations increased >100% between the first year of sampling and 2022 and were significantly higher in 2022 than 2021 at the majority ( $\geq$  50%) of the mine-exposed areas on Dry Creek in 2022 (i.e.,  $\geq$  3 areas);

**Criteria 4:** Constituents that have existing SPOs for Dry Creek (total selenium and total cadmium) and/or have previously been identified by Structured Decision Making (SDM) and/or AMP response frameworks on Dry Creek (total selenium, nitrate, sulphate, and non-selenate selenium species).

#### 2.3 Study Question 2: Acute and Chronic Toxicity

Permit 107517 requires that water samples be collected quarterly at LC\_SPDC by LCO operations for acute toxicity testing<sup>6</sup>, however, following a multiple toad mortality event in October of 2022 (RAPP #22-039122) acute toxicity testing was also completed at LC\_DC3 and LC\_DCDS weekly through October. The acute toxicity tests were conducted at LC\_SPDC, LC\_DC3, and LC\_DCDS using *Oncorhynchus mykiss* and *Daphnia* spp. (see Appendix A2 for detailed methods).

Chronic toxicity tests were also completed on water samples collected quarterly and semi-annually in 2022 at area LC\_DCDS (Table 2.2; Figures 1.4 and 2.1) as per the Permit 107517 Chronic Toxicity Program integration amendment (March 4, 2019). The quarterly and semi-annual tests were conducted using *Pseudokirchneriella subcapitata, Ceriodaphnia dubia, Hyalella azteca, Oncorhynchus mykiss,* and *Pimephales promelas* (detailed methodology can be found in Appendix A3). Water quality samples were collected during toxicity testing to

<sup>&</sup>lt;sup>6</sup> Additional testing occurred in May and June 2022 when flocculant blocks are added to Dry Creek.



support evaluation of toxicity results (see Appendix A3 for detailed methods). See Teck 2023 and WSP 2023 for details on acute and chronic toxicity testing, respectively.

## 2.4 Study Questions 3 and 4: Benthic Invertebrates

#### 2.4.1 Overview

In 2022, biological sampling (i.e., benthic invertebrate community and tissue chemistry) and calcite assessment for the LCO Dry Creek LAEMP met the requirements outlined in the 2022 LCO Dry Creek LAEMP study design (Tables 2.3 and 2.4; Minnow 2022b).

### 2.4.2 Study Question 3: Benthic Invertebrate Community

Triplicate benthic invertebrate community samples were collected in September except LC\_DCDS (n= 5). Benthic invertebrate community was also collected from LC\_DCDS in May (n=5) and November (n=2) to comply with the benthic tissue permit limit (ENV 2023; see Section 1.1); however, ice conditions precluded sampling at all three of the five riffles in November. Replicates were collected from three (or five) stations within each sampling area either in separate riffles or in riffle sections a minimum of 50 m apart, where habitat allowed, and sampling could be completed safely. Effort was made to target similar habitats for collection of both benthic invertebrate community and tissue samples within each sampling area. Benthic invertebrate community samples were collected according to the Canadian Aquatic Biomonitoring Network (CABIN) protocol (detailed methodology can be found in Appendix A5.2.1; Environment Canada 2012).

#### 2.4.2.1 Laboratory and Data Analysis

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland, BC, for sorting and taxonomic identification. Total organism abundance was reported for every distinct taxon identified in each sample (see Appendix A5.2.2 for detailed methodology, see Appendix K for raw data).

Benthic invertebrate community condition was evaluated based on total abundance, taxonomic richness (to the lowest practicable level of taxonomy), and the abundances and proportional abundances (%) of major taxonomic groups. Analyses of benthic invertebrate community data were completed using the following approaches (see Appendix A5.2.4 for detailed methodology):

Table 2.3: Benthic Invertebrate Community Sampling for Dry Creek LAEMP, 2022

| Are          | ea      | Мау     | June | September | November |
|--------------|---------|---------|------|-----------|----------|
| Mine-exposed | LC_DC3  | -       | -    | n=3 (√)   | -        |
| Reference    | LC_DCEF | -       | -    | n=3 (√)   | -        |
|              | LC_DCDS | n=5 (√) | -    | n=5 (√)   | n=2      |
|              | LC_DC2  | -       | -    | n=3 (√)   | -        |
|              | LC_DC4  | -       | -    | n=3 (√)   | -        |
| Mine-exposed | LC_DC1  | -       | -    | n=3 (√)   | -        |
|              | LC_FRUS | -       | -    | n=3 (√)   | -        |
|              | LC_FRB  | -       | -    | n=3 (√)   | -        |
|              | LC_GRCK | -       | -    | n=3 (√)   | -        |

Notes: "-" Indicates area was not sampled. " $\sqrt{}$ " = target sample size was met. Target sample sizes were not met at LC\_DCDS in November due to ice conditions.

- Graphical comparison of data relative to regional<sup>7</sup> and site-specific normal ranges<sup>8</sup>;
- Evaluation of temporal changes in endpoints from mine-exposed areas relative to reference, and in the Fording River downstream relative to upstream of Dry Creek, using a two-way ANOVA;
- Assessment of relationship between benthic invertebrate community structure and physical and chemical parameters using non-parametric (Spearman Rank) correlations.

Benthic invertebrate community data collected in September were the focus of data analyses and interpretation. See Appendix A4.2.4 for additional rationale.

#### 2.4.3 Study Question 4: Benthic Invertebrate Tissue Selenium

Benthic invertebrate tissue chemistry sampling was completed in accordance with the 2022 LCO Dry Creek LAEMP study design (Table 2.4; Minnow 2022b).

Samples were collected using the kick and sweep method described in Appendix A4.2.1, except collections were not timed, and kicking continued only until sufficient organisms were collected. All sampling events included collection of a composite sample of a variety of benthic invertebrate taxa (composite-taxa samples; see Appendix A5.3.1 for detailed methodology).

## 2.4.3.1 Laboratory and Data Analysis

Frozen samples were shipped by courier to TrichAnalytics Inc. in Saanichton, BC. Analyses of composite-taxa benthic invertebrate tissue selenium data were completed using the following approaches (see Appendix A5.3.3 for detailed methodology):

- Graphical comparison of tissue selenium concentrations relative to applicable benchmarks and the regional normal range;
- Comparison of observed tissue selenium concentrations to those predicted using a selenium bioaccumulation tool;
- Evaluation of changes in tissue selenium concentrations among sampling events in 2022 at mine-exposed areas relative to reference, and in the Fording River downstream relative to upstream of Dry Creek, using a two-way ANOVA;

<sup>&</sup>lt;sup>8</sup> Site-specific normal ranges represent the 2.5<sup>th</sup> and 97.5 percentile for a given area as determined by habitat predictors for a given site in relation to the complete set of Elk Valley monitoring areas. The site-specific normal ranges were estimated using regression modelling as presented in the RAEMP (Minnow 2020c).



<sup>&</sup>lt;sup>7</sup> The reference normal range as presented in the RAEMP represents the 2.5<sup>th</sup> and 75<sup>th</sup> percentiles of the distribution of reference area data (pooled 2012 to 2019 data) reported in the 2017 to 2019 RAEMP report (Minnow 2020c).

**Table 2.4:** Benthic Invertebrate Composite-Taxa Tissue Sampling for Dry Creek LAEMP, 2022

| Are          | ea      | Мау     | June    | September | November |
|--------------|---------|---------|---------|-----------|----------|
| Mine-exposed | LC_DC3  | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |
| Reference    | LC_DCEF | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |
|              | LC_DCDS | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |
|              | LC_DC2  | n=5 (√) | n=5 (√) | n=5 (√)   | -        |
|              | LC_DC4  | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |
| Mine-exposed | LC_DC1  | n=5 (√) | n=5 (√) | n=5 (√)   | -        |
|              | LC_FRUS | n=5 (√) | -       | n=5 (√)   | n=5 (√)  |
|              | LC_FRB  | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |
|              | LC_GRCK | n=5 (√) | n=5 (√) | n=5 (√)   | n=5 (√)  |

Notes: "-" = area was not sampled. " $\sqrt{}$ " = target sample size was met. Samples were not collected from LC\_FRUS in June due to high water. Samples were not collected from LC\_DC2 and LC\_DC1 in November due to ice conditions.

### 2.5 Study Question 5: Fish and Fish Habitat

Annual fish sampling and redd surveys have been conducted in LCO Dry Creek since 2013 and 2015, respectively, to support different monitoring programs. There was minimal fish sampling completed in 2020 and in 2021 to limit stress on WCT populations related to sampling activities. The decision to limit fish handling was based on feedback from the Elk Valley Fish and Fish Habitat Committee (EVFFHC) and it was implemented as a proactive response to an observed decline in the WCT population of the UFR in 2019 (Cope 2020). The sampling and data analysis methods and results for 2022 are summarized from the LCO Dry Creek 2022 Population Monitoring Report (WSP & Poisson 2023).

### 2.5.1 Physical Habitat, Temperature, Flow, Calcite, and Dissolved Oxygen

#### 2.5.1.1 Water Temperature

The Dry Creek water temperature monitoring program began in 2016 at six locations in Dry Creek and one location in the East Tributary of Dry Creek (DRY-WQ01 to 07; Table 2.5). Two additional monitoring locations (LC\_DRY\_US\_TRB5 and LC\_DRY\_DS\_TRB5) were added in Tributary 5 of Dry Creek in 2022. The temperature sensors at DRY-WQ06 in the old Sedimentation Pond outlet were decommissioned October 5, 2020, and replaced by DRY-WQ07 in the new Sedimentation Pond outlet stream on June 21, 2021. The stations were last downloaded October 25, 2022 except for DRY-WQ04, which ended on August 4, 2022 as a result of data loss caused by data loggers reaching capacity early (Table 2.5). Metrics used to characterize water temperature regime and their processing methods are provided in Table 2.6. Three metrics were used to represent water temperature in Dry Creek: daily mean temperature, mean weekly maximum temperature (MWMxT), and growing season (season length in days and intensity in degree days [growing season degree days], GSDD).

During data collection and analysis steps are taken to ensure high quality data. Two temperature loggers were installed at each monitoring location for duplication and quality assurance (QA). The sensors were installed, to the extent feasible, to avoid freezing, burial under sediment, and dewatering. Loggers were downloaded several times per year to minimize data loss, and the two downloaded time series were reviewed and averaged to generate a single time series for each location. The averaged water temperature data series then underwent further processing and QA by trained staff and senior biologists to identify and remove periods where the water temperature data may not be representative of the stream (e.g., if a dewatered logger is measuring air temperature). Data gaps of less than one-hour duration were infilled using linear interpolation where possible. When the QA process was completed, the data were analyzed to generate the relevant summary metrics provided in (Table 2.6).



Table 2.5: Summary of Water Temperature Monitoring Stations in Dry Creek

| Waterbody                   | Site Name             | Site Description <sup>1</sup>                       |         | oordinates<br>U, NAD83) | Elevation<br>(masl) <sup>1</sup> | Start of<br>Record | End of<br>Record | Number of<br>Days with | Gaps in<br>Record |
|-----------------------------|-----------------------|---|---------|-------------------------|----------------------------------|--------------------|------------------|------------------------|-------------------|
|                             |                       |   | Easting | Northing                | - ` ′                            |                    |                  | Valid Data             | (%)               |
| Dry Creek<br>East Tributary | DRY-WQ03              | ~20 m upstream of East tributary bridge             | 658,269 | 5,541,290               | 1,701                            | 06-Jun-2016        | 25-Oct-2022      | 2,331                  | 0                 |
| Dry Creek                   | DRY-WQ04              | ~50m upstream from the East tributary<br>confluence | 658,132 | 5,541,240               | 1,690                            | 06-Jun-2016        | 04-Aug-2022      | 2,250                  | 0                 |
|                             | DRY-WQ02              | ~80m downstream of East tributary                   | 658,069 | 5,541,281               | 1,686                            | 06-Jun-2016        | 25-Oct-2022      | 2,309                  | 1                 |
|                             | DRY-WQ06 <sup>†</sup> | Settling pond outlet channel                        | 657,808 | 5,542,061               | 1,642                            | 07-Oct-2016        | 07-Oct-2020      | 1,489                  | 0                 |
|                             | DRY-WQ07              | Settling pond outlet channel                        | 657,808 | 5,542,061               | 1,642                            | 25-Jun-2021        | 25-Oct-2022      | 486                    | 10                |
|                             | DRY-WQ05 <sup>†</sup> | Downstream of settling pond                         | 657,749 | 5,542,082               | 1,642                            | 07-Sep-2016        | 25-Oct-2022      | 2,009                  | 10                |
|                             | DRY-WQ01              | ~100m upstream of Dry/Fording River<br>confluence   | 655,972 | 5,544,842               | 1,515                            | 06-Jun-2016        | 24-Oct-2022      | 2,330                  | 0                 |
| Dry Creek<br>Trib 5         | LC_DRY_US_TRB5        |   | 657,423 | 5,542,555               | 1,617                            | 18-May-2022        | 25-Oct-2022      | 130                    | 18                |
|                             | LC_DRY_DS_TRB5        |   | 657,433 | 5,542,595               | 1,616                            | 18-May-2022        | 25-Oct-2022      | 159                    | 0                 |

Estimated using Google Earth; masl = metres above sea level

**Table 2.6:** Summary of Water Temperature Metrics, Calculation Methods and Treatment of Data Gaps

| Parameter                          | Description   | Method of Calculation   | Treatment of Data Gaps  |
|------------------------------------|---|---|---|
| Daily average water<br>temperature | Mean temperature on each day  | Average of all data points (15 minute intervals) in a 24-hour period.   | Days with <21 hours data excluded.  |
| MWT                                | Mean Weekly Temperature<br>(Maximum and Minimum)  | A centered 7-day moving-average is applied to the series of daily-maximum water temperatures (see description of daily maximum); e.g., if MWMxT = 15°C on August 1, this is the average of the daily-maximum water temperatures for the 7 days from July 29 to August 4. The same procedure is used for daily-minimum water temperature (MWMinT). MWTs are compared to activity period optima (e.g., spawning, incubation, summer rearing) for species and life stages. | hourly measurement between 11:00 and 18:00 are excluded. Moving average is calculated over period with data. Activity periods with <50% data coverage are not reported. |
| Growing season degree days (GSDD)  | The beginning of the growing season is defined as the date MWT exceeds and remains above 5°C; the end of the growing season is defined as the date MWT drops below 4°C (Coleman and Fausch 2007). | A degree day is the average temperature during a day; GSDD is calculated by taking the sum of daily average water temperatures over the growing season (i.e., from the first day of the first week when weekly average temperatures reach and remain above 5°C until the last day of the first week when weekly average temperature drop below 4°C).  |   |

<sup>&</sup>lt;sup>2</sup> FRD-WQ03 data contain a gap from September 3 to October 23, 2021 because the sensor was dewatered

Results are compared to BC Water Quality Guidelines (WQG) for the protection of aquatic life (Oliver and Fidler 2001) or other reference points for reporting (i.e., Coleman and Fausch 2007). To assess suitability compared to WCT life activity stages, MWMxT is compared to the optimum temperature ranges provided by the BC WQG (Oliver and Fidler 2001) for WCT spawning, incubation and rearing. WQG state that water temperature should not exceed 1°C beyond optima for species and life activity stage; exposure to prolonged periods of warm water is a useful indicator of potential thermal stress experienced by fish or other organisms. The number of growing degree days was also calculated for each water temperature monitoring location. For interior subspecies of Cutthroat Trout, recruitment failure may occur when there are less than 800 degree days in a growing season; recruitment may be uncertain in years when there are 800 to 900 growing degree days; and recruitment sufficient to sustain the population is expected when growing degree days exceed 900 (Coleman and Fausch 2007).

#### 2.5.1.2 Flow

Streamflow is a "master variable" that influences myriad components of flowing water systems (Poff et al. 1997; Annear et al. 2004). In this report, we focus on timing and magnitude of low flows during the non-freshet period and high flows during freshet. Low flows during the non-freshet period may indicate habitat limitations during an activity period; evidence of anomalous high flows during freshet can be used to infer direct effects to fish (e.g., scour of redds or displacement of free-swimming individuals) or rapid changes to stream morphology. High magnitude flows during freshet also have positive ecological effects and are referred to as channel-maintenance or flushing flows. These high flows maintain gravel quality, sediment dynamics, connectivity with off-channel habitat and riparian communities, and healthy vegetation dynamics in riparian communities. Timing and duration of high and low flows were also examined.

Flow data for Dry Creek were collected in 2022 by Teck and Kerr Wood Leidal (KWL) at the hydrometric station LC\_DC1. LC\_DC1 is located in Dry Creek upstream of the confluence with the Fording River (Figure 2.1). Instantaneous flow at 5-minute and 15-minute intervals recorded at LC\_DC1 were averaged into hourly flow data; days with less than 20 hours of data were excluded from the dataset. Additionally, months with less than 20 days of data were not used in the calculations of mean monthly discharge. Mean monthly flow for the period of record was tabulated and a hydrograph showing mean daily flows was created to present flows relative to timing and duration (periodicity) of life history activity periods for WCT in Dry Creek. The periodicity used here was developed collaboratively and previously reported in Teck (2021c). Monthly flow statistics were also tabulated for the Water Survey of Canada (WSC) gauge at Fording River at the Mouth (WSC 08NK018; Government of Canada 2023) for comparison.

The WSC 08NK018 gauge is in Fording River <0.5 km downstream of the confluence with Line Creek.

Summary statistics were reviewed and examined for anomalies within the main WCT activity periods. Pre-existing thresholds for effects are not available, so the evaluation of low flows was done qualitatively. A preliminary flushing flow threshold of 1.0 m³/s for a 2-day duration as measured at LC\_DC1 was developed and presented in West *et al.* (2021). Recent historical flows as measured at LC\_DC1 were calculated and tabulated relative to this flushing flow threshold to describe existing conditions in Dry Creek.

## 2.5.1.3 Dissolved Oxygen

Dissolved oxygen (DO) is an important parameter of water quality relevant to all aquatic life, and particularly salmonids, which are sensitive to low DO conditions (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] 2016). The annual minimum and 30-day mean DO concentrations (from discrete *in situ* measures, a minimum of four samples a month, except LC\_DCEF which is sampled once a month)) at five locations (LC\_DCEF, LC\_DC1, LC\_DC2, LC\_DC4, and LC\_DCDS) in Dry Creek in 2022 were evaluated for key life history activity periods for WCT (e.g., spawning and incubation) to determine if DO minima may negatively impact WCT recruitment or survival. The annual minimum and 30-day mean DO concentrations were also compared to the water column long-term BCWQG of 11 mg/L for buried embryo/alevin life stages as well as the instantaneous minimum criterion for the protection of embryo/alevin life stages (9 mg/L), the 30-day mean for all other fish life stages (8 mg/L), and the Instantaneous Minimum for All Other Life Stages (5 mg/L).

## 2.5.2 Fish Abundance, Density and Condition

#### 2.5.2.1 Electrofishing

Backpack electrofishing surveys to estimate juvenile densities were conducted in Dry Creek by Lotic in 2022. Two survey methods were used following the study design of the 2022 UFR WCT monitoring program (Thorley et al. 2022c). A total of four sites were sampled in 2022, one closed site and three open sites (Table 2.7, Figure 2.2). Sites are named for the distance in metres from the confluence with the UFR. Where these sites correspond to locations sampled in previous years, that name is noted.

A single closed site (DRY-600) sampled was in the same location as the site called DRY1
that was sampled in previous years and, as in previous years (e.g., Cope et al 2016,
Faulkner et al. 2020), three mesohabitats were sampled. Removal-depletion methods



**Summary of Electrofishing Sites Sampled in 2022 Table 2.7:** 

| Site Name             | Location<br>(km <sup>a</sup> ) | Date Sampled      | Site<br>Type | Mesohabitat | Number<br>of<br>Passes | Site<br>Length<br>(m) | Average<br>Site<br>Width<br>(m) |
|-----------------------|--------------------------------|-------------------|--------------|-------------|------------------------|-----------------------|---------------------------------|
| DRY-100o              | 0.12                           | 24 August<br>2022 | Open         | NA          | 2                      | 295                   | 4.4                             |
| DRY-600 (DRY1)        | 0.56                           | 24 August<br>2022 | Closed       | Pool        | 1                      | 16                    | 4.0                             |
| DRY-600 (DRY1)        | 0.56                           | 24 August<br>2022 | Closed       | Riffle      | 1                      | 12                    | 5.0                             |
| DRY-600 (DRY1)        | 0.56                           | 24 August<br>2022 | Closed       | Glide       | 1                      | 25                    | 4.0                             |
| DRY-2400o             | 2.37                           | 25 August<br>2022 | Open         | NA          | 1                      | 295                   | 4.7                             |
| DRY-4400o<br>(DRY4.3) | 4.37                           | 24 August<br>2022 | Open         | NA          | 1                      | 300                   | 4.2                             |

a. km refers to the distance upstream from the confluence of LCO Dry Creek with the upper Fording River.
b. NA – not applicable
Source: WSP & Poisson 2023

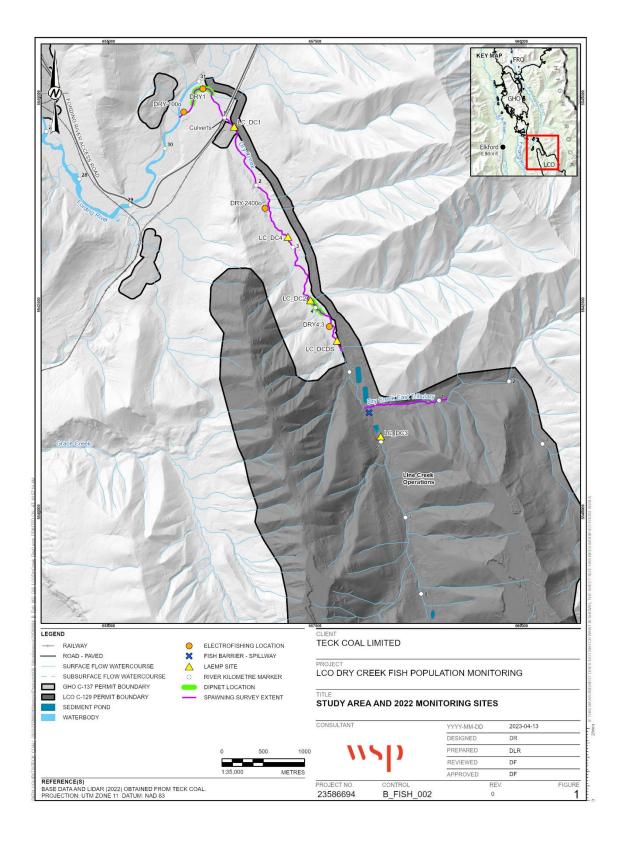


Figure 2.2: LCO Dry Creek Fish Population Monitoring Study Area Sample Sites and Survey Areas

- were used in three mesohabitats of approximately 10 to 35m² in length (total of ~100 m²).
   The mesohabitats were isolated at the upstream and downstream boundaries using stopnets. One electrofishing pass was conducted in each of the mesohabitats.
- Three open sites of approximately 300 m in length were randomly selected for sampling in 2022, one location downstream of the culverts at km 1 and two sites from upstream of the culverts which are partial barriers that allow upstream fish passage at some flows. Mark-recapture methods were used at large open (not isolated with stop-nets) sites approximately 300m in length, as they were in 2021 (Thorley et al. 2022a). A single electrofishing pass was conducted DRY 2400o and DRY-4400o (DRY4.3) and two passes were conducted at DRY 100o1.

A shift from the small, closed index sites to the large open sites that are randomly selected each year is underway across the UFR population monitoring program (Thorley et al 2022b). Bias associated with site selection of a relatively small area (closed sites) is reduced as a greater portion of the study area is sampled using large, open sites. The use of both electrofishing methods in 2021 and 2022 allows comparison to previous years of data that used only small, closed sites.

Fish processing followed the Teck backpack electrofishing protocol (Thorley et al. 2022c) and the 2022 study design for UFR WCT population monitoring (Thorley et al. 2022b). All captured fish were measured for fork length to the nearest 1 mm, weighed to the nearest 0.1 g, scanned for a Passive Integrated Transponder (PIT) tag (if larger than 99 mm), and photographed. The total number of fish observed but not captured was also recorded. A PIT tag was inserted into all uninjured fish ≥100 mm in fork length. Fish were inspected for any deformities, erosion, lesions, or tumours (DELT) and the information was recorded using the new DELT categories and scale (Ings and Weech 2020). Processed fish were allowed to recover before being released as close to their capture location as possible, preferably near cover and in slow moving water.

#### 2.5.3 Redd Surveys

Surveys have been conducted in LCO Dry Creek each year from 2015 to 2022 to count the number of redds, which are where fish eggs are deposited and may contain multiple nests (e.g., Cope et al. 2016, Faulkner et al. 2019, Thorley et al. 2022a). The same general approach has always been used in these surveys, with two observers, one on each bank, walking in an upstream direction. Prior to 2021, the number of redds was recorded, but not the number of nests within the redd unless more than one spawning pair was observed (Cope 2020, Faulkner et al. 2020). Beginning in 2021, all visible nests were counted each week, which was

done to provide data suitable for the modelling approach that estimates the total count of unique nests using an area-under-the-curve model and estimates of the length of time that individual redds remain visible. Under a new standardized protocol which was implemented starting in 2021, each nest is classified as "definitive", that is nests with a distinct pit upstream of a loose mound of clean pebbles and gravels, or "potential", which includes test digs by females to evaluate the substrate, or older nests that are no longer distinct (Smit et al 2022). This is similar to methods used from 2016 to 2019 (Faulkner et al. 2020) where clearly visible redds were distinguished from possible redds, where gravel had been cleared and test digging had occurred but a redd was not clearly visible. The data from spawning surveys contribute to understanding spatial distribution and timing of spawning, but not should not be used to represent the number of fish that spawned.

In 2022, spawning surveys were conducted approximately weekly between early June and early August from the confluence of Dry Creek and the UFR to km 4.5 and 1 km of East Tributary was also surveyed (Figure 2.2). For each redd, the time, spatial coordinates, number of potential and definitive nests within the redd, and the number of adult fish associated with the redd were recorded. These data were used to estimate the total number of unique nests over the whole spawning season and provide information about timing and spatial distribution of spawning.

## 2.5.4 Dip Net Surveys

Backpack electrofishing rarely captures WCT in their first year (age-0s) because of their small size and patchy distribution. To supplement the electrofishing data, night-time dip-net surveys were conducted in LCO Dry Creek for the first time in 2022. Data from these surveys provides information about size-at-age, and some limited information on spatial distribution (occupancy, not relative density) of age-0 as well as age-1 fish. Dip-net surveys are conducted by a team of two observers walking the stream margins searching for fish less than 100 mm in length. Surveys were conducted on October 12, 13, and 14 at one site upstream of the culverts at km 3.8 (325 m of habitat) and one site downstream of the culverts (370 m of habitat).

The location and estimated body length were recorded for all observed WCT. Fish approximately 100 mm or less were captured using a hand net where possible and were measured, photographed, and a subset were weighed (to 0.01 g) before being released at their location of capture.

#### 2.5.5 Data Analysis

The data from the backpack electrofishing data (2013 to 2022) were used to estimate fish density. The electrofishing data were analyzed using a hierarchical Bayesian removal model (Wyatt 2002). The model estimated capture efficiency using removal-depletion data from the subset of small,



closed sites that received more than one electrofishing pass. Capture efficiency was used in the model to estimate the absolute density of fish at each site. Density was estimated separately for the age-1 and age-2+ life stages. Other methods and key assumptions in the density model are discussed in the LCO Dry Creek 2022 Fish Population Monitoring Report (WSP & Poisson 2023).

Body condition was analyzed using weight-length regression. Length and weight data for individuals between 90 and 169 mm were analyzed using an allometric mass-length model to estimate body condition (He et al. 2008; Thorley et al. 2023a, 2023b). The simplified equation for body condition is:

Body condition =  $W/(\alpha L\beta)$ 

Where W = is the weight (g) of the individual fish

 $\alpha = 6.6*10^{-6}$ , the expected weight (g) of a 1 mm fish

L = is the length (mm) of the individual fish

 $\beta$  = scaling term of 3.1

The  $\alpha$  and  $\beta$  terms were calculated for fish from 90 to 169 mm using UFR monitoring data collected from 2013 to 2022 (Thorley et al. 2023a, Thorley et al 2023b). The model was used to estimate the percent difference in body condition of an LCO Dry Creek fish relative to a typical subpopulation in the UFR, in a typical year (Thorley et al 2023a). Additional details are available in the technical appendix to the UFR WCT population monitoring report (Thorley et al., 2023b).

Length data were also used to identify the sizes of different age classes in LCO Dry Creek using the electrofishing (2013 to 2022) and dip-net survey data (2022). Using field sampling methods that target the age-0 size range, age-0 were documented in LCO Dry Creek for the first time since 2016. These data were used in the length frequency histograms were used to assign length cutoffs by age class and to calculate the mean length-at-age of age-0s.

Data from all spawning surveys conducted from 2015 to 2022 are used for reporting total unique redds observed prior to 2020 and total definitive nests observed thereafter. In addition, for 2021 and 2022, an Area-Under-the-Curve (AUC) model (Hilborn et al. 1999; Su et al. 2001) was used to estimate the total number of unique definitive nests that would have been recorded over the whole sampling season by a typical observer (WSP & Poisson 2023). The AUC estimate of unique redds is roughly comparable to the previous total count of unique redds, and these data are used to assess trends over time.

# 3 STUDY QUESTION 1: WATER QUALITY

## 3.1 Background

The water quality monitoring data were evaluated to address Study Question #1: are aqueous concentrations of mine-related constituents elevated in relation to British Columbia Water Quality Guidelines (BCWQG) and Elk Valley Water Quality Plan (EVWQP) benchmarks, and are concentrations changing over time? To address this study question, monitoring of constituents listed under permit 107517 and selenium species were carried out in 2022 (see Sections 2.1 and Appendix A1 for details.

Water quality data collected concurrent with biological sampling for the present study were of acceptable quality as characterized by good detectability, appropriate LRLs, concentrations below LRLs in almost all method blank samples, minimal field blank contamination, excellent laboratory precision and accuracy, and good field sampling precision and reproducibility, with the exception of methylseleninic acid which had poor field precision (this is expected when results are close to the LRLs). Overall, the associated data are considered acceptable for this study (see Appendix B for details). QA/QC associated with water samples collected routinely by Teck for Permit 107517 were discussed in the 2022 annual water quality report for Permit 107517 (Teck 2023). Temporal changes in concentrations of aqueous constituents evaluated for the Dry Creek LAEMP were statistically evaluated as outlined in Appendix A. Although statistical analyses were completed for: 1) Order Constituents; 2) constituents with early warning triggers under the AMP; and 3) constituents that have previously identified and tracked through SDM and/or AMP response frameworks (listed in Section 2.1.1), detailed data interpretation was focused on those that satisfied the criteria listed in Section 2.1.2. In 2022, the constituents that satisfied the criteria for detailed data interpretation included nitrate, total cadmium, total selenium, and organoselenium species<sup>9</sup> (Table 3.1). For graphical plots and the results of statistical analyses for remaining water quality constituents, see Appendix C.

#### 3.2 Nitrate

Aqueous nitrate concentrations were higher than the BCWQG for long-term chronic exposure in >95% of samples at all Dry Creek and Fording River areas throughout 2022 (Table C.4). Reference and low impact stations (LC\_DCEF, LC\_UC, and LC\_GRCK) were not above the BCWQG in 2022. The BCWQG for short-term acute exposure limit was also surpassed in

<sup>&</sup>lt;sup>9</sup> This interpretation focused on organoselenium species (particularly DMSeO and MeSe(IV) and specifically excluding selenite, selenate and other individual selenium species) as elevated concentrations of those constituents are captured in AMP response framework in 2020.



Table 3.1: Criteria for Detailed Evaluation of Water Quality Endpoints in 2022 LCO Dry Creek LAEMP

|                             |                                 |                             | Criteria                         | for Inclusion   |                                |
|-----------------------------|---------------------------------|-----------------------------|----------------------------------|---|--------------------------------|
|                             |                                 |                             | Or Only                          |   |                                |
| Water Quality Endp          | point                           | 2-Way<br>ANOVA <sup>a</sup> | Seasonal<br>Kendall <sup>b</sup> | Guidelines/<br>Benchmarks/<br>Updated Effects<br>Concentration <sup>c</sup> | SPO or<br>AMP/SDM <sup>d</sup> |
| Nitrate (as N)              |                                 | -                           | √                                | <b>√</b>  | $\sqrt{}$                      |
| Total Kjeldahl Nitrog       | en                              | $\checkmark$                | -                                | -   | -                              |
| Sulphate                    |                                 | $\checkmark$                | -                                | -   | -                              |
| Total Dissolved Solid       | ds                              | $\checkmark$                | -                                | -   | -                              |
| Cadmium (Cd) -Tota          | ıl                              | $\checkmark$                | -                                | -   | $\sqrt{}$                      |
| Lithium (Li) -Total         |                                 | √                           | -                                | _e  | -                              |
| Molybdenum (Mo) -           | Total                           | √                           | -                                | -   | -                              |
| Nickel (Ni) -Total          |                                 | √                           | -                                | √   | -                              |
| Selenium (Se) -Tota         | I                               | √                           | √ _e                             |   | $\checkmark$                   |
| Uranium (U) -Total          |                                 | √                           | -                                | -   | -                              |
| Zinc (Zn) -Total            |                                 | √                           | -                                | -   | -                              |
| Cadmium (Cd) -Diss          | olved                           | <b>√</b>                    | -                                | -   | -                              |
| Se(IV) - Selenite           |                                 | -                           | -                                | _e  | -                              |
| Se(VI) - Selenate           |                                 | -                           | -                                | _e  | -                              |
| 0f                          | DMSeO - Dimethylselenoxide      | <b>√</b>                    | -                                | _e  | $\sqrt{}$                      |
| Organoselenium <sup>f</sup> | MeSe(IV) - Methylseleninic Acid | <b>√</b>                    | -                                | _e  | $\sqrt{}$                      |

Criteria for detailed evaluation met.

Notes: "\" = criteria met, "-" = criteria not met, ANOVA = Analysis of variance, SPO = site performance objective, AMP = adaptive management plan, SDM = Structured Decision Making.

<sup>&</sup>lt;sup>a</sup> In 2-way ANOVA results, analyte concentrations increased >100% between first year of sampling and 2022 *and* were significantly higher in 2022 than 2021 at ≥ 50% (i.e., ≥ 3) of the mine exposed areas on Dry Creek (Appendix Table C.3).

<sup>&</sup>lt;sup>b</sup> In Seasonal Kendall results, analyte concentration trend slope (average percent increase per year) >50% at ≥50% (i.e., ≥ 3) of the mine exposed areas on Dry Creek in 2022 (Appendix Table C.2).

<sup>&</sup>lt;sup>c</sup> Analyte exceeded BCWQG and/or site-specific benchmark(s) and/or updated effects concentration(s) in 2022 (Appendix Table C.4).

<sup>&</sup>lt;sup>d</sup> Analyte has SPO for Dry Creek LAEMP area(s) under permit 107517 (ENV 2021) and/or elevated analyte concentrations have triggered AMP or SDM response frameworks (Appendix Table C.1).

<sup>&</sup>lt;sup>e</sup> No guidelines or benchmarks exist for lithium, total selenium, or organoselenium.

<sup>&</sup>lt;sup>f</sup> The 2020 AMP response framework for LCO Dry Creek (Teck 2021) identified dimethyl selenoxide (DMSeO) and methylseleninic acid (MeSe(IV)) as the two organoselenium species primarily generated by biological productivity within the Dry Creek Water Management System (DCWMS). Therefore, interpretation of organoselenium species herein was focused on these two organoselenium species (DMSeO and MeSe(IV)), and excluded consideration of selenite and other individual selenium species.

Dry Creek at LC\_DC3, LC\_SPDC, LC\_DCDS, and LC\_DC2 in 2022 (Figure 3.1; Table 2.2; Appendix Table C.4; Appendix Figure C.13).

Nitrate concentrations were above the level 1 UECs at all stations on Dry Creek, with the level 1 UEC less frequently surpassed at stations located furthest downstream (100% of samples at LC\_DC3 and LC\_DCDS to 79% of samples at LC\_DC1; Figure 3.1; Appendix Table C.4). Approximately 70% of all samples at LC\_DC3, LC\_SPDC, and LC\_DCDS, > 60% at LC\_DC2, and > 20% of samples at the remaining stations located further downstream in Dry Creek (LC\_DC4 and LC\_DC1) had nitrate concentrations that were above the level 2 UECs, while none had concentrations above level 3 UECs in 2022. In the Fording River, at LC\_DCEF, LC\_UC, and LC\_GRCK nitrate concentrations were below the UECs in 2022 (Appendix Table C.4; Appendix Figure C.13).

Nitrate concentrations have increased significantly over time at all Dry Creek areas since mining started in the watershed, as well as LC\_DCEF, LC\_FRB, and LC\_GRCK (2012; Figure 3.1, Table 3.2; Appendix Tables C.2, C.3). Results of the 2-way ANOVA indicated that nitrate did not change in Dry Creek stations in 2022 relative to 2021; however, nitrate concentrations at LC\_DCEF and LC\_GRCK increased significantly in 2022 relative to 2021 (by ~45% at both stations; Appendix Table C.3). In the Fording River upstream of Dry Creek (LC\_FRUS), nitrate concentrations decreased in 2022 relative to 2021 (Table 3.2; Appendix Table C.3). At reference area LC\_UC, nitrate concentrations did not change significantly between 2022 and 2021 but did increase between 2020 and 2021 (Table 3.2; Appendix Table C.3). Despite the lack of statistically significant increases between 2022 and 2021 at other areas, annual mean and maximum aqueous nitrate concentrations were higher in 2022 than 2021 at all Dry Creek LAEMP stations and reference stations (LC\_DCEF, LC\_UC and LC\_GRCK; Appendix Figure C.13, Appendix Table C.3; Minnow 2021a).

Annual mean and maximum nitrate concentrations in Dry Creek in 2022 were highest closest to spoiling at area LC\_DC3 and decreased moving downstream (Figure 3.1; Appendix Table C.4). At areas LC\_DC4 and LC\_DC1, mean annual and maximum nitrate concentrations in 2022 were notably less than those observed at LC\_DC2 which is adjacent (upstream) of LC\_DC4 and LC\_DC1 (Appendix Figure C.13; Appendix Table C.4). Annual mean and maximum nitrate concentrations in 2022 were higher at FR\_FR5, than LC\_FRUS and LC\_FRB which are located farther downstream on the Fording River (upstream and downstream of Dry Creek, respectively; Figure 2.1; Appendix Table C.4). Elevated nitrate concentrations at areas FR\_FR5, LC\_FRUS and LC\_FRB are primarily attributed to upstream mining sources from Fording River Operation.

At LC\_DCDS in 2022, nitrate was identified as potentially causing observed effects in chronic toxicity tests with water fleas and amphipods (similar to the results seen from 2018 to 2021).

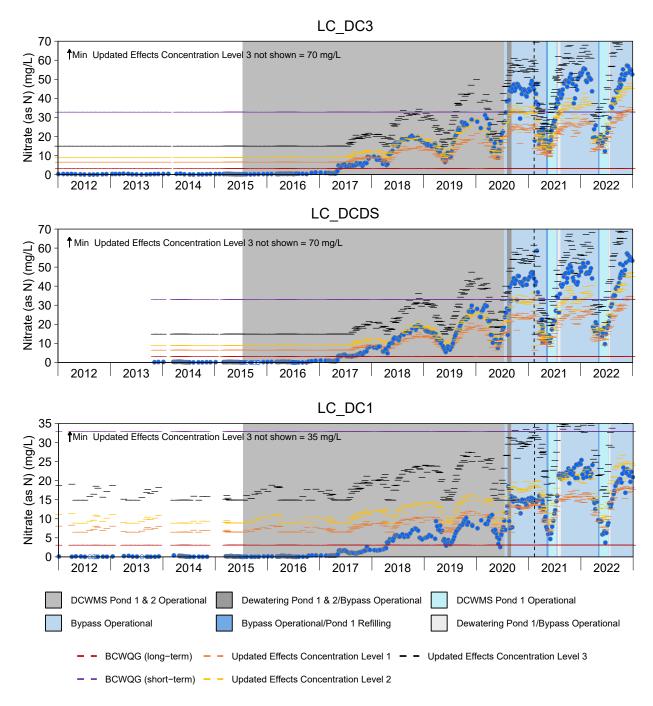


Figure 3.1: Time Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine-exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

Table 3.2: Summary of Water Quality Statistical Results and Comparison with Benchmarks and Guidelines, Dry Creek LAEMP, 2022

|                                 |                      |               |   | Seasonal Kendall   |             | 2-way  | Exceedances                           |   |                                 |
|---------------------------------|----------------------|---------------|---|--|-------------|--|---------------------------------------|---|---------------------------------|
| Enc                             | lpoint               | Watercourse   | # of Areas<br>with<br>Significant<br>Change | with Change Since the Base Year Significant of Sampling <sup>b</sup> |             | Areas with Significant Change<br>Between 2021 and 2022 | Change<br>Between<br>2021 and<br>2022 | Range <sup>a</sup> of %<br>Change Between<br>First Year <sup>b</sup> of<br>Sampling and 2022  | BCWQG/ EVWQP<br>Benchmarks/UECs |
|                                 |                      | Dry Creek     | 6   | LC_DC3, LC_SPDC, LC_DCDS,<br>LC_DC2, LC_DC4, LC_DC1                  | 29 to 96    | LC_DC3, LC_SPDC, LC_DCDS, LC_DC4                       | √ (n=4)                               | 187 to 5,293<br>(n=6)   | +                               |
| Tota                            | al Selenium          | Fording River | 2   | FR_FR5, LC_FRB   | 3.0 to 3.3  | -  | -                                     | NS  | +                               |
|                                 |                      | Other         | 2   | LC_DCEF, LC_UC, LC_GRCK  | 0.8 to 5.9  | -  | -                                     | NS  | +                               |
|                                 |                      | Dry Creek     | 6   | LC_DC3, LC_SPDC, LC_DCDS,<br>LC_DC2, LC_DC4, LC_DC1                  | 22 to 90    | -  | ı                                     | 140 to 77,909<br>(n=6)  | +                               |
| Nitra                           | ate                  | Fording River | 2   | FR_FR5, LC_FRB   | 1.2 to 1.8  | LC_FRUS  | √ (n=1)                               | NS  | +                               |
|                                 |                      | Other         | 0   | -  | NS          | LC_GRCK, LC_DCEF                                       | GRCK, LC_DCEF                         |   | -                               |
|                                 |                      | Dry Creek     | 6   | LC_DC3, LC_SPDC, LC_DCDS,<br>LC_DC2, LC_DC4, LC_DC1                  | 25 to 68    | LC_DC3, LC_SPDC, LC_DCDS, LC_DC4, LC_DC1               | √ (n=5)                               |   | -                               |
| Sulp                            | ohate                | Fording River | 2   | FR_FR5, LC_FRB   | 2.8 to 3.1  | -  | -                                     | 48.1<br>(n=1)   | -                               |
|                                 |                      | Other         | 2   | LC_UC, LC_GRCK   | 0.75 to 1.9 | -  | -                                     | 19.9<br>(n=1)   | -                               |
|                                 |                      | Dry Creek     | 6   | LC_DC3, LC_SPDC, LC_DCDS,<br>LC_DC2, LC_DC4, LC_DC1                  | 8.5 to 28   | LC_SPDC, LC_DCDS, LC_DC2,<br>LC_DC4, LC_DC1            | √ (n=5)                               | 101 to 408<br>(n=6)   | -                               |
| Tota                            | al Cadmium           | Fording River | 0   | -  | NS          | LC_FRUS  | √ (n=1)                               | (n=6)  NS  NS  140 to 77,909 (n=6)  NS  73.3 to 93.3 (n=2)  159 to 2,015 (n=6)  48.1 (n=1)  19.9 (n=1)  101 to 408 (n=6)  -20.4 (n=1)  NS  -20.9 to -21.1 (n=2)  NS  -48.7 to 178 (n=2)  NS | -                               |
|                                 |                      | Other         | 0   | -  | NS          | -  | -                                     | NS  | 93                              |
| ٩                               |                      | Dry Creek     | 1   | LC_SPDC  | -11         | LC_DCDS  | √ (n=1)                               |   | -                               |
| jun                             | Methylseleninic Acid | Fording River | -   | -  | NS          | -  | -                                     | NS  | -                               |
| seleniun                        |                      | Other         | _c  | -  | -           | -  | -                                     | -   | -                               |
| ganos                           | Diagram and a        | Dry Creek     | 3   | LC_DC3, LC_DC2, LC_DC1   | 5 to 20     | -  | ·                                     |   | -                               |
| ŏ                               | Dimethylseleneoxide  | Fording River | -   | -  | NS          | -  | -                                     | NS  | -                               |
| Janoselenium <sup>d</sup> Lands |                      | Other         | - c   | -  | -           | -  | -                                     | -   | -                               |

Significant increase.
Significant decrease.

Notes: "Other" refers to Grace Creek (LC\_GRCK), Dry Creek East Tributary (LC\_DCEF), and Unnamed Creek (LC\_UC); "NS" = no significant changes; " v " = significant change; "+" = at least one value exceeded guideline or benchmark.

<sup>&</sup>lt;sup>a</sup> Range of increase for areas with significant results only.

<sup>&</sup>lt;sup>b</sup> First year of sampling: LC DC3 - 2012, LC SPDC - 2014, LC DCDS - 2013, LC DC2 - 2012, LC DC4 - 2018, LC DC1 - 2012, FR FR5 - 2012, LC FRUS - 2013, LC FRB - 2012.

<sup>&</sup>lt;sup>c</sup> Selenium speciation samples not collected at area LC\_UC .

<sup>&</sup>lt;sup>d</sup> The 2020 AMP response framework for LCO Dry Creek (Teck 2021) identified dimethyl selenoxide (DMSeO) and methylseleninic acid (MeSe(IV)) as the two organoselenium species primarily generated by biological productivity within the Dry Creek Water Management System (DCWMS). Therefore, interpretation of organoselenium species herein was focused on these two organoselenium species (DMSeO and MeSe(IV)), and excluded consideration of selenite and other individual selenium species.

Elevated concentrations of nitrate have been tracked, and future monitoring efforts evaluated, as the need for a response was identified under the AMP response framework in 2018 (Section 1.4 for details; Teck 2019b). Investigations and adjustments as part of that response are currently ongoing. With respect to nitrate, efforts are already underway and include integrated effects assessment modelling to better understand potential effects of nitrate on biota including resident WCT early life stages and thereby guide management planning (Teck 2020b) and implementation of the nitrate compliance action plan. Under the nitrate compliance action plan there has been an increase in explosives bagging (100% bagged at Dry Creek in 2022) to reduce nitrate releases from waste rock placed in the LCO Dry Creek watershed (Golder 2021b). Effects of elevated aqueous nitrate concentrations on biota are discussed in more detail in Sections 4 and 5.4.

#### 3.3 Total Cadmium

Permit 107517 outlines an SPO for total cadmium at Dry Creek area LC\_DCDS as well as Grace Creek (LC\_GRCK) and Unnamed Creek (LC\_UC) that came into effect January 1, 2020 (ENV 2013). There were no exceedances of the SPO for total cadmium at any area in 2022 (Figure 3.2; Appendix Figure C.5, Appendix Table C.1 and C.4).

Total cadmium has increased significantly since the start of spoiling in the watershed (2015) at all monitoring areas of Dry Creek (Figure 3.2; Table 3.2; Appendix Tables C.2 and C.3). Total cadmium concentrations were significantly higher at Dry Creek areas in 2022 compared with 2021, except for LC\_DC3 which showed no change (Table 3.2; Appendix Table C.3). In the Fording River temporal trends in total cadmium were not consistent with Dry Creek stations, where concentrations at LC\_FRUS were significantly lower in 2022 compared with 2021 (Table 3.2; Appendix Table C.3).

Annual mean and maximum total cadmium concentrations in 2022 were highest on Dry Creek at areas LC\_DC3 and LC\_SPDC and lowest at area LC\_DC1 (Figure 3.2; Appendix Figure C.5; Appendix Table C.4). Annual mean total cadmium concentrations in Fording River areas were highest at FR\_FR5 and lowest at LC\_FRB, downstream of the mouth of Dry Creek, indicating Dry Creek did not have a detectable impact on Fording River total cadmium concentrations in 2022.

#### 3.4 Total Selenium

Aqueous total selenium concentrations were higher than the BCWQG in all samples from the mine-exposed LAEMP areas in 2022, except at LC\_GRCK where 57% of samples where higher

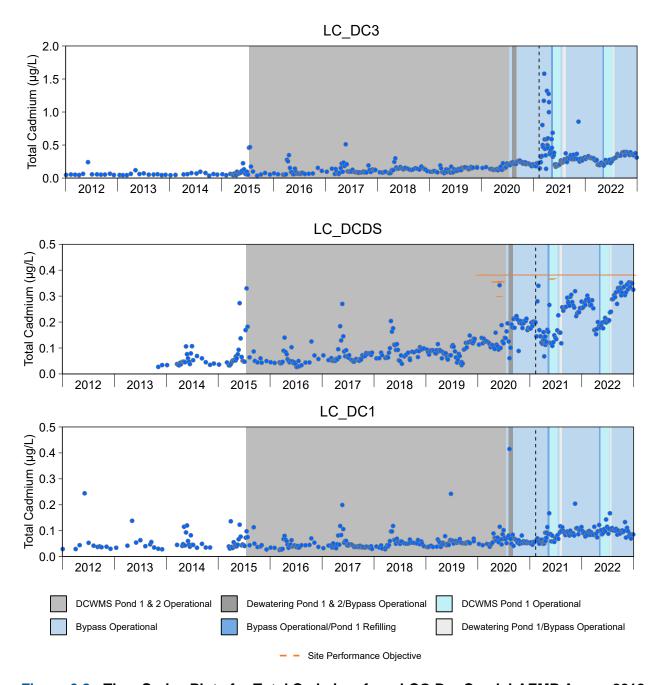


Figure 3.2: Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine-exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concentrations. Constituent was plotted because it was identified as a mine related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

than the guideline (Appendix Table C.4). The SPO for total selenium<sup>10</sup> was exceeded in all 2022 samples at LC\_DCDS; and was not exceeded at LC\_GRCK or LC\_UC (Teck 2023; Figure 3.3; Appendix Figure C.18). For this report, potential risks to aquatic life associated with selenium were assessed through the evaluation of tissue selenium results in biota as compared to primarily using EVWQP benchmarks for aqueous selenium.

When comparing annual means (2-way ANOVA), total selenium concentrations have increased significantly since the start of baseline and LAEMP monitoring at all Dry Creek LAEMP areas, except LC\_GRCK and LC\_FRUS (2012 to 2018 depending on site compared to 2022; Figure 3.3, Table 3.2; Appendix Figure C.18, Appendix Table C.3). However, when trends are assessed using a Seasonal Kendall Trend Analysis significant increases are seen at all Dry Creek LAEMP locations except LC\_FRUS (Appendix Table C.2). Broadly speaking, the Seasonal Kendal Trend Analysis may be a more appropriate measure of change as there has been a gradual increase overtime with seasonal variation (monotonic) rather than an abrupt point shift (step trend), for which the ANOVA would be more appropriate (Figure 3.3; Appendix Figure C.18). The annual percent increase over time in total selenium concentrations was higher at areas in Dry Creek than at reference (LC\_DCEF and LC\_UC), Fording River (FR\_FR5, LC\_FRB), and Grace Creek (LC\_GRCK; Table 3.2; Appendix Table C.2). Mean total selenium concentrations were significantly higher in 2022 than 2021 at LC\_DC3, LC\_SPDC, LC\_DCDS, and LC DC4 (Table 3.2; Appendix Table C.3).

The proportion of water samples in Grace Creek having total selenium concentrations above the BCWQG was above the threshold required for further biological monitoring at that area (50% of samples >2  $\mu$ g/L; ranging from 1.1 to 2.9  $\mu$ g/L; total Se) in 2022 (57%, Appendix Table C.4). As a result, biological monitoring will continue at LC\_GRCK in 2023. The same threshold applies to LC\_UC; however, no samples at LC\_UC were above the 2  $\mu$ g/L total selenium guideline in 2022 (ranged from 0.27 to 0.48  $\mu$ g/L; Appendix Table C.4). Total selenium concentration at LC\_UC were within the range seen at all RAEMP MU1 reference stations in 2022 (0.39 to 1.34  $\mu$ g/L; Minnow 2023). Screening of 2023 LC\_GRCK and LC\_UC aqueous total selenium concentrations against this threshold will be included in the 2023 Dry Creek LAEMP report.

Annual maximum and mean total selenium concentrations on Dry Creek were highest at area LC DC3 (the area farthest upstream on Dry Creek and closest to the LCOII expansion) in 2022.

 $<sup>^{10}</sup>$  The SPO for total selenium (10  $\mu$ g/L) came into effect January 1, 2020, at areas LC\_DCDS, LC\_GRCK, and LC\_UC (ENV 2015).



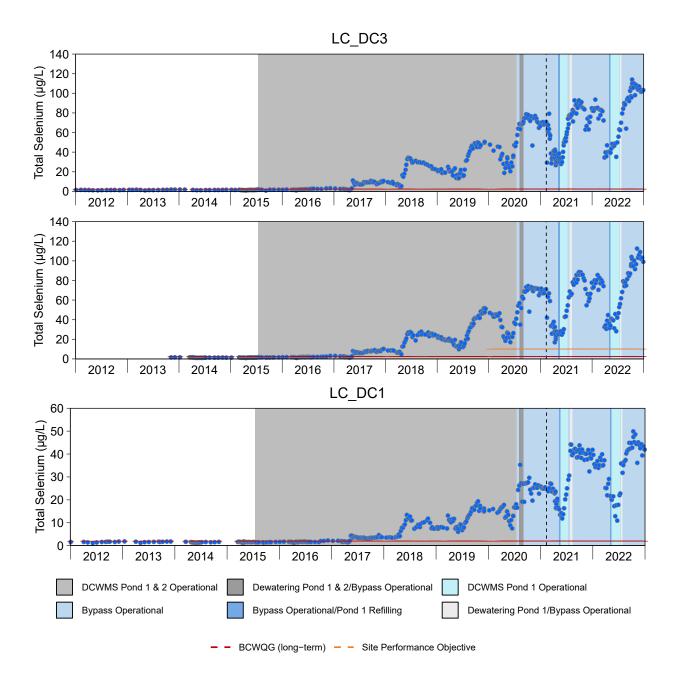


Figure 3.3: Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022

Notes: Green data points are used for reference sites and blue data points are used for mine-exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

Selenium concentrations at the three areas closest to the DCWMS outlet (LC\_SPDC, LC\_DCDS, and LC\_DC2) were similar to selenium concentrations at LC\_DC3. Selenium concentrations on Dry Creek were lowest at areas LC\_DC4 and LC\_DC1 in 2022 (Appendix Figure C.18; Appendix Table C.4). Selenium concentrations were higher on Dry Creek than at both reference areas (LC\_DCEF and LC\_UC) and area LC\_GRCK. Annual mean selenium concentrations at Fording River area FR\_FR5 (farthest upstream of the mouth of Dry Creek) were higher in 2022 than at Fording River area LC\_FRUS and LC\_FRB.

## 3.5 Organoselenium

The most common selenium species detected in the Elk Valley are selenate, selenite, dimethylselenoxide (DMSeO), and methylseleninic acid (MeSe(IV)) and the most important selenium species effecting bioaccumulation are DMSeO and MeSe(IV) (i.e., organoselenium; ADEPT 2022). In 2022, DMSeO concentrations increased from base year (2019) at LC DC3 and LC SPDC; however, results of the 2-way ANOVA indicated that DMSeO was not significantly higher in 2022 than 2021 at these or any other stations on Dry Creek (Figure 3.4; Appendix Figure C.23, Appendix Table C.3). Since implementation of the seasonal bypass of the DCWMS (2020), MeSe(IV) concentrations have decreased in Dry Creek. However, results of the 2-way ANOVA indicated that in 2022 compared to 2021, MeSe(IV) concentrations increased at LC DCDS by approximately 30%. It is notable that annual mean concentrations of MeSe(IV) at LC DCDS in 2022 were similar to those recorded on 2020 and significantly lower than 2019 (prior to season bypass of DCWMS; Figure 3.4; Appendix Figure C.24, Appendix Tables C.3, C.5). Overall, the DCWMS bypass in 2022 continued to result in decreased organoselenium (DMSeO and MeSe[IV]) concentrations downstream compared to when the DCWMS bypass was not implemented. Downstream of the DCWMS, organoselenium concentrations in 2022 were similar to or lower than in 2020, in contrast upstream of the DCWMS (LC DC3) organoselenium in 2022 was significantly higher than in 2019 and 2020.

The Selenium Bioaccumulation Tool (B-Tool), which was developed to predict benthic invertebrate selenium tissue concentrations from aqueous selenium speciation concentration, has been used to calculate the concentrations of the combination of MeSe (IV) and DMSeO that would cause a detectable increase in benthic invertebrate tissue selenium concentrations (de Bruyn and Luoma 2021). This information was then used to develop screening levels for the sum of MeSeIV and DMSeO; Level 1 <0.025  $\mu$ g/L where organoselenium is unlikely to cause a discernible shift in benthic invertebrate selenium concentrations, Level 2 0.025 to 0.05  $\mu$ g/L is likely to cause a discernible increase in bioaccumulation, and Level 3 < 0.05  $\mu$ g/L is likely to cause a discernible increase in bioaccumulation and is likely to cause exceedance of 11 mg/kg in benthic invertebrate tissue Se concentrations. In 2022, Dry Creek organoselenium concentrations were

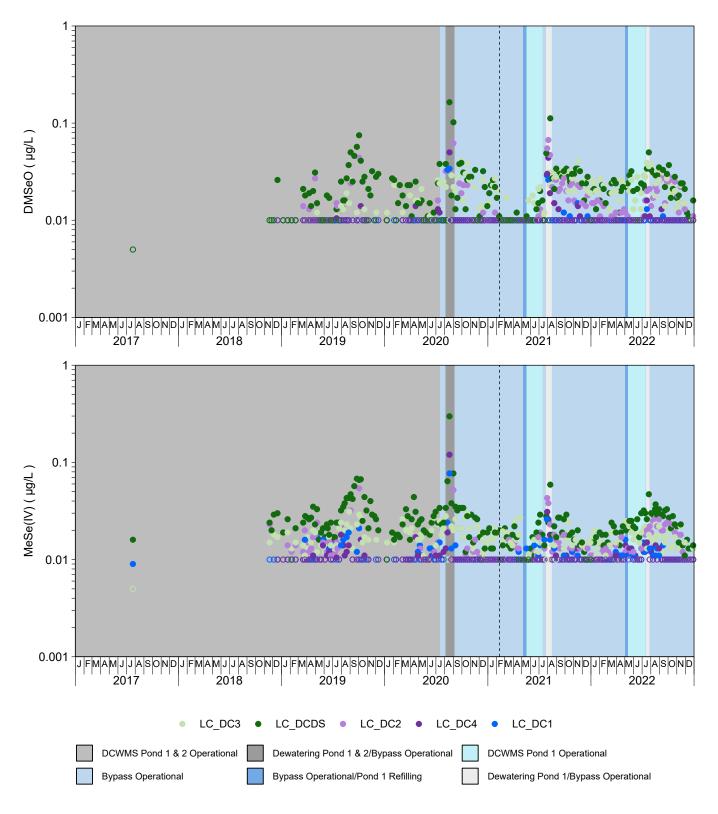


Figure 3.4: Selenium Species Concentrations from LCO Dry Creek LAEMP Sampling Areas, 2017 to 2022

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

frequently above screening levels at LC\_DC3, LC\_SPDC, LC\_DCDS, and LC\_DC2 and rarely above screening levels at LC\_DC4 and LC\_DC1 (Appendix Table C.5). No samples were above screening values in the Fording River, Grace Creek, or at the reference station (LC\_DCEF; Appendix Table C.5).

In the surface water of Dry Creek, organoselenium concentrations (DMSeO and MeSe(IV)) were generally highest immediately downstream of the DCWMS at LC DCDS and decreased downstream. Concentrations of DMSeO and MeSe(IV) were below detectable levels in most samples from LC DC4 and LC DC1 in 2019, 2020, 2021, and 2022 likely due to a combination of dilution from LC DCEF, the presence of a gaining reach downstream of station LC\_DC2, uptake by periphyton, and degradation of organoselenium species (via hydrolysis and/or photolysis) into species such as dimethyl selenide and dimethyl diselenide (Appendix Figures C.23 and C.24, Appendix Table C.5; Golder 2021b). Organoselenium concentrations were below detectable levels in all samples collected in 2022 from LC DCEF, LC GRCK, and at Fording River areas LC FRB and LC FRUS (Appendix Figures C.23 and C.24; Appendix Table C.5).

#### 3.6 Nutrient Status

Dry Creek was nitrogen and phosphorus co-limited (versus solely nitrogen or phosphorus limited) prior to LCOII development owing to high natural phosphorus and low natural nitrogen concentrations (Minnow 2020d). Since 2017, total nitrogen to total phosphorus (TN:TP) ratios have increased in Dry Creek concurrent with increasing nitrate concentrations (Figure 3.1). As a result, Dry Creek nutrient limitation has shifted to phosphorus limitation over the same period since total phosphorus concentrations did not increase (Appendix Figure C.16; Appendix Table C.3).

Trophic status of Dry Creek has also changed since the start of LCOII development, with shifts from oligotrophic to either mesotrophic or meso-eutrophic conditions observed at areas LC\_DC3, LC\_DCDS, and to a lesser extent, LC\_DC1 (based on nutrient concentrations; Minnow 2020d). Changes in nutrient limitation and trophic status were not observed over the same period at reference areas LC\_DCEF and LC\_UC or Fording River areas LC\_FRUS and LC\_FRB. It is likely that mine-related nitrogen input has changed nutrient limitation and trophic status in Dry Creek (Minnow 2020d). Initial nutrient enrichment above background levels can increase productivity; however, concentrations can reach nuisance and even toxic levels that cause impairment to biological communities (CCME 2016). As Dry Creek is now phosphorus, it is unlikely that further increases in nitrogen concentrations will contribute to productivity stimulation of existing Dry Creek biological communities.

## 3.7 Summary

Concentrations of mine-related constituents including nitrate, total cadmium, and total selenium, have increased over time on Dry Creek since spoiling began in this watershed in 2015. Nitrate concentrations were above updated effects concentrations and dissolved nickel concentrations were above proposed benchmarks in Creek in 2022. Dry Constituent concentrations were more frequently elevated at areas LC DC3 (the Dry Creek area immediately downstream of LCOII spoiling and prior to DCWMS effects) and LC SPDC, LC DCDS, and LC DC2 (the areas immediately downstream of the DCWMS) than at areas LC DC4 and LC DC1, likely due to increasing distance from LCOII operations and input of groundwater from reference area LC DCEF between LC DC2 and LC DC4 (Golder 2019b). Similar trends in aqueous constituents were not detected at reference areas (LC DCEF and LC UC), in the Fording River downstream of Dry Creek, or in Grace Creek (LC GRCK), except for nitrate which showed increasing trends at LC DCEF, LC FRB and LC GRCK and total selenium which increased at LC DCEF, LC UC and LC FRB. Operational changes to the DCWMS including development and implementation of the seasonal bypass and modification of discharge channel area LC SPDC have successfully mitigated organoselenium concentrations in the surface water as well as selenium bioaccumulation and effects to biota.

# 4 STUDY QUESTION 2: AQUEOUS TOXICITY

Acute toxicity testing was conducted with water samples collected from LC\_DC3 (n=5), LC\_DCDS (n=4), and LC\_SPDC (n=10) using the water flea *D. magna* and rainbow trout in 2022. Out of all samples collected, no samples failed the test criteria for acute toxicity for either organism (i.e., did not cause > 50% mortality to either organism; Table 4.1; Appendix Table D.1).

Chronic toxicity testing was performed quarterly on water flea (*C. dubia*) and green algae (*P. subcapitata*) using water samples collected from LC\_DCDS to evaluate the potential effects to benthic invertebrates in Dry Creek. Semi-annual chronic toxicity tests were conducted to evaluate potential effects on amphipods (*H. azteca*), fathead minnow, and rainbow trout. Results of chronic toxicity testing were compared to reference stations on the Fording River, Elk River, Michel Creek, and South Line Creek. The local reference comparison of interest for LC\_DCDS is FR\_UFR1 on the Fording River. Chronic toxicity test results in 2022 that were categorized by WSP (2023) as 'possible' or 'likely' adverse responses, and the possible causal factors of these responses, are briefly outlined below; see WSP (2023) for a complete discussion of results.

In Q1 2022, a "likely adverse response" was identified for effects on *C. dubia* reproduction, which was similar to 2020 and 2021 (Table 4.2, WSP 2023). Nitrate and/or nickel were identified as potential contributors to the observed responses reported between 2018 and 2022 (including the Q1 2022 responses (Table 4.2, WSP 2023). Chronic toxicity results in 2022 indicated that effects to *C. dubia* reproduction were of similar frequency to 2020, and less frequent than responses in 2021.

In Q1 2022, a "likely adverse response" was identified for cell yield of *P. subcapitata* (Table 4.2, WSP 2023). This is the first year where results have indicated a "likely adverse response," with only a "possible adverse response" being observed in 2020 and 2021, and no adverse responses seen in years before 2020. Similar to previous years, no water quality constituent has been identified as potentially contributing to observed responses. Briefly, constituents are first screened against applicable guidelines/benchmarks and no relevant constituent was identified as contributing to the effect meaning that these results could not be attributed to a specific constituent.

A "possible adverse response" was identified for dry weight of *H. azteca* in Q4 2022 (Table 4.2, WSP 2023). The frequency of possible or likely adverse responses of *H. azteca* to dry weight has remained similar since sampling began in 2019. WSP (2023) have indicated that "nickel and/or nitrate have been identified as potentially contributing factors in all *H. azteca* tests with an observed adverse response, and the evidence from *C. dubia* and *H. azteca* toxicity testing

Table 4.1: Summary of Acute Toxicity Test Results for LCO Dry Creek LAEMP Monitoring Stations, 2022 (Teck 2023)

|           | Water Station  |      | Water<br>(Daphnia          |               | Rainbow Trout (Oncorhynchus mykiss) |               |  |
|-----------|--|------|----------------------------|---------------|-------------------------------------|---------------|--|
| Teck Code | Description  | Year | # Tests > 50%<br>mortality | Total # tests | # Tests > 50%<br>mortality          | Total # tests |  |
| LC_DC3    | Dry Creek upstream of<br>Headpond                            | 2022 | 0                          | 5             | 0                                   | 5             |  |
| LC_DCDS   | Dry Creek downstream<br>of sediment ponds<br>outlet          | 2022 | 0                          | 4             | 0                                   | 4             |  |
| LC_SPDC   | Dry Creek sediment<br>ponds outlet; effluent<br>to Dry Creek | 2022 | 0                          | 10            | 0                                   | 10            |  |

Table 4.2: Results of Quarterly and Semi-Annual Chronic Toxicity Tests at LC\_DCDS 2015 to 2022<sup>a</sup> (Golder [2016, 2017a, 2018, 2019, 2020a, 2021, 2022], WSP 2023)

| Area |         |    |  | Water Flea<br>(Ceriodaphnia dubia)                                | b  | Ampi<br>( <i>Hyalella</i>              | •  | Green Alga<br>(Pseudokirchneriella<br>subcapitata) <sup>c</sup> | rchneriella (Oncorhynchus mykiss) <sup>d</sup> |   |                                      |  | Fathead Minnow<br>( <i>Pimephales promelas</i> ) <sup>d</sup> |  |                                       |                                      |   |  |  |
|------|---------|----|--|---|--|--|--|---|--|---|--------------------------------------|--|---|--|---------------------------------------|--------------------------------------|---|--|--|
|      | Quarter |    | Survival<br>(% control-<br>normalized) | Reproduction<br>(% control-<br>normalized;<br>Protocol-specified) | Reproduction<br>(% control-<br>normalized;<br>8-day) | Survival<br>(% control-<br>normalized) | Dry Weight<br>(% control-<br>normalized) | Cell Yield<br>(x10 <sup>4</sup> cells/ml)                       | Survival<br>(% control-<br>normalized)         | Viability<br>(% control-<br>normalized) | Length<br>(% control-<br>normalized) | Wet Weight<br>(% control-<br>normalized) | Hatch<br>(% control-<br>normalized)                           | Survival<br>(% control-<br>normalized) | Biomass<br>(% control-<br>normalized) | Length<br>(% control-<br>normalized) | Normal<br>Development<br>(% control-<br>normalized) |  |  |
|      |         | Q1 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2015    | Q2 | 111                                    | 87  | -  | -                                      | -  | 132.5   | -  | -                                       | -                                    | -  |   | -                                      | -                                     |                                      |   |  |  |
|      | 2015    | Q3 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  |   | -                                      | -                                     |                                      |   |  |  |
|      |         | Q4 | 111                                    | 103   | -  | -                                      | -  | 118.3   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2016    | Q2 | 90                                     | 62 <sup>UN</sup>  | -  | -                                      | -  | 118.5   | -  | -                                       | -                                    | -  |   | -                                      | -                                     | -                                    |   |  |  |
|      | 2010    | Q3 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q4 | 100                                    | 39 <sup>UN</sup>  | -  | -                                      | -  | 183.5   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      |                                       | -                                    |   |  |  |
|      | 2017    | Q2 | 100                                    | 87  | -  | -                                      | -  | 140.5   | -  | -                                       | -                                    | -  |   | -                                      | -                                     |                                      |   |  |  |
|      | 2017    | Q3 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q4 | 100                                    | 87  | -  | -                                      | -  | 123   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | -                                      | -   | -  | -                                      | -  | -   | -  |   | -                                    | -  | -   | -                                      | -                                     | -                                    |   |  |  |
|      | 2018    | Q2 | 100                                    | 77  | -  | -                                      | -  | 148.3   | -  | -                                       | -                                    | -  | -   |  | -                                     | -                                    |   |  |  |
| SC   | 2016    | Q3 | -                                      | -   | -  | -                                      | -  | -   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
| SGDG |         | Q4 | 100                                    | 85 <sup>NO3</sup>   | -  | -                                      | -  | 100.8   | -  | -                                       | -                                    | -  | -   | -                                      | -                                     | -                                    | -   |  |  |
| ၂ ၂  |         | Q1 | 100 ± 0                                | 90 ± 19   | 90 ± 19  | -                                      | -  | 82.8 ± 5.0  | -  | -                                       | -                                    | -  | 100 ± 0   | 100 ± 4                                | 85 ± 7                                | <u>88 ± 3</u>                        | 96 ± 4  |  |  |
|      | 2019    | Q2 | 90 ± 32                                | 87 ± 30   | 87 ± 30  | -                                      | -  | <u>112.0 ± 7.3</u>  | 95 ± 13  | 98 ± 16                                 | 105 ± 2                              | 112 ± 6                                  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2010    | Q3 | 90 ± 32                                | 111 ± 16  | 94 ± 14  | 94 ± 10                                | 65 ± 25 <sup>UN</sup>                    | 58.5 ± 6.5  | -  | -                                       | -                                    | -  | 98 ± 3  | 76 ± 20                                | 74 ± 13                               | 98 ± 2                               | 100 ± 0   |  |  |
|      |         | Q4 | 90 ± 32                                | 100 ± 18  | 100 ± 11   | 35 ± 33 <sup>NO3</sup>                 | 52 ± 30 <sup>NO3</sup>                   | 102.0 ± 7.0   | 73 ± 9 NO3                                     | 66 ± 13 NO3                             | 101 ± 4                              | 105 ± 3                                  | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | 100 ± 35                               | 68 ± 12 <sup>NO3</sup>  | <u>68 ± 12</u>                                       | -                                      | -  | 93 ± 3.7  | -  | -                                       | -                                    | -  | 100 ± 0   | 64 ± 43 UN, HI-RV                      | 58 ± 39 UN, HI-RV                     | 94 ± 4                               | 100 ± 0   |  |  |
|      | 2020    | Q2 | 100 ± 0                                | 92 ± 22   | 97 ± 12  | 87 ± 17                                | 49 ± 13 <sup>UN</sup>                    | 134 ± 5.6   | 104 ± 20 <sup>M</sup>                          | 97 ± 31 <sup>M</sup>                    | 99 ± 9 <sup>M</sup>                  | 109 ± 22 <sup>M</sup>                    | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2020    | Q3 | 100 ± 0                                | 89 ± 9  | <u>93 ± 12</u>                                       | -                                      | -  | <u>85 ± 5.7</u> UN  | -  | -                                       | -                                    | -  | 113 ± 4   | 99 ± 11                                | 69 ± 9                                | 86 ± 3                               | 100 ± 0   |  |  |
|      |         | Q4 | 100 ± 0                                | 76 ± 17   | <u>77 ± 17</u>                                       | 61 ± 23 <sup>UN, HI-RV</sup>           | 20 ± 6                                   | 112 ± 4.1   | 86 ± 9 <sup>M</sup>                            | 86 ± 9 <sup>M</sup>                     | 104 ± 2 <sup>M</sup>                 | 106 ± 5 <sup>M</sup>                     | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | 90 ± 32                                | <u>90 ± 36</u>  | -  | -                                      | -  | 78.5 ± 5 UN   | -  | -                                       | -                                    | -  | 89 ± 16   | 100 ± 18                               | 90 ± 7                                | 100 ± 8                              | 98 ± 5  |  |  |
|      | 2021    | Q2 | 100 ± 0                                | 96 ± 27   | -  | 98 ± 9                                 | _ e                                      | 69 ± 9.8  | 102 ± 4 <sup>M</sup>                           | 109 ± 7 <sup>M</sup>                    | 107 ± 2 <sup>M</sup>                 | 132 ± 16 <sup>M</sup>                    | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2021    | Q3 | 80 ± 42                                | 57 ± 42 Ni, NO3   | -  | 104 ± 0                                | 67 ± 7                                   | 68.5 ± 7.4 UN   | -  | -                                       | -                                    | -  | 105 ± 0   | 89 ± 28                                | 94 ± 11                               | 95 ± 4                               | 100 ± 8   |  |  |
|      |         | Q4 | 100 ± 0                                | <u>58 ± 16</u> Ni, NO3  | -  | 83 ± 36                                | 92 ± 19 Ni, NO3                          | <u>74.5 ± 4.9</u>   | 105 ± 4 <sup>M</sup>                           | 103 ± 7 <sup>M</sup>                    | 105 ± 5 <sup>M</sup>                 | 107 ± 10 <sup>M</sup>                    | -   | -                                      | -                                     | -                                    | -   |  |  |
|      |         | Q1 | 111 ± 0                                | <b>70 ± 19</b> Ni, NO3  | -  | -                                      | -  | 49 ± 6.7 UN   | -  | -                                       | -                                    | -  | 100 ± 4   | 91 ± 9                                 | 114 ± 13                              | 98 ± 7                               | 100 ± 0   |  |  |
|      | 2022    | Q2 | 100 ± 0                                | 96 ± 35   | -  | 96 ± 9                                 | <u>175 ± 28</u>                          | <u>87.0 ± 6.6</u>   | 104 ± 11 <sup>M</sup>                          | 114 ± 16 <sup>M</sup>                   | 103 ± 6 <sup>M</sup>                 | 98 ± 11 <sup>M</sup>                     | -   | -                                      | -                                     | -                                    | -   |  |  |
|      | 2022    | Q3 | 100 ± 0                                | 96 ± 38   | -  | -                                      | -  | 108.0 ± 7.0   | -  | -                                       | -                                    | -  | 93 ± 10 <sup>M</sup>  | 90 ± 7 <sup>M</sup>                    | 89 ± 10 <sup>M</sup>                  | 98 ± 5 <sup>M</sup>                  | 100 ± 0 <sup>M</sup>                                |  |  |
|      |         | Q4 | 100 ± 0                                | 102 ± 16  | -  | 100 ± 0                                | 57 ± 7 Ni, NO3                           | 66.0 ± 4.2  | 85 ± 5   | 83 ± 8                                  | 96 ± 5                               | 97 ± 11                                  | -   | -                                      | -                                     | -                                    | -   |  |  |



Notes: Q<sub>x</sub> = Calendar year quarters, "-" = no data available. Possible and likely symbols are annotated with constituent identified as potentially contributing to observed response: HI\_RV = high inter-replicate variability; NO3 = nitrate; Ni = Nickel; UN =unknown, no water quality constituent identified.

<sup>&</sup>lt;sup>a</sup> Results presented as percent survival or mean ± standard deviation.

b Ceriodaphnia dubia survival (% control normalized) and reproduction (% control normalized; protocol specified) toxicity tests were conducted for LC\_DCDS between 2015 and 2018 but not under Permit 107517. Standard deviations are not available for these results. Two test lengths were used to evaluate potential effects or C. dubia reproduction in 2020. These included: 1) a protocol-specified test length (i.e., reproduction was measured when ≥60 % of controls produced three or more broods; as per Environment Canada [2007c]); and 2) an 8-day test duration (Golder 2021). These two test lengths were used in 2019 and 2020 to evaluate potential brood effect. Prior to 2019, the protocol-specified test length was used.

<sup>&</sup>lt;sup>c</sup> Pseudokirchneriella subcapitata cell yield toxicity tests were conducted for LC\_DCDS between 2015 and 2018 but not under Permit 107517. Standard deviations are not available for these results.

<sup>&</sup>lt;sup>d</sup> Fathead minnow and rainbow trout chronic toxicity testing at LC\_DCDS was initiated in 2019

e H. azteca Q2 test organisms were disposed prior to measured dry weight due to a lab technician error (see Section 2.6), and therefore the initial Q2 tests have only survival data. In response to this, tests were repeated in Q3 for all stations.

collectively indicates that nickel exposure likely explains at least a portion of the variance in chronic crustacean toxicity."

Fathead minnow (Q1 and Q3; via evaluation of hatch, survival, biomass, length, and normal development) and rainbow trout (Q2 and Q4; survival, viability, length, and wet weight) results in 2022 did not differ from reference (Table 4.2, WSP 2023). For rainbow trout, Q2 results are considered the most relevant for evaluating potential effects on early life stages of the congenic westslope cutthroat trout, and all Q2 tests were categorized as no adverse response (Golder 2023).

Overall, acute toxicity testing of Dry Creek DCWMS effluent showed no test failures in all samples collected at LC DC3, LC DCDS, and LC SPDC in 2022 (Teck 2023). Chronic toxicity testing in 2022 identified possible adverse responses to H. azteca dry weight and likely adverse responses to C. dubia reproduction and P. subcapitata cell yield at LC DCDS, but the frequency and magnitude of these responses was temporally stable (i.e., no apparent consistent pattern of responses over time) except for the P. subcapitata response that increased in magnitude in 2022. No "likely" or "possible response" were seen in any of the fish tests in all quarters in Dry Creek in 2022. The chronic toxicity testing identified nickel and/or nitrate as potentially contributors to the observed effects on C. dubia reproduction and on H. azteca dry weight at LC DCDS (Golder 2023). Nickel and/or nitrate have been identified as potential contributors to observed effects in all chronic toxicity tests in all C. dubia and H. azteca tests at LC DCDS with an observed adverse response between 2018 to 2022. For nitrate, this corresponds to the increasing trend in concentrations observed at LC DCDS since 2018 (see Sections 5.4 for further discussion of potential effects of nitrate to the receiving environment). Teck has initiated an increase to explosives bagging (100% bagged at Dry Creek in 2022) under the LCO Nitrate Compliance Action Plan to reduce nitrate releases from waste rock placed in the LCO Dry Creek watershed. Chronic toxicity testing is one line of evidence that is used to evaluate the potential effects in a watershed and is used in conjunction with other endpoints to help assess overall effects.

# 5 STUDY QUESTION 3: BENTHIC INVERTEBRATE COMMUNITY

## 5.1 Background

Benthic invertebrate communities were sampled in September (Dry Creek, Fording River, and Grace Creek) in 2022 to support Study Question #3: "Are benthic invertebrate community endpoints within normal ranges derived based on samples collected at regional and local reference areas within the Elk River as part of the RAEMP and are the endpoints changing over time?". Benthic invertebrate community samples were also collected in May and November at LC\_DCDS to support the upcoming tissue permit limit for benthic invertebrate tissue selenium concentrations. Data collected in September are the focus of this section.

Benthic invertebrate community data collected for the present study were considered to be of good quality based on sorting efficiency, subsampling precision and accuracy, and taxonomic identification accuracy. Therefore, the associated data can be used with a high level of confidence for interpretation (Appendix B).

## 5.2 Dry Creek

Total benthic invertebrate abundance was within regional normal ranges at all Dry Creek sampling areas in September 2022, however, abundance was lower than site specific normal ranges in at least one replicate at all stations except LC DC3 (Figures 5.1 and 5.2). Taxonomic richness in September 2022 was within the regional normal range at all Dry Creek sampling areas, but at least one replicate from LC DC3 and LC DCDS fell outside the site-specific normal range (LC DC3 fell below and LC DCDS was higher that site-specific normal ranges; Figures 5.1 and 5.3). Except at station LC DC3, the proportion of EPT (%EPT) was within the regional normal range for all samples from Dry Creek; however, %EPT fell below the site-specific normal ranges in at least one replicate at LC DC3, LC DCDS, LC DC4 and LC DC1 (Figures 5.1 and 5.4). Abundance of EPT was similar to total abundance, where results from all Dry Creek areas were within the regional normal ranges; however, at least one replicate from all stations on Dry Creek (except LC DC3) were below the site-specific normal ranges (Appendix Figures E.1 and E.4). The proportion of Ephemeroptera (%E) was below the regional and/or site-specific normal ranges in at least one replicate from every Dry Creek area, and upstream areas (LC DC3, LC DCDS, and LC DC2) fell below the normal ranges more often than further downstream areas (Figures 5.1 and 5.5). Similarly, abundances of Ephemeroptera were below regional and/or site-specific normal ranges at all areas on Dry Creek (Appendix Figures E.1 and E.5). The proportion of Chironomidae (%C) was within the regional normal range at all Dry Creek

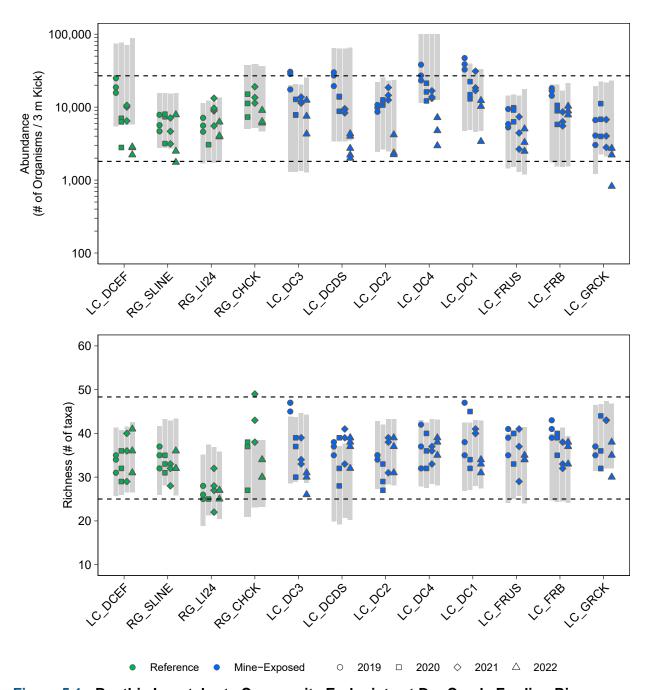


Figure 5.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

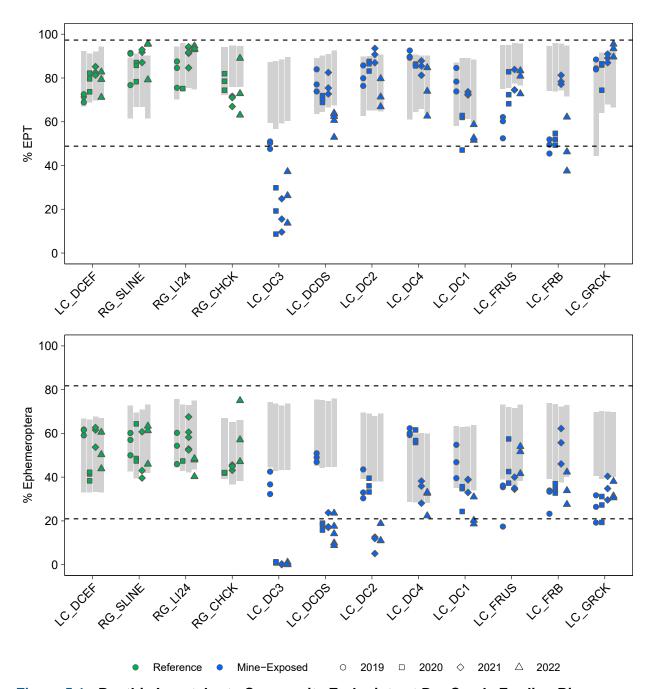


Figure 5.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

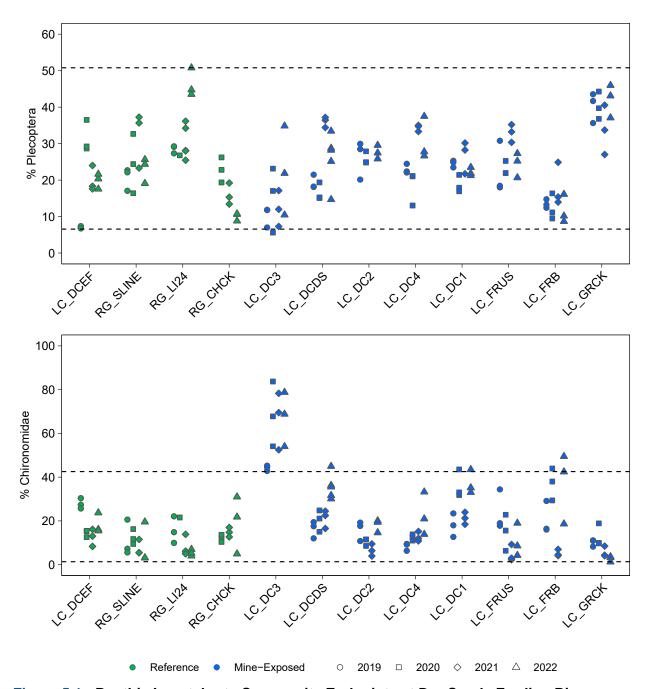


Figure 5.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

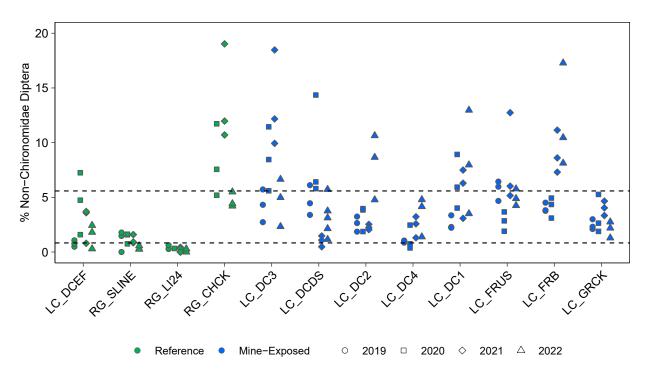


Figure 5.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

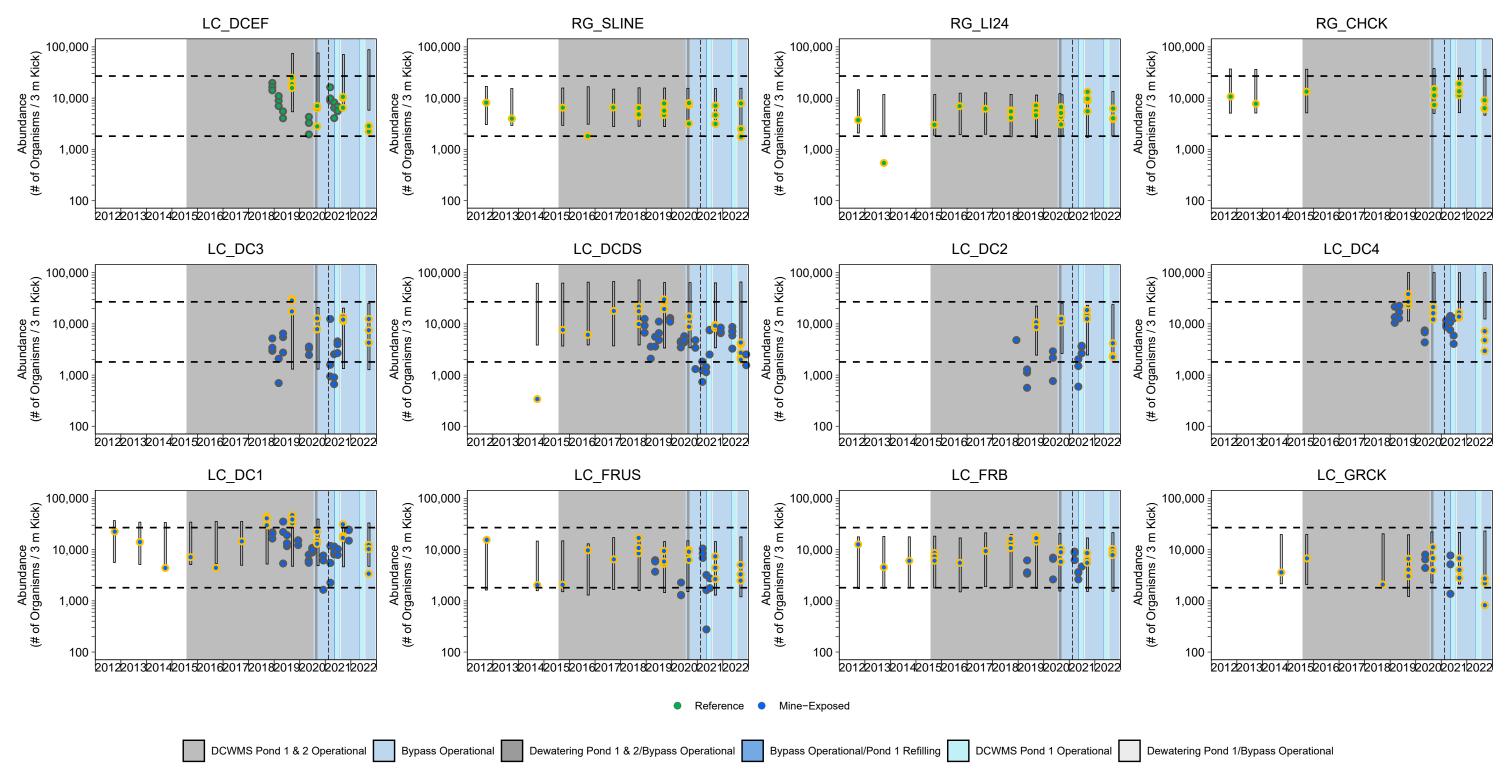


Figure 5.2: Benthic Invertebrate Community Abundance (# of Organisms / 3 m Kick) from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC1).

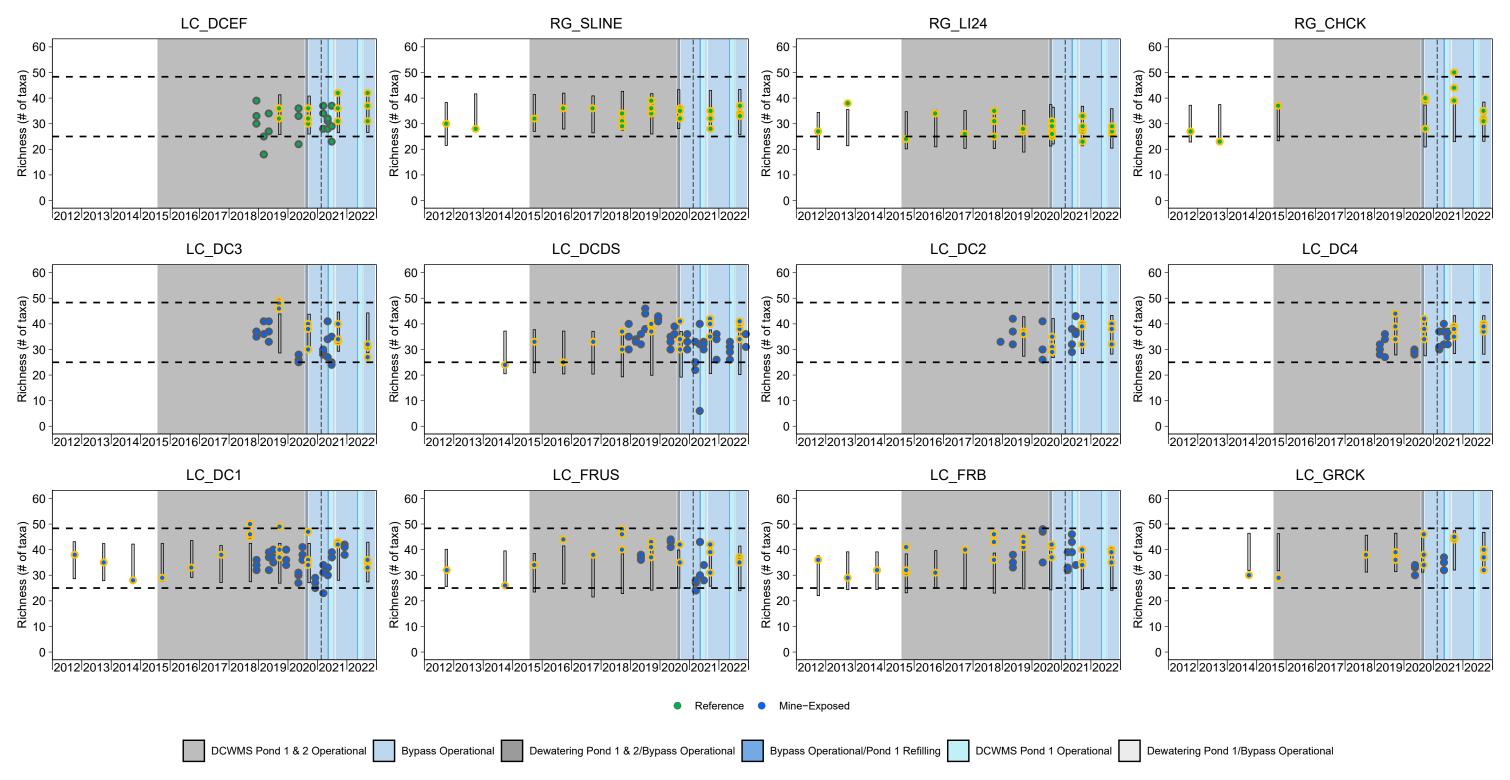


Figure 5.3: Benthic Invertebrate Community Richness (# of taxa) from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC1).

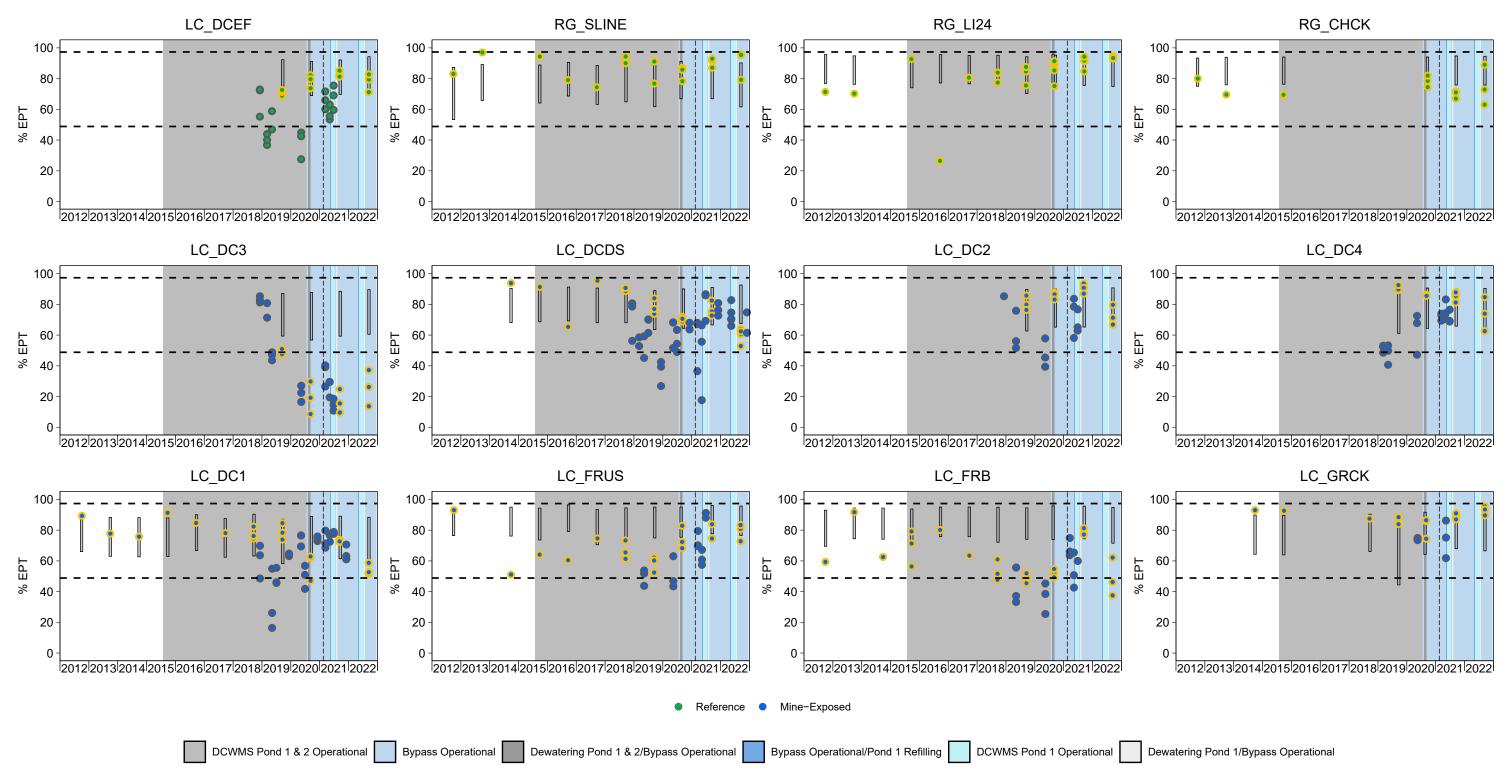


Figure 5.4: Benthic Invertebrate Community % EPT from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC1).

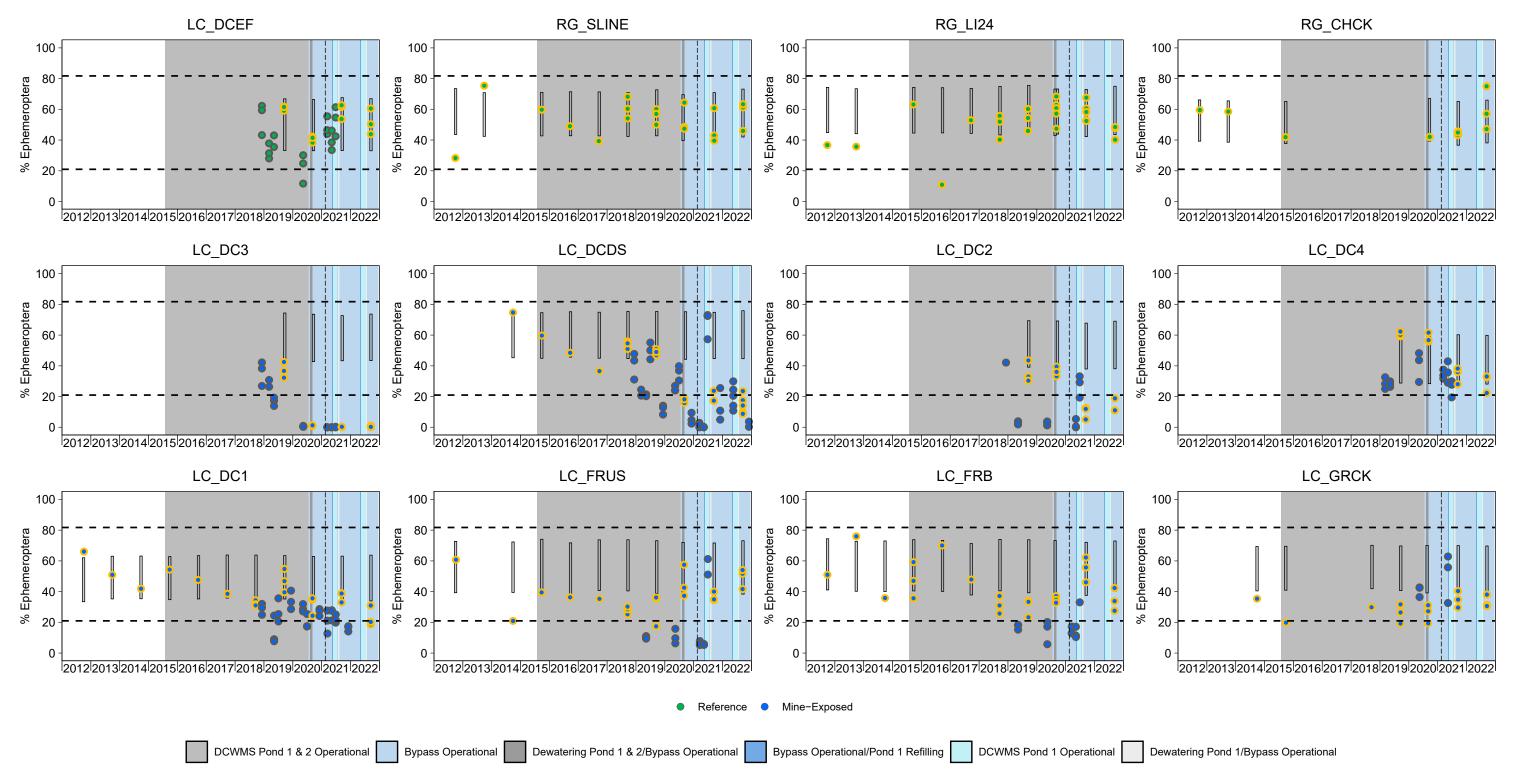


Figure 5.5: Benthic Invertebrate Community % Ephemeroptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC1).

stations except LC\_DC3, LC\_DCDS and LC\_DC1 where at least one replicate was above the range (Figures 5.1, 5.6 and 5.7). In contrast, abundances of Chironomidae were within the regional normal range for all Dry Creek areas (Appendix Figures E.1 and E.7). Proportions of non-Chironomidae Diptera (%NCD; e.g. Simuliidae and Psychodidae) were above regional normal range in at least one replicate from all areas in Dry Creek samples except LC\_DC4 (Figures 5.1 and 5.8). Similar to Chironomidae abundance, non-Chironomidae Diptera abundance were within the regional normal range for all Dry Creek areas.

In general, benthic invertebrate communities in Dry Creek upstream of the DCWMS and closest to the LCOII spoil (LC\_DC3) were most likely to have endpoints outside of normal ranges. Areas located closest to the outlet of the ponds (LC\_DCDS and LC\_DC2) also tended to have lower %E than other areas and compared to regional and site-specific normal ranges.

### 5.2.1 Fording River and Grace Creek

The majority of benthic invertebrate community endpoints associated with samples collected from the Fording River in September 2022 were within the respective regional normal ranges (Figure 5.1; Appendix Figure E.1). Benthic invertebrate community endpoints fell below normal ranges in at least one replicate from both LC\_FRUS and LC\_FRB for %EPT and in at least one replicate at LC\_FRB for %E. Benthic invertebrate community endpoints were above normal ranges for %Chironomidae at LC\_FRB and %non-Chironomidae Diptera at LC\_FRUS and LC\_FRB.

In 2022, %EPT, %E, %P, and %T, were all lower downstream of the mouth of Dry Creek in the Fording River (LC\_FRB) compared to upstream of Dry Creek (LC\_FRUS), whereas the opposite was true for total abundance, %O, %C, and %NCD (Appendix Table E.3). With this considered, there was no consistent temporal variation in the %EPT, %E, %P, and %T endpoints that was indicative of an influence on the benthic community downstream of Dry Creek (i.e., most endpoints in 2022 were similar to 2018/2019 at LC\_FRB; Appendix Table E.3). Secondly, water quality constituents were similar upstream and downstream of the mouth of Dry Creek in the Fording River and/or showed no temporal variation (except nitrite which was higher at LC\_FRB, but below guidelines, in 2022 despite being similar to RG\_FRUS in prior years; Appendix Table C.6). These together suggest that that there is a minimal influence of Dry Creek on benthic invertebrate community structure in the immediate downstream receiving environment.

The benthic invertebrate community within Grace Creek had endpoints in September 2022 that were generally within regional normal ranges, as expected, based on current lack of mine-related influence. The exception to this was total, EPT and E abundance, which was below both site-specific and regional normal ranges in 2022 in at least one replicate; and %EPT

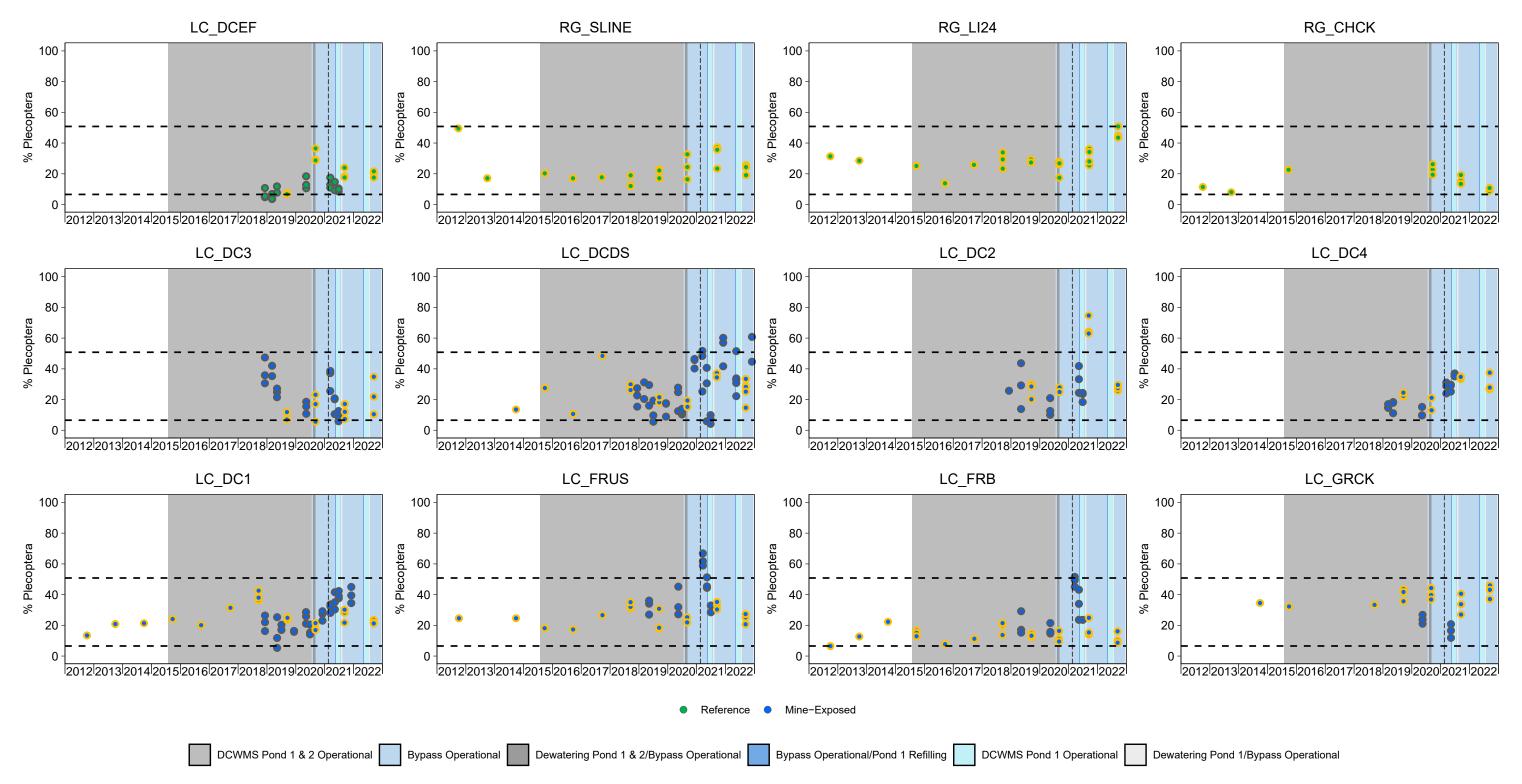


Figure 5.6: Benthic Invertebrate Community % Plecoptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

59

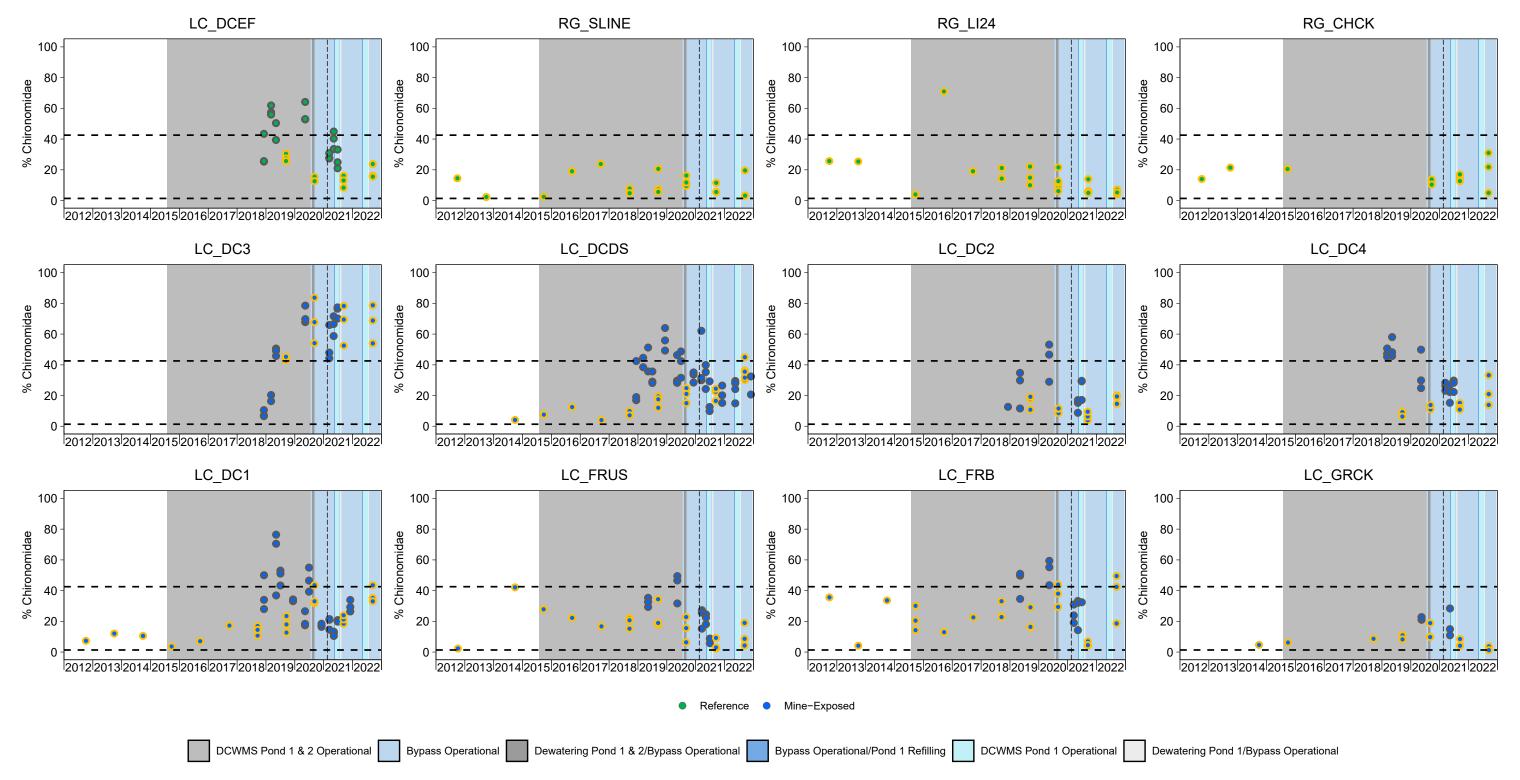


Figure 5.7: Benthic Invertebrate Community % Chironomidae from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

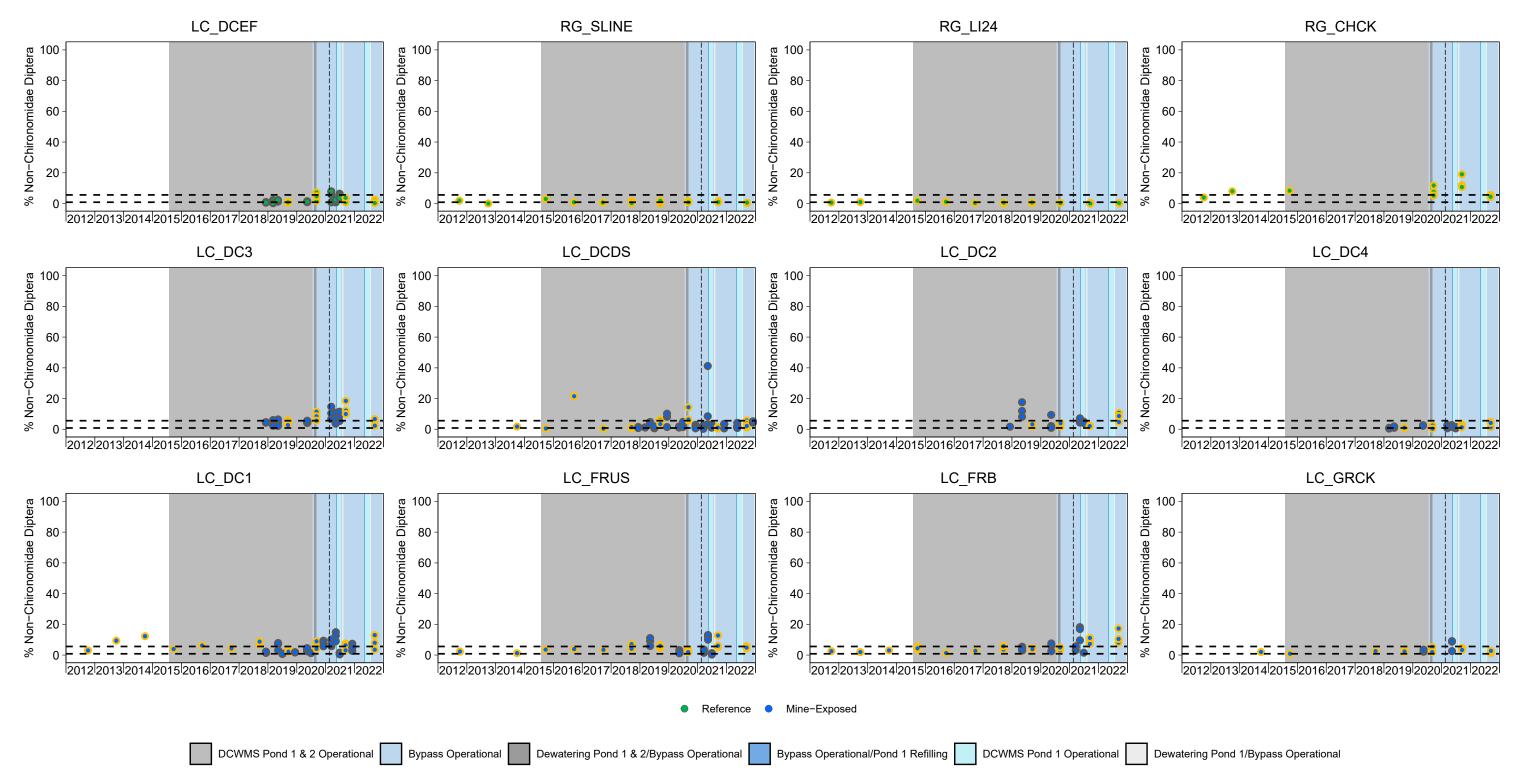


Figure 5.8: Benthic Invertebrate Community % Non-Chironomidae Diptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

which was above the site-specific normal ranges and % E which was below the site-specific normal ranges in 2022 (Figure 5.1; Appendix figure E.1).

## 5.3 Spatiotemporal Changes and Biological Trigger Assessment

Analysis of potential changes in benthic invertebrate community endpoints over time and among mine-exposed areas in Dry Creek and the Fording River relative to changes at upstream reference areas (i.e., LC\_DCEF for Dry Creek areas and LC\_FRUS<sup>11</sup> for LC\_FRB) were explored using data from Dry Creek areas over the 2019 to 2022 period and data from Fording River areas over the 2018 to 2022 period (Figures 5.1 to 5.8; Appendix Figures E.1 to E.10, Appendix Tables E.2 and E.3; see Appendix A for ANOVA methods).

Total abundance, EPT abundance and E abundance of benthic invertebrates significantly decreased between 2021 and 2022 at most areas in Dry Creek, except LC\_DC3 (Figures 5.1 and 5.2; Appendix Table E.2). EPT abundance at mine-exposed sites in Dry Creek where similar to those at the reference stations; however, E abundance was lower at LC\_DC3 and LC\_DCDS in 2022. Total abundance in 2020 to 2022 was significantly lower than in 2019 in all study areas except LC\_DC2 (2021 and 2020) and LC\_DC4 (2020; where no temporal differences were observed; Appendix Table E.2). There was no change in total abundance at either Fording River area (LC\_FRB and LC\_FRUS) in 2022 compared to 2021, however total abundance was lower at LC\_FRUS in 2022 compared 2018 as was the case in 2021 (Appendix Table E.3).

The decrease in total abundance (driven by a decrease in ETP and E abundance) in most Dry Creek stations in 2022 compared to 2021 was accompanied by a decrease at the reference station (LC\_DCEF); all mine-exposed sites fell within the range of abundance seen at LC\_DCEF, except LC\_DC3 and LC\_DC1 where abundance was significantly higher than reference (Figures 5.1 and 5.2; Appendix Table E.2, Appendix Figure E.4). Total abundance and EPT abundance also decreased at RG\_CHCK (RAEMP reference station) in 2022 compared to 2021, decreases in abundance across the broader area could point to a regional environmental stressor (e.g., temperature or rainfall; Figure 5.1). RG\_CHCK is a second potential reference station located approximately 8 km upstream of Dry Creek (Figure 2.1). It is a small tributary (similar in size to Dry Creek), that flows into the Fording River. RG\_CHCK has a similar benthic invertebrate community as LC\_DCEF and stations in Dry Creek (specifically, LC\_DC2, LC\_DC4, and LC\_DC1) making is a good candidate as a second reference station for Dry Creek. Similar changes in BIC abundance were not seen at RG SLINE or

<sup>&</sup>lt;sup>11</sup> LC\_FRUS is not in reference condition; however, due to its position upstream of the mouth of Dry Creek, it is being used as an upstream reference area for LC\_FRB (located downstream of the mouth of Dry Creek) to assess potential effects of Dry Creek inputs on Fording River benthic invertebrate communities.



RG\_LI24 (LCO LAEMP reference stations; Figure 2.1 and 5.1) which are located slightly further away. It is important to note that at LC\_DCEF, in 2022 compared to 2021, the proportions of E and EPT remained relatively stable and for all other benthic invertebrate community endpoints (e.g., %Plecoptera, %Trichoptera, %Oligochaeta, %Chironomidae, and %Non-Chironomidae Diptera), there were no significant differences, or patterns of change over time (Figures 5.1 and 5.4 to 5.8; Appendix Figure E.3).

There were no temporal or spatial (comparison to LC\_DCEF) differences in taxonomic richness observed at all Dry Creek study areas in 2022 relative to any other study year, except LC\_DC3 which exhibited lower richness than 2019 but has been stable since (2019 to 2021; Figure 5.3; Appendix Table E.2). At the Fording River study areas (LC\_FRUS and LC\_FRB), a similar pattern was observed for richness in 2022 as 2021 (i.e., lower relative to 2018 but stable from 2019 to 2022, and no difference in between the downstream and upstream area; Figures 5.1 and 5.3; Appendix Table E.3).

Within Dry Creek, percent EPT was significantly lower in 2022 relative to 2021 with the exception of LC\_DC3 which decreased in 2020 compared to 2019 but has not changed since (Figures 5.1 and 5.4; Appendix Table E.2). The decrease in %EPT at all Dry Creek sites was largely driven by a decrease in abundance and proportion of Ephemeroptera; however, there is some variability between sites (i.e., a decrease in Plecoptera played a significant role at LC\_DCDs in 2022; Appendix Figure E.6). Percent EPT was significantly lower at LC\_DC3, LC\_DCDs, and LC\_DC1 compared to the reference station in 2022. Within the Fording River, a decrease in %EPT was observed at LC\_FRB (driven by a decrease in %E, %P and %T) in 2022 relative to 2021; however, proportions are similar to earlier study years (2018 to 2020). This temporal decrease resulted in a significantly lower %EPT at LC\_FRB compared to LC\_FRUS in 2022 (Appendix Table E.3).

In addition to assessment of spatial and temporal changes, percent EPT was also compared against the biological trigger (i.e., lower limit) established for this endpoint for Dry Creek LAEMP monitoring areas with available water quality predictions (i.e., two mine-exposed areas [LC\_DCDS and LC\_DC1]; see Appendix H for details). The percentage of EPT in all samples from both study areas was below the trigger and within habitat-adjusted normal ranges. Percent EPT at these areas has previously been flagged for further investigation in the RAEMP based on benthic invertebrate community results (Minnow 2020b). Further information regarding the percent EPT biological trigger as it pertains to the LCO Dry Creek LAEMP can be found in Appendix H.

Significant decreases in %E were observed at all mine-exposed areas in Dry Creek over the 2019 to 2022 period (Figures 5.1 and 5.5; Appendix Table E.2). In some cases, the significant

decrease occurred in 2020 (i.e., LC\_DC3, LC\_DCDS, and LC\_DC1), whereas in other cases, the significant decrease occurred in 2021 (i.e., LC\_DC2 and LC\_DC4) or 2022 (a second decrease for LC\_DC1; Figure 5.5; Appendix Table E.2). At the reference area (LC\_DCEF), %E initially decreased in 2020 relative to 2019, but returned in 2021 and 2022 to a similar percentage as observed in 2019 (Figures 5.1 and 5.5; Appendix Table E.2). The temporal decreases in %E observed at all mine-exposed areas resulted in all areas having significantly lower %E relative to the reference area in 2022 (and in many cases, 2021, 2020, and 2019; Figure 5.5; Appendix Table E.2).

A nearly opposite pattern to that of %E was observed for %Plecoptera (%P) at the Dry Creek study areas, with LC\_DC3 and LC\_DCDS exhibiting a significant increase in %P over time (2022 relative to 2019; Figure 5.6; Appendix Table E.2). Over the same time period, %P measured at the reference area (LC\_DCEF) ranged from its lowest in 2019 and 2022 to highest in 2020 (Figure 5.6). As a result of the temporal patterns observed at Dry Creek study areas, almost all the mine-exposed areas differed from the reference area with respect to %P over time, due to the substantial increase in %P at the reference area in 2020, most mine-exposed areas exhibited significantly lower %P relative to the reference area that year (Appendix Table E.2). Then in 2021, when %P decreased at the reference area, but increased at almost all mine-exposed areas, significantly higher %P was noted at most mine-exposed areas relative to the reference area (Appendix Table E.2). % P has remained higher than reference at LC\_DC2 and LC\_DC4 in 2022. In the Fording River, %P was highest at both the downstream and upstream study areas in 2018 and 2021, and lowest in 2019, 2020 and 2022, with the downstream area consistently exhibiting lower %P than the upstream area in all years (Figure 5.6; Appendix Table E.3).

For most other benthic invertebrate community endpoints (e.g., %Trichoptera, %Oligochaeta, %Chironomidae, and %Non-Chironomidae Diptera), there were either no significant differences, or no obvious patterns of change over time or relative to reference within Dry Creek and the Fording River that would potentially be indicative of a mine-related influence (Figures 5.6 to 5.8; Appendix Figures E.7 to E.9, Appendix Tables E.2 and E.3).

Overall, %E appeared to be the endpoint most likely linked to a mine-related influence. Both the relative proportion and total abundance of Ephemeroptera decreased at all mine-exposed areas on Dry Creek over the 2019 to 2022 monitoring period, and percentages measured at the mine-exposed areas were almost always significantly lower than those measured in the reference area, particularly in 2021 and 2022. Unlike previous years where %EPT was unchanged compared to 2019, the decreased in proportion and abundance of Ephemeroptera in 2022 was reflected in a decrease in the proportion and abundance of EPT.

Generally, in previous years (2021 to 2019) proportions of EPT did not reflect the patterns observed in %E because %P often increased to offset the observed changes. In the Fording River in 2022, %EPT, %E, %P, and %T, were all lower downstream of the mouth of Dry Creek in the Fording River (LC\_FRB) compared to upstream of Dry Creek (LC\_FRUS); however, there has been very few temporal changes in benthic community endpoints (i.e., portions are no different than 2018 at either station) and there were no changes in water quality that would be indicative of an influence of Dry Creek on the downstream receiving environment.

# 5.4 Correlation Analysis

Spearman Rank Correlation analysis was used to assess relationships between benthic invertebrate community endpoints and physicochemical data (e.g., water quality constituents and habitat variables) collected from all Dry Creek LAEMP study areas in September 2019 to 2022 (Table 5.1; Appendix Figure E.11). Data were not screened against benchmarks or guidelines to refine the assessed physicochemical variables prior to correlation analysis; in addition, although correlation is a fundamental tool applied for exploring data and generating evidence of potential causation, it is not equal to causation (e.g., Suter 2015). Correlations results were discussed if their correlation coefficient (R<sub>s</sub>) was less than or equal to -0.6 or greater than or equal to 0.6 and their p-value was less than 0.0001 (Appendix Figure E.11) and the discussion was focused on correlations with %E (for which most significant relationships were reported).

In 2022, total nickel and nitrate were significantly negatively correlated with %E (Table 5.1). Both nickel and nitrate were associated with chronic toxicity responses in *Ceriodaphnia dubia* (*C.dubia*) and *Hyalella azteca* (*H. azteca*) in 2022 (See section 4). Additionally, nitrate concentrations were above updated effects concentrations and dissolved nickel concentrations were above proposed benchmarks at Dry Creek stations in 2022. Thus, the evidence supports the potential for mine-related changes in nickel and nitrate to be influencing benthic invertebrate community structure in Dry Creek.

%E was also significant correlated with, total molybdenum, total thallium, total zinc and some selenium species (i.e., dimethylselenoxide, selenate, and selenite); however, neither molybdenum nor thallium were higher than BCWQGs; therefore, there is no direct causal link between these constituents and mayfly survival. In addition, no relationship between aqueous total molybdenum, total thallium, total zinc and %E was found in the RAEMP or in previous Dry Creek LAEMP reports despite increasing concentrations of these constituents, thus the correlation observed in the current study is likely coincidental (Minnow 2020c). Lastly, various selenium species (i.e., dimethylselenoxide, selenate, and selenite) were also correlated with the decrease in %E; however, benthic invertebrate tissue selenium concentrations are a better indicator of direct effects on community and there was no correlation between any

Table 5.1: Spearman's Correlation Relationships between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, Dry Creek, 2019 to 2022

| Parameter                                       | Abundance (# organisms/<br>3 min kick) |          | Richnes        | Richness (# taxa) % EPT |                | EPT      | % Ephemeroptera |          | % Plecoptera |          | % Trichoptera  |          | % Oligochaeta  |          | % Non-Chironomidae<br>Diptera |          | % Chironomidae |          |
|---|--|----------|----------------|-------------------------|----------------|----------|-----------------|----------|--------------|----------|----------------|----------|----------------|----------|-------------------------------|----------|----------------|----------|
|   | r <sub>s</sub>                         | p-value  | r <sub>s</sub> | p-value                 | r <sub>s</sub> | p-value  | r <sub>s</sub>  | p-value  | $r_s$        | p-value  | r <sub>s</sub> | p-value  | r <sub>s</sub> | p-value  | r <sub>s</sub>                | p-value  | r <sub>s</sub> | p-value  |
| Calcite Index                                   | 0.3                                    | 0.000491 | 0.1            | 0.166                   | -0.4           | 0.000209 | 0.2             | 0.11     | -0.4         | 0.000135 | -0.4           | <0.0001  | 0.1            | 0.149    | 0.2                           | 0.0709   | 0.2            | 0.0214   |
| Calcite (%)                                     | 0.3                                    | 0.000492 | 0.1            | 0.165                   | -0.3           | 0.000497 | 0.1             | 0.123    | -0.3         | 0.000471 | -0.4           | <0.0001  | 0.2            | 0.112    | 0.2                           | 0.0626   | 0.2            | 0.046    |
| Concreted (mean)                                | 0.0                                    | 0.908    | -0.1           | 0.234                   | -0.4           | 0.00016  | -0.1            | 0.378    | -0.3         | 0.00142  | -0.4           | <0.0001  | 0.0            | 0.918    | 0.1                           | 0.227    | 0.4            | <0.0001  |
| Embeddedness (%)                                | -0.5                                   | <0.0001  | -0.1           | 0.511                   | -0.2           | 0.0568   | 0.0             | 0.885    | -0.1         | 0.367    | 0.0            | 0.617    | 0.0            | 0.715    | 0.1                           | 0.161    | 0.1            | 0.126    |
| D16   | 0.0                                    | 0.61     | -0.1           | 0.167                   | -0.1           | 0.419    | 0.0             | 0.689    | 0.0          | 0.934    | 0.1            | 0.429    | 0.0            | 0.692    | 0.1                           | 0.164    | 0.0            | 0.974    |
| D84   | 0.3                                    | 0.000793 | -0.1           | 0.415                   | -0.4           | <0.0001  | 0.1             | 0.471    | -0.5         | <0.0001  | -0.3           | 0.000197 | 0.0            | 0.722    | 0.2                           | 0.0963   | 0.5            | <0.0001  |
| Water Velocity (m/s)                            | 0.2                                    | 0.0648   | 0.2            | 0.0324                  | 0.0            | 0.694    | 0.1             | 0.499    | 0.0          | 0.636    | 0.0            | 0.717    | 0.3            | 0.000421 | 0.1                           | 0.129    | -0.2           | 0.0585   |
| Water Depth (cm)                                | -0.2                                   | 0.117    | 0.1            | 0.235                   | -0.2           | 0.0096   | 0.1             | 0.323    | -0.3         | 0.00761  | -0.2           | 0.0744   | 0.2            | 0.116    | 0.3                           | 0.000485 | 0.0            | 0.999    |
| Annual Temperature (oC)                         | 0.3                                    | 0.000259 | 0.1            | 0.37                    | 0.2            | 0.034    | 0.2             | 0.105    | 0.0          | 0.955    | 0.3            | 0.00115  | 0.1            | 0.386    | 0.0                           | 0.676    | -0.2           | 0.0215   |
| Annual Total Alkalinity as CaCO3 (mg/L)         | -0.2                                   | 0.033    | 0.2            | 0.0741                  | 0.0            | 0.714    | 0.2             | 0.0685   | 0.1          | 0.552    | -0.2           | 0.0768   | 0.3            | 0.00443  | 0.1                           | 0.152    | -0.2           | 0.0141   |
| Annual Nitrate (mg/L as N)                      | 0.0                                    | 0.672    | -0.1           | 0.331                   | -0.4           | <0.0001  | -0.6            | <0.0001  | -0.1         | 0.419    | 0.1            | 0.371    | -0.1           | 0.132    | 0.3                           | 0.00127  | 0.4            | <0.0001  |
| Annual Nitrite (mg/L s N)                       | 0.4                                    | <0.0001  | 0.0            | 0.999                   | -0.2           | 0.117    | -0.3            | 0.000699 | -0.1         | 0.368    | 0.2            | 0.0502   | -0.2           | 0.0406   | 0.1                           | 0.191    | 0.2            | 0.0122   |
| Annual Ammonia (mg/L as N)                      | 0.6                                    | <0.0001  | 0.2            | 0.0407                  | 0.0            | 0.922    | 0.1             | 0.576    | -0.2         | 0.0359   | 0.0            | 0.939    | -0.1           | 0.561    | -0.1                          | 0.538    | 0.1            | 0.452    |
| Annual Phosphorus (mg/L)                        | 0.1                                    |          | -0.1           | 0.461                   | -0.2           | 0.0337   | -0.5            | <0.0001  | 0.0          | 0.638    | 0.2            | 0.0281   | -0.2           | 0.0568   | 0.2                           | 0.0964   | 0.4            | 0.000149 |
| Annual Sulphate (mg/L)                          | -0.2                                   | 0.0409   | 0.0            | 0.891                   | -0.5           | <0.0001  | -0.5            | <0.0001  | -0.1         | 0.186    | -0.1           | 0.526    | 0.1            | 0.245    | 0.4                           | <0.0001  | 0.3            | 0.00165  |
| Annual Total Dissolved Solids (mg/L)            | -0.1                                   | 0.126    | 0.0            | 0.845                   | -0.5           | <0.0001  | -0.5            | <0.0001  | -0.1         | 0.296    | 0.0            | 0.685    | 0.0            | 0.651    | 0.4                           | <0.0001  | 0.4            | 0.000219 |
| Annual Total Antimony (mg/L)                    | 0.2                                    | 0.0138   | -0.1           | 0.313                   | -0.3           | 0.000402 | -0.5            | <0.0001  | -0.1         | 0.265    | 0.1            | 0.311    | -0.3           | 0.00121  | 0.1                           | 0.525    | 0.5            | < 0.0001 |
| Annual Total Arsenic (mg/L)                     | 0.2                                    | 0.0174   | -0.1           | 0.294                   | -0.3           | 0.00236  | -0.5            | <0.0001  | -0.1         | 0.417    | 0.1            | 0.129    | -0.3           | 0.00263  | 0.1                           | 0.138    | 0.4            | < 0.0001 |
| Annual Total Barium (mg/L)                      | 0.4                                    | 0.000125 | -0.1           | 0.168                   | 0.1            | 0.609    | 0.1             | 0.253    | 0.0          | 0.759    | 0.0            | 0.783    | -0.3           | 0.000381 | -0.2                          | 0.0617   | 0.1            | 0.193    |
| Annual Total Boron (mg/L)                       | -0.4                                   | <0.0001  | -0.1           | 0.415                   | 0.1            | 0.371    | -0.5            | <0.0001  | 0.4          | <0.0001  | 0.3            | 0.000576 | 0.0            | 0.97     | -0.1                          | 0.446    | 0.0            | 0.64     |
| Annual Dissolved Cadmium (µg/L)                 | 0.2                                    | 0.11     | -0.2           | 0.112                   | -0.4           | <0.0001  | -0.5            | <0.0001  | -0.1         | 0.262    | 0.1            | 0.242    | -0.3           | 0.00138  | 0.1                           | 0.235    | 0.5            | <0.0001  |
| Annual Total Chromium (mg/L)                    | -0.2                                   | 0.0173   | 0.2            | 0.0928                  | 0.0            | 0.703    | -0.3            | 0.00191  | 0.2          | 0.0603   | 0.2            | 0.0782   | 0.4            | <0.0001  | 0.3                           | 0.000243 | -0.2           | 0.0239   |
| Annual Total Cobalt (mg/L)                      | 0.2                                    | 0.0183   | 0.1            | 0.259                   | 0.0            | 0.734    | -0.4            | <0.0001  | 0.0          | 0.673    | 0.2            | 0.0625   | 0.1            | 0.267    | 0.3                           | 0.0051   | 0.0            | 0.934    |
| Annual Total Copper (mg/L)                      | -0.2                                   | 0.0264   | 0.1            | 0.489                   | -0.3           | 0.000411 | -0.4            | 0.000176 | -0.1         | 0.374    | 0.0            | 0.789    | 0.1            | 0.212    | 0.5                           | <0.0001  | 0.2            | 0.012    |
| Annual Total Iron (mg/L)                        | -0.2                                   | 0.0767   | 0.2            | 0.08                    | 0.0            | 0.846    | -0.3            | 0.00105  | 0.2          | 0.0658   | 0.1            | 0.227    | 0.4            | 0.000218 | 0.4                           | <0.0001  | -0.2           | 0.0546   |
| Annual Total Lead (mg/L)                        | -0.1                                   | 0.163    | 0.1            | 0.273                   | 0.1            | 0.414    | -0.3            | 0.000472 | 0.2          | 0.018    | 0.2            | 0.013    | 0.3            | 0.000451 | 0.4                           | 0.000158 | -0.2           | 0.0255   |
| Annual Total Lithium (mg/L)                     | -0.3                                   | 0.000673 | -0.2           | 0.0483                  | -0.5           | <0.0001  | -0.3            | 0.000462 | -0.2         | 0.0562   | -0.2           | 0.032    | 0.0            | 0.934    | 0.3                           | 0.000853 | 0.4            | 0.000148 |
| Annual Total Manganese (mg/L)                   | 0.0                                    | 0.668    | 0.2            | 0.0689                  | 0.1            | 0.323    | -0.3            | 0.000499 | 0.3          | 0.00343  | 0.2            | 0.0709   | 0.3            | 0.00369  | 0.3                           | 0.00269  | -0.2           | 0.0321   |
| Annual Total Molybdenum (mg/L)                  | 0.1                                    | 0.338    | 0.0            | 0.68                    | -0.2           | 0.0148   | -0.6            | <0.0001  | 0.1          | 0.436    | 0.3            | 0.00122  | -0.2           | 0.0349   | 0.1                           | 0.402    | 0.4            | <0.0001  |
| Annual Total Nickel (mg/L)                      | 0.1                                    | 0.243    | -0.1           | 0.401                   | -0.4           | <0.0001  | -0.6            | <0.0001  | -0.1         | 0.33     | 0.2            | 0.0579   | -0.2           | 0.0963   | 0.3                           | 0.00274  | 0.5            | < 0.0001 |
| Annual Total Selenium (μg/L)                    | -0.1                                   | 0.206    | 0.0            | 0.668                   | -0.5           | <0.0001  | -0.5            | <0.0001  | -0.1         | 0.22     | 0.0            | 0.743    | 0.0            | 0.719    | 0.4                           | <0.0001  | 0.3            | 0.000234 |
| Annual Total Thallium (mg/L)                    | 0.0                                    | 0.666    | 0.0            | 0.798                   | -0.2           | 0.0129   | -0.7            | <0.0001  | 0.1          | 0.275    | 0.3            | 0.000484 | 0.1            | 0.563    | 0.2                           | 0.0101   | 0.3            | 0.00566  |
| Annual Total Uranium (mg/L)                     | -0.3                                   | 0.00454  | 0.0            | 0.859                   | -0.4           | <0.0001  | -0.5            | <0.0001  | -0.1         | 0.239    | -0.1           | 0.473    | 0.2            | 0.038    | 0.5                           | <0.0001  | 0.2            | 0.0186   |
| Annual Total Zinc (mg/L)                        | -0.2                                   | 0.0556   | -0.2           | 0.028                   | -0.4           | <0.0001  | -0.6            | <0.0001  | 0.0          | 0.988    | 0.1            | 0.128    | 0.0            | 0.666    | 0.3                           | 0.000394 | 0.4            | < 0.0001 |
| Annual Dimethylseleneoxide (μg/L)               | 0.2                                    | 0.0292   | -0.1           | 0.322                   | -0.3           | 0.000722 | -0.6            | <0.0001  | -0.1         | 0.452    | 0.3            | 0.00294  | -0.2           | 0.0514   | 0.2                           | 0.127    | 0.4            | < 0.0001 |
| Annual Methylseleninic Acid (µg/L)              | 0.3                                    | 0.000441 | 0.0            | 0.871                   | -0.3           | 0.000769 | -0.4            | <0.0001  | -0.2         | 0.0377   | 0.2            | 0.0193   | -0.2           | 0.117    | 0.1                           | 0.197    | 0.4            | < 0.0001 |
| Annual Selenate (µg/L)                          | -0.1                                   | 0.241    | -0.1           | 0.292                   | -0.5           | <0.0001  | -0.6            | <0.0001  | -0.1         | 0.311    | 0.0            | 0.634    | -0.1           | 0.6      | 0.4                           | 0.000169 | 0.4            | <0.0001  |
| Annual Selenite (μg/L)                          | 0.3                                    | 0.00557  | -0.1           | 0.552                   | -0.4           | <0.0001  | -0.6            | <0.0001  | -0.2         | 0.0533   | 0.1            | 0.153    | -0.1           | 0.14     | 0.2                           | 0.0322   | 0.5            | <0.0001  |
| Dimethylseleneoxide (% of Total Selenium)       | 0.1                                    | 0.26     | 0.0            | 0.881                   | 0.4            | <0.0001  | 0.3             | 0.000678 | 0.1          | 0.288    | 0.1            | 0.17     | -0.1           | 0.552    | -0.5                          | <0.0001  | -0.2           | 0.0327   |
| Methylseleninic Acid (% of Total Selenium)      | 0.1                                    | 0.393    | 0.0            | 0.857                   | 0.4            | 0.000244 | 0.4             | 0.000189 | 0.0          | 0.659    | 0.1            | 0.243    | 0.0            | 0.689    | -0.4                          | <0.0001  | -0.2           | 0.0905   |
| Selenate (% of Total Selenium)                  | 0.1                                    | 0.619    | -0.1           | 0.284                   | -0.1           | 0.442    | -0.1            | 0.271    | 0.0          | 0.714    | 0.1            | 0.231    | -0.1           | 0.354    | 0.0                           | 0.901    | 0.2            | 0.0579   |
| Selenite (% of Total Selenium)                  | 0.3                                    | 0.00447  | 0.0            | 0.724                   | 0.2            | 0.1      | 0.1             | 0.398    | 0.0          | 0.881    | 0.1            | 0.355    | 0.0            | 0.763    | -0.3                          | 0.00501  | 0.0            | 0.841    |
| Benthic Invertebrate Tissue Selenium (mg/kg dw) | 0.2                                    | 0.115    | 0.0            | 0.755                   | -0.3           | 0.00613  | -0.2            | 0.105    | -0.2         | 0.0676   | 0.2            | 0.059    | -0.1           | 0.301    | 0.2                           | 0.0143   | 0.3            | 0.00738  |

P-value < 0.05/47 (0.05 Bonferroni Corrected for 47 independent comparisons).

Notes: D16 and D84 are sediment size parameters corresponding to the 16th and 84th percentile of the sediment size distributions (equivalent to +/- 1SD from a normal distribution). For example, D16 is the sediment size for which 16% of the sediment sample is finer. PC1, PC2, and PC3 are axes from Principal Component Analysis (PCA) of annual water chemistry analytes calculated using data from 2019 to 2022. Annual water chemistry variables were calculated using September data from 2019 to 2022 from: LC\_DC5, LC\_DC1, LC\_DC3, LC\_DC1, LC\_DC3, LC\_DC1, LC\_DC3, LC\_DC3,

BIC endpoints and benthic invertebrate tissue concentrations in 2022 (Table 5.1). Additionally, mean tissue concentrations were not higher than EVWQP tissue benchmarks in 2022 (See Section 6.2). It is, therefore, unlikely that aqueous selenium is driving changes in benthic community in 2022.

Decreasing total and relative abundance of Ephemeroptera was noted in all mine-exposed areas of Dry Creek commensurate with increasing aqueous concentrations of many mine-related constituents, including nitrate, and nickel, and other general indicators of mine influence such as total dissolved solid (TDS) and conductivity. Thus, observed changes in benthic invertebrate community may simply reflect a more general response to changing water chemistry (e.g., secondary stress response and energetic cost of ion regulation [Kefford 2019, Buchwalter et al. 2019]), rather than a direct effect on invertebrate survival by one or several specific constituents.

To explore the changes in total abundance in Dry Creek, LC\_DCEF, and LC\_GRCK a second Spearman Rank Correlation analysis was completed on this reduced data set (i.e., only the above sites; Appendix Figure E.12). Calcite, nitrite, and annual ammonia were positively correlated (p-value < 0.001) with total abundance, whereas embeddedness was negatively correlated (p-value < 0.001) with total abundance; however, they do not meet the above criteria for interpretation (i.e., R<sub>s</sub> was greater than -0.6 but less than 0.6 for each variable). Neither ammonia or nitrite increased in 2022 compared to 2021, in Dry Creek, LC\_DCEF, or LC\_GRCK. Considering this, the decrease in total abundance in these sites can not currently be linked to any changes in water quality and mining related constituents (e.g., nitrate, nickel, and selenium) do not appear to be a driver of total abundance in Dry Creek in 2022.

Overall, there was some evidence that mining activities associated with Dry Creek are having an influence on benthic invertebrate community structure. The relationship between changing water quality and decreasing total and relative abundance of Ephemeroptera was previously documented in the RAEMP, the 2020 and 2021 Dry Creek LAEMP, and observed in the present study.

### 5.5 Summary

Benthic invertebrate community total abundance and taxonomic richness were generally within regional normal ranges at Dry Creek LAEMP sampling areas in 2022; however, they were occasionally outside site-specific normal ranges. Benthic invertebrate communities in Dry Creek upstream of the DCWMS (LC\_DC3) had endpoints outside of normal ranges (particularly %EPT, %E, and %C) most often. Areas located closest to the DCWMS discharge (LC\_DCDS and LC\_DC2) also tended to have lower %E than other areas and compared to regional and site-specific normal ranges. In 2022, benthic invertebrate communities located

upstream and downstream of the mouth of Dry Creek in the Fording River differed from each other; however, community endpoints were generally within regional normal ranges and show no temporal variation. The benthic invertebrate community within Grace Creek also had endpoints within regional normal ranges, as expected, based on current lack of mine-related influence.

Over the 2019 to 2022 monitoring period there have been decreases in total abundance, EPT and E abundance, and the proportion of EPT and E at all areas along Dry Creek were almost always significantly lower than those associated with the community in the Dry Creek reference area (LC\_DCEF). Overall, %E appeared to be the endpoint most likely linked to a mine-related influence. Both the relative proportion and total abundance of Ephemeroptera decreased at all mine-exposed areas on Dry Creek over the 2019 to 2022 monitoring period. Unlike previous years where %EPT was unchanged compared to 2019, the decreased in proportion and abundance of Ephemeroptera in 2022 was reflected in a decrease in the proportion and abundance of EPT. In the Fording River, there were no obvious temporal changes in benthic invertebrate community endpoints that would be indicative of an influence of Dry Creek on the downstream receiving environment.

Changes in Dry Creek benthic invertebrate community structure, namely decreases in relative and total abundance of E, may be associated with increasing aqueous concentrations of mine related constituents including nitrate, selenium, and nickel. It is therefore likely that mining activities are contributing to changes in the benthic invertebrate communities of Dry Creek. An AMP framework is already in place to address increasing concentrations of nitrate, sulphate, and selenium on Dry Creek and the updated DCWMP includes proposed in-stream flow requirements, flushing flows, ramping flows, as well as proposed site performance objectives for selenium, nitrate, sulphate, and cadmium (Teck 2021b).

# 6 STUDY QUESTION 4: BENTHIC INVERTEBRATE TISSUE SELENIUM

# 6.1 Background

To address Study Question #2: "How do selenium concentrations in benthic invertebrate tissue compare to normal ranges and BCWQG or EVWQP benchmarks, and are they changing over time?", selenium concentrations in composite-taxa benthic invertebrate tissue samples were evaluated over time and in relation to DCWMS status (see Section 1.3 for additional DCWMS details; Table 1.1; and Appendix Table F.1 for BCWQG and EVWQP benchmarks). In general, benthic invertebrate tissue selenium concentrations measured at each Dry Creek LAEMP study area in 2022 were within or lower than the range of values previously reported for each study area in 2018 to 2021.

Benthic invertebrate tissue chemistry data collected for the present study were of good quality as characterized by appropriate LRLs, measurable (i.e., >LRL) concentrations, and excellent laboratory precision and accuracy. Therefore, the associated data were considered acceptable for the purposes of this evaluation (see Appendix B for details).

## 6.2 Normal Ranges, Benchmarks and Biological Trigger Evaluation

Generally, mean benthic invertebrate tissue selenium concentrations were within the regional normal reference range in Dry Creek in 2022; however, benthic invertebrate tissue selenium concentrations were higher than the regional normal range in at least one sample from all mine-exposed areas on Dry Creek, the Fording River (LC FRUS and LC FRB), and Grace Creek (LC GRCK) study areas in 2022 (Figure 6.1; Appendix Table F.2). Upstream of the DCWMS (LC DC3), mean tissue selenium concentrations were higher than the regional normal range in September, however, they were not above normal ranges in any other sampling event (Appendix Table F.2). Downstream of the DCWMS (LC DCDS), mean tissue selenium concentrations were higher than the regional normal range in every sampling event in 2022, apart from samples taken in June where tissue selenium concentrations were lower than other months (Appendix Table F.2). Further downstream of the DCWMS at areas LC DC2, LC DC4 and LC DC1, mean benthic invertebrate tissue selenium concentrations were above the regional normal range in May 2022, but were not above the normal ranges in any other sampling event in 2022; Appendix Table F.2). In contrast to the mine-exposed sites, mean selenium concentrations were below the regional normal range during all sampling events at the Dry Creek reference area (LC DCEF, Appendix Table F.2). In the Fording River upstream and downstream

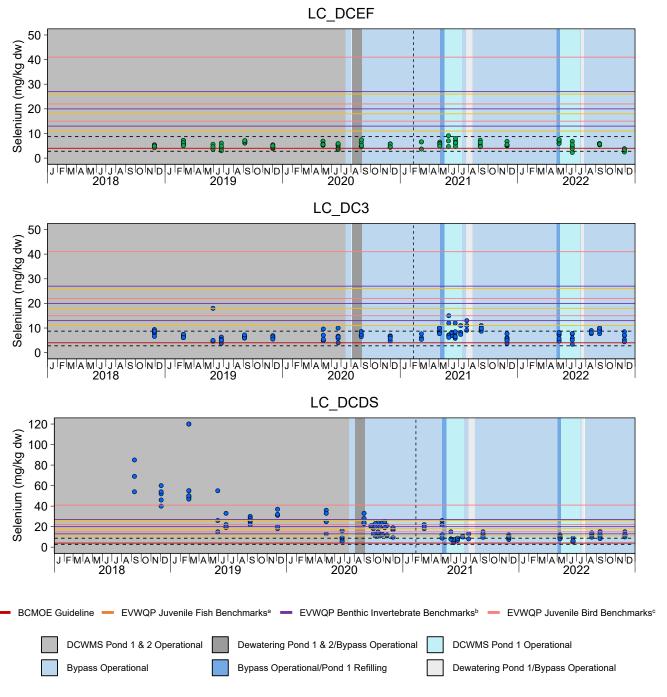


Figure 6.1: Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2018 to 2022

Notes: Dashed black vertical line indicates the Burnt Ridge North spoil failure. Dashed black horizontal lines represent 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. Reference areas are shown in green and mine-exposed areas are shown in blue. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

<sup>a</sup> 11, 18, and 26 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014),respectively, for dietary effects to juvenile fish.

<sup>b</sup> 13, 20, and 27 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for growth, reproduction, and survival of benthic invertebrates.

° 15, 22, and 41 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for dietary effects to juvenile birds.

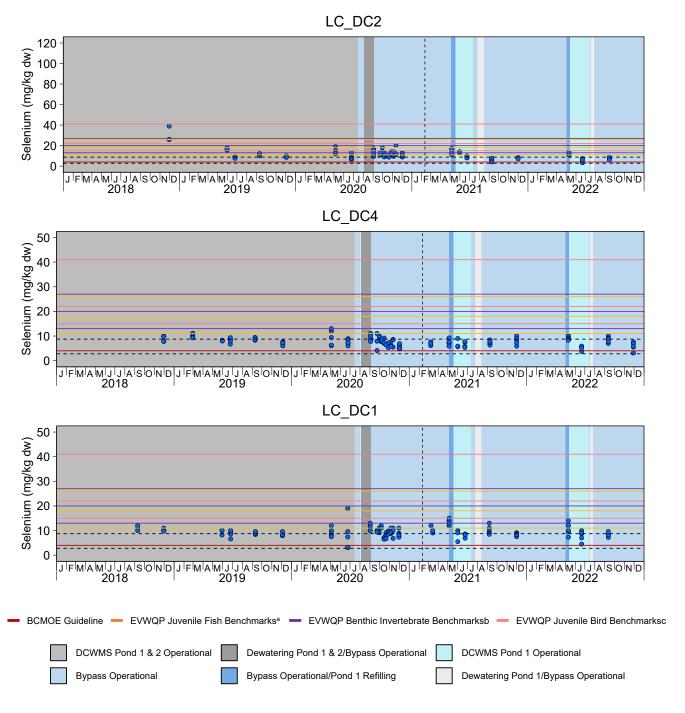


Figure 6.1: Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2018 to 2022

Notes: Dashed black vertical line indicates the Burnt Ridge North spoil failure. Dashed black horizontal lines represent 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. Reference areas are shown in green and mine-exposed areas are shown in blue. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

- <sup>a</sup> 11, 18, and 26 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014),respectively, for dietary effects to juvenile fish.
- <sup>b</sup> 13, 20, and 27 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for growth, reproduction, and survival of benthic invertebrates.
- c 15, 22, and 41 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for dietary effects to juvenile birds.

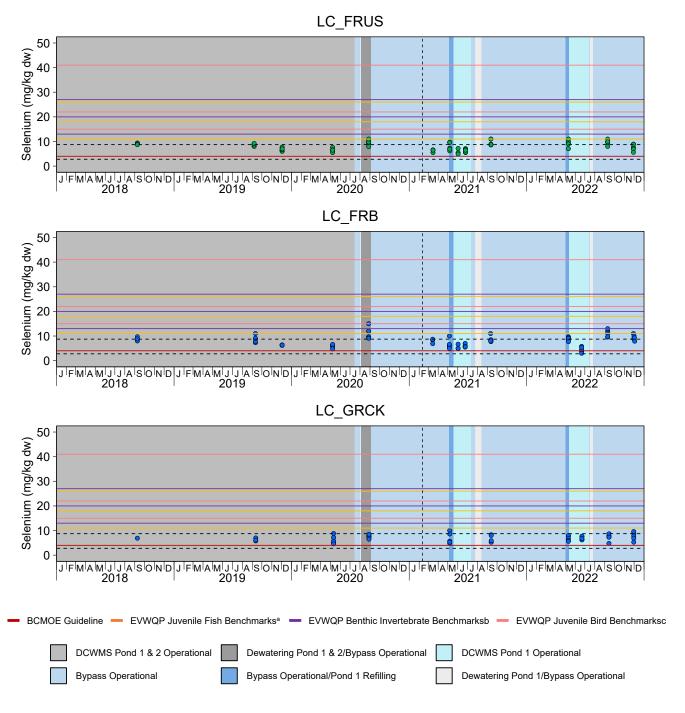


Figure 6.1: Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2018 to 2022

Notes: Dashed black vertical line indicates the Burnt Ridge North spoil failure. Dashed black horizontal lines represent 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. Reference areas are shown in green and mine-exposed areas are shown in blue. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

- <sup>a</sup> 11, 18, and 26 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014),respectively, for dietary effects to juvenile fish.
- <sup>b</sup> 13, 20, and 27 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for growth, reproduction, and survival of benthic invertebrates.
- c 15, 22, and 41 mg/kg dw represent the Level 1, 2, and 3 Benchmarks (Elk Valley Water Quality Plan [EVWQP]; Golder, 2014), respectively, for dietary effects to juvenile birds.

of Dry Creek (LC\_FRUS and LC\_FRB), mean benthic invertebrate tissue selenium concentrations in 2022 were above the normal range in most sampling events (Figure 6.1; Appendix Table F.2).

Benthic invertebrate tissue selenium concentrations were predicted for Dry Creek areas using the selenium speciation bioaccumulation tool<sup>12</sup> (b-tool; de Bruyn and Luoma 2021; Appendix Table F.3). Field-measured mean benthic invertebrate tissue selenium concentrations were generally below the b-tool predictions, except in the Fording River and Grace Creek where the b-tool under predicted measured tissue selenium concentrations (Appendix Table F.3).

The frequency of tissue selenium results above the EVWQP tissue benchmarks was lower in 2022 than 2021. In Dry Creek mean benthic invertebrate tissue selenium concentrations were not higher than the EVWQP benthic invertebrate benchmark (13 mg/kg dw); however, individual samples were occasionally above the EVWQP level 1 benchmarks for to juvenile fish, benthic invertebrates, and juvenile birds (11, 13, and 15 mg/kg dw, respectively) at stations closest to the DCWMS (LC DCDS and LC DC2; Figure 6.1; Appendix Table F.2). The elevated selenium concentrations in benthos from LC DCDS and LC DC2 were likely related to enhanced algal selenium bioaccumulation and generation of more bioavailable organoselenium in the DCWMS sedimentation ponds upstream of LC DCDS (see Section 1.3 for details of DCWMS operations; Lorax 2020, Minnow 2020c). In 2022 no samples from the Dry Creek LAEMP areas were above the EVWQP level 2 and 3 benchmarks for effects to juvenile birds (22 and 41 mg/kg dw, respectively), benthic invertebrates (20 and 27 mg/kg dw, respectively), and juvenile fish (18 and 26 mg/kg dw, respectively) Appendix Tables F.1 and F.2). In the Fording River upstream of Dry Creek mean benthic invertebrate tissue concentrations were not higher than EVWQP benchmarks, whereas downstream of Dry Creek (LC FRB) samples from September were higher then the EVWQP level 1 benchmark for juvenile fish (11 mg/kg); however, there was no statistical difference between LC FRUS and LC FRB in 2022 (Appendix Table F.5).

Selenium concentrations in benthic invertebrate tissue were also assessed against the biological trigger established for this endpoint (information pertaining to the determination of the biological trigger value can be found in Appendix H). Similar to the biological trigger evaluation for %EPT, this was completed for each replicate from each of the Dry Creek LAEMP monitoring areas with available water quality predictions (i.e., two mine-exposed areas [LC\_DCDS and LC\_DC1], see Appendix H for details). Approximately 15% of samples were higher than the biological trigger value at LC\_DCDS and 13% of samples at LC\_DC1 (3 of 20 and 2 of 15

<sup>&</sup>lt;sup>12</sup> The b-tool is a predictive bioaccumulation model that can be used to integrate selenium speciation data and aqueous sulphate concentrations to predict tissue selenium concentrations in benthic invertebrate and periphyton tissue (de Bruyn and Luoma 2021).



samples, respectively). This is considerably lower than in 2021 where ~ 37% of samples were higher than trigger values and LC DCDS and 27% at LC DC1 (Minnow 2022a).

## 6.3 Spatiotemporal Trends

Benthic invertebrate tissue selenium concentrations in 2022 generally decreased relative to earlier years (2020) in areas directly downstream of the DCWMS (LC\_DCDS and LC\_DC2; while concentrations remained unchanged at the area located upstream of the DCWMS and further downstream (i.e., LC\_DC3, LC\_DC4 and LC\_DC1; Figure 6.1; Appendix Table F.6). Stations located closest to the DCWMS (LC\_DCDS and LC\_DC2) recorded the greatest decreases from 2020 to 2022 (Appendix Table F.6). There were no changes in benthic invertebrate tissue selenium concentrations in the Fording River in 2022 compared to 2021 and 2020, and measured concentrations did not vary between areas directly upstream of Dry Creek and downstream (Appendix Tables F.5 and F.7).

Spatial variability in benthic invertebrate tissue selenium concentrations was observed among sampling events in Dry Creek in 2022 (Figure 6.2; Appendix Table F.4). In May, tissue selenium concentrations were higher at areas LC\_DCDS, LC\_DC2, and LC\_DC1 than the reference area (LC\_DCEF). In June, only LC\_DC1 had higher tissue selenium concentrations than LC\_DCEF. Concentrations at LC\_DC1 were very slightly higher than LC\_DCEF in June and based on the current water quality data, cannot be attributed to a specific cause. Additionally, concentrations at LC\_DC1 did not differ significantly from the other exposed areas during the June sampling event. In September and November, tissue selenium concentrations were higher at LC\_DC3 and LC\_DCDS than the reference area (LC\_DCEF).

Several temporal trends were observed in tissue selenium concentrations across sampling events in 2022 (Figure 6.2; Appendix Table F.4). In the upstream stations (LC\_DC3 and LC\_DCDS) benthic invertebrate tissue concentrations were highest in September; however, moving downstream (LC\_DC4, LC\_DC2 and LC\_DC1) concentrations were highest in May. In contrast to the benthic tissue concentrations, the temporal pattern in organoselenium (sum of DMSeO and MeSe(IV)) was consistent at all stations in Dry Creek, with highest concentrations observed in July, August, and September and lower concentrations measured from January to May (Figure 6.3 and 6.4; Appendix Figures C.23, C.24). Across all Dry Creek areas, the lowest mean benthic tissue selenium concentrations were observed in June, possible due to dilution of organoselenium during freshet. At the reference area (LC\_DCEF), tissue selenium concentrations were highest in May (aligned with the downstream stations on Dry Creek) and were lowest in November (Figure 6.2). In the Fording River, tissue selenium concentration did not vary significantly between areas and at both LC\_FRUS and LC\_FRB (Appendix Table F.5), and tissue selenium concentrations were highest in September and

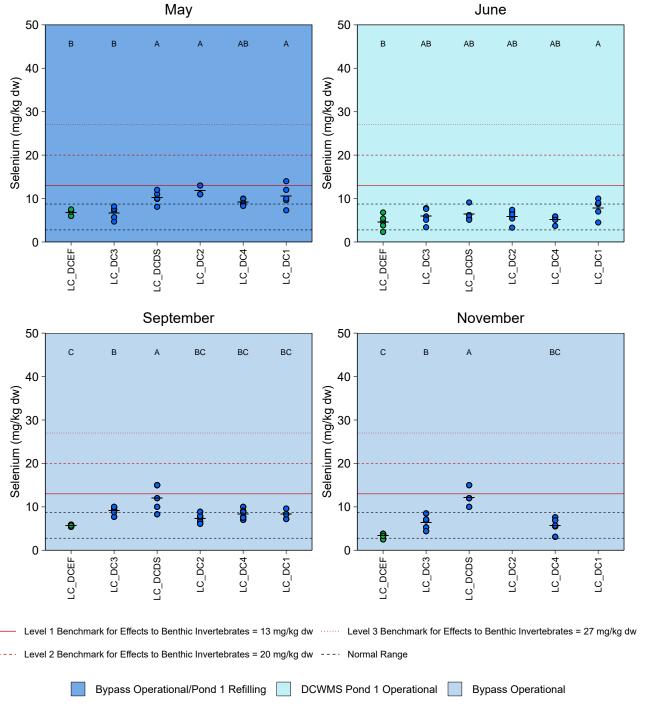


Figure 6.2: Selenium Concentrations (mg/kg dw) in Composite-Taxa Benthic Invertebrate Samples from Dry Creek Sampling Areas, 2022

Notes: Dashed black lines represent the normal range defined as the 2.5<sup>th</sup> and 97.5<sup>th</sup> percentiles of the 2012 to 2019 reference area data from the Regional Aquatic Environmental Monitoring Program (RAEMP). Areas that do not share a letter (e.g. a,b,c) are significantly different (p-value = 0.05) in a Tukey's HSD test following a two-way ANOVA by area. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context.

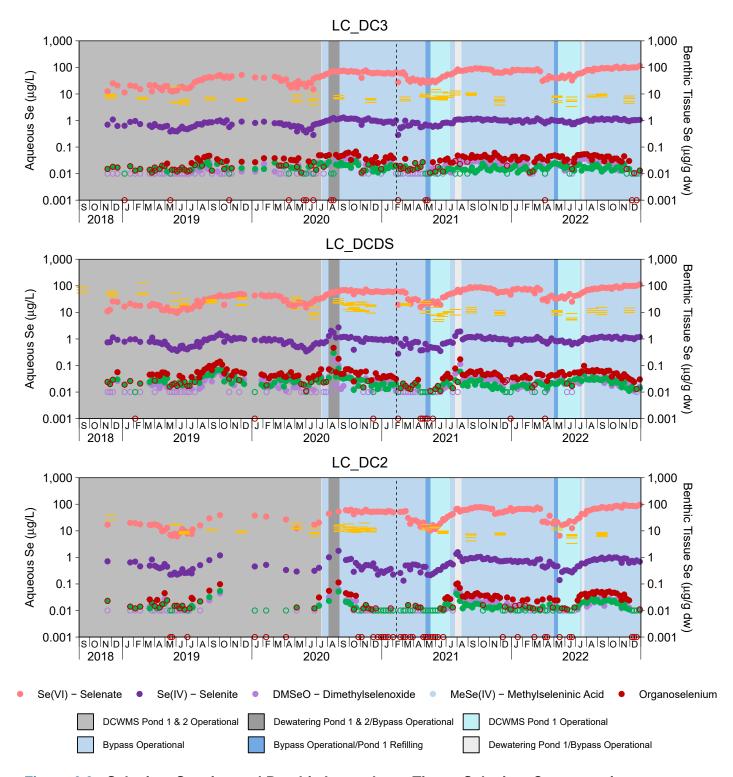


Figure 6.3: Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December 2022

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted with an open symbol. Benthic composite tissue concentrations plotted with orange bars. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only appliy to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Biological sampling (including benthic invertebrate tissue selenium monitoring) was discontinued at LC\_SPDC following operational changes in October 2020 at this area (see Minnow 2021a).

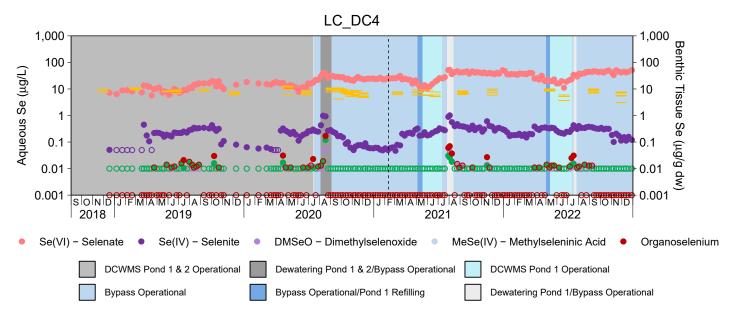


Figure 6.3: Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December 2022

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted with an open symbol. Benthic composite tissue concentrations plotted with orange bars. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only appliy to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Biological sampling (including benthic invertebrate tissue selenium monitoring) was discontinued at LC\_SPDC following operational changes in October 2020 at this area (see Minnow 2021a).

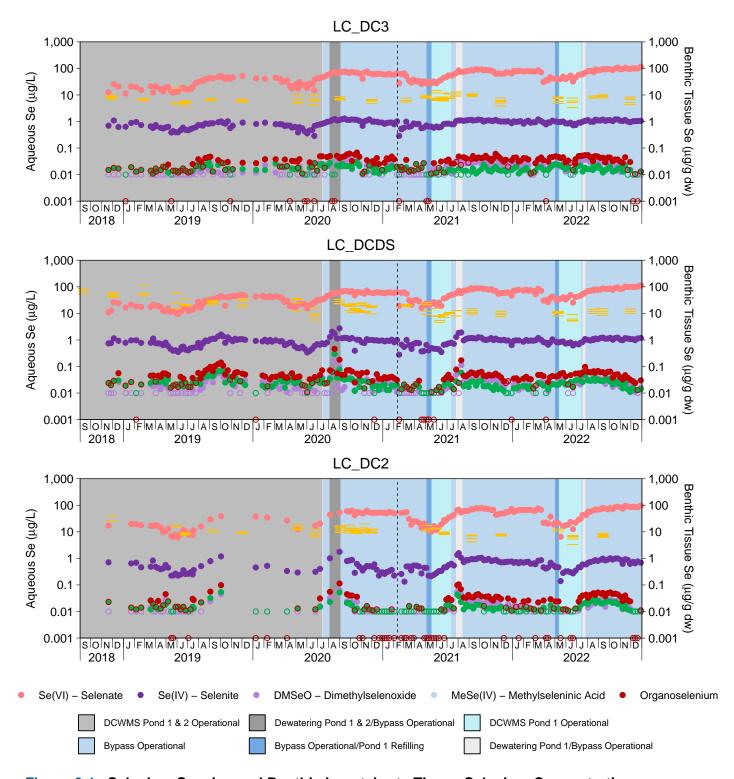
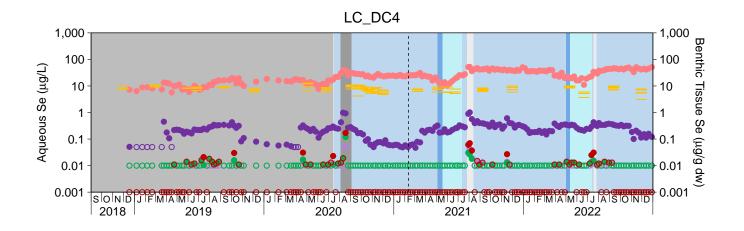


Figure 6.4: Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December 2022

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted with an open symbol. Benthic composite tissue concentrations plotted with orange bars. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only appliy to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Biological sampling (including benthic invertebrate tissue selenium monitoring) was discontinued at LC\_SPDC following operational changes in October 2020 at this area (see Minnow 2021a



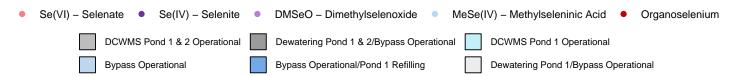


Figure 6.4: Selenium Species and Benthic Invertebrate Tissue Selenium Concentrations from LCO Dry Creek LAEMP Sampling Areas, September 2018 to December 2022

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted with an open symbol. Benthic composite tissue concentrations plotted with orange bars. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only appliy to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Biological sampling (including benthic invertebrate tissue selenium monitoring) was discontinued at LC\_SPDC following operational changes in October 2020 at this area (see Minnow 2021a).

lowest in June (LC\_FRB) or November (LC\_FRUS; samples were not collected in June due to high flows and unsafe access; Appendix Figure F.1; Appendix Table F.2).

As described in Sections 3.5 and 3.6, there were statistically significant increases in total selenium, selenite and selenate (and methylseleninic acid at LC\_DCDS) in Dry Creek from 2021 to 2022. Despite such increases, no associated increased in tissue selenium concentrations in benthic invertebrates was observed. Benthic invertebrate tissue selenium concentrations were the same in 2022 as 2021 and lower than 2020 (Figure 6.3; Appendix Table F.6).

Overall, the management actions implemented at the DCWMS starting in mid-2020 has been effective in reducing selenium concentrations in benthic invertebrates downstream. Initial re-operation of the DCWMS in mid-May through mid-July 2022 did result in an increase in aqueous organoselenium species during the subsequent dewatering phase; however, this does not appear to be linked to an increase in benthic invertebrate tissue selenium downstream areas. This is evidenced by concentrations of selenium in benthic invertebrates in June were similar at LC DC3 and LC DCDS (during operation of the DCWMS), and at LC DCDS that were similar in May and September (prior to and post DCWMS dewatering; Appendix table F.4). Aqueous Selenium concentrations decreased again shortly after pond 1 operation in 2022 and were in line with those measured during the previous bypass phase in 2022 (Figures 3.4 and 6.3).

#### 6.4 Summary

In areas directly downstream of the DCWMS (LC\_DCDC and LC\_DC2), benthic invertebrate tissue selenium concentrations decreased in 2022 relative to earlier years (2020 and 2021; although were still often higher than regional normal ranges and concentrations measured at the reference area), while concentrations remained unchanged at the area located upstream of the DCWMS and further downstream (i.e., LC\_DC3, LC\_DC4 and LC\_DC1). Downstream of the DCWMS (particularly from LC\_DCDS and LC\_DC2), the decreases in benthic invertebrate tissue selenium concentrations measured in 2022 relative to earlier years (2020) can be primarily attributable improvements made in management of the DCWMS (e.g., use of a single DCWMS pond in 2022 compared to both DCWMS ponds in 2020). Within the Fording River, benthic invertebrate tissue selenium concentrations generally the same upstream and downstream of the mouth of Dry Creek, indicating that operations at LCO Dry Creek have had limited influence on benthic invertebrate tissue selenium concentrations in these areas.

# 7 STUDY QUESTION 5: FISH AND FISH HABITAT

# 7.1 Background

Relevant fish and fish habitat monitoring data collected in Dry Creek and the East Tributary in 2022 were integrated into this report to address Study Question 5: Are changes in fish and fish habitat (including instream flow and calcite index) occurring within Dry Creek as a result of mine operations? Monitoring included a limited survey of fish health, redd surveys, and fish habitat (water temperature, dissolved oxygen [in Reaches 1 to 4 of Dry Creek], instream flow, and calcite coverages). No fish tissue chemistry results were obtained in 2022 as fish were not retained in planned sampling to reduce fish handling, and no fish mortalities were observed in Dry Creek in 2022. Water temperature was assessed based on data collected at six Dry Creek locations, one location in the Dry Creek East Tributary, and at one location in the Fording River directly near Dry Creek. In 2022, flow in Dry Creek was characterized based on data collected at two hydrometric stations (LC\_DC1 and LC\_DCDS).

#### 7.2 Fish Habitat

## 7.2.1 Water Temperature

The available water temperature data indicate that Dry Creek is a coldwater stream in which daily average water temperatures were less than 10°C in 2022 (Figures 7.1 and 7.2). The records for most stations indicated that summer 2022 was cool relative to most other years. For stations not strongly influenced by sedimentation pond operations (i.e., DRY-WQ02,03,04 and 01) 2022 was comparable to 2019 and colder than other years. Locations that are influenced by sedimentation pond operations (i.e., DRY-WQ05 and DRY-WQ06/07) were the coldest since 2016, but this conclusion needs to be understood within the context of changes to operations of the sedimentation pond that were implemented in 2020 and after.

Although the water temperature regime is cold, water temperature in the Dry Creek watershed is spatially heterogenous and seasonally variable. The upstream section of Dry Creek (as measured by DRY-WQ04) is warmer in the summer than other nearby stations downstream of East Tributary, though daily mean temperatures at DRY-WQ04 have been less than 10°C each summer. In the winter, the upstream portions of Dry Creek are cold and close to zero for roughly five months. The East Tributary has a more stable temperature throughout the year, with summer highs around 4°C and winter lows around 2°C. Downstream of its confluence with East Tributary, Dry Creek is relatively cold compared to the upstream section and has water temperatures intermediate between the East Tributary and upstream Dry Creek.

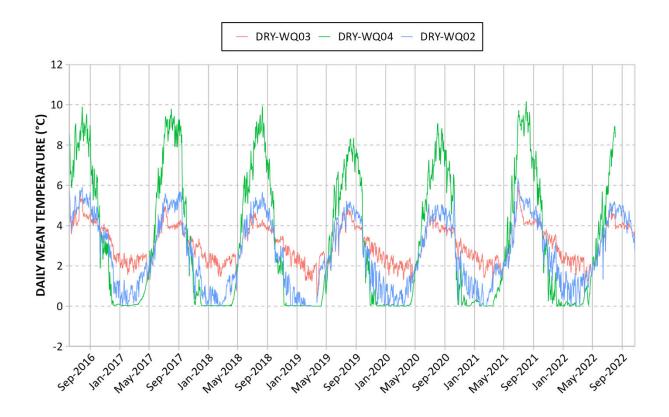


Figure 7.1: Daily Mean Water Temperature from June 2016 to October 2022 at Stations in the Upper Portion of the Dry Creek Watershed

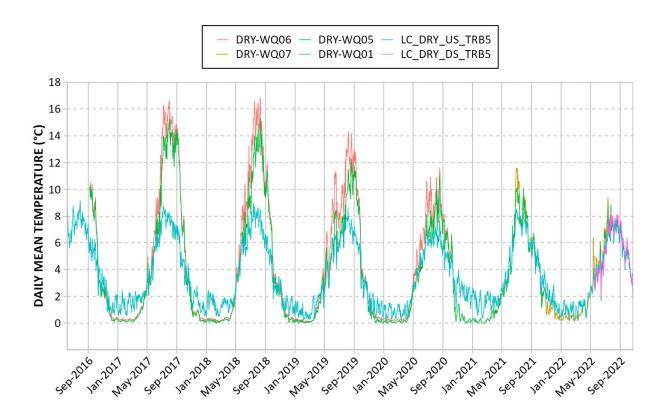


Figure 7.2: Daily Mean Water Temperature from June 2016 to October 2022 at Stations in the Lower Portion of the Dry Creek watershed and Dry Creek Tributary 5

Operation of the sedimentation ponds (Section 1.3) changed in 2020 and thereafter (use during freshet only). Prior to this date the ponds were operated with continuous flow through the ponds. The change in operation appears to have resulted in lower mean daily temperatures immediately downstream of the sedimentation ponds in summer (see DRY-WQ05 and DRY-WQ06 in Figure 7.2). As a result, water temperature in Dry Creek downstream of the sedimentation ponds outlet no longer reaches the higher temperatures that occurred in 2017 to 2019. Instead, DRY-WQ05 and DRY-WQ06/07 reached maximum daily average of <12°C in the years since and reached a relatively cool maximum of only ~9°C in 2022.

Dry Creek Tributary 5 is a new station and therefore had records for only one summer. Water temperature at this station had a 2022 summer temperature regime that was similar to Dry Creek mainstem stations nearby (Figure 7.2).

At stations closer to the confluence with the Fording River (DRY-WQ01), Dry Creek is cooler than at stations near the sedimentation ponds outlet. This is contrary to the typical pattern of warming as streams flow downstream, and may indicate inflows from cool sources such as groundwater or cool surface water inflows. Compared to monitoring locations upstream, the temperature of Dry Creek near the Fording River has remained more consistent year to year, including in 2022, despite the operational changes to the sedimentation ponds. In the winter, Dry Creek near the Fording varies between 0.5°C and 1.5°C.

Average daily temperatures did not exceed 18°C at any site within the period of record. Typically, the Dry Creek upstream (DRY-WQ04) and the sedimentation pond outlet (DRY-WQ05) have the most days with water temperature <1°C; however, all stations except Dry Creek near the confluence (DRY-WQ01) had data gaps that prevented the calculation of this metric in 2022. Mean weekly maximum temperature (MWMxT) was assessed in relation BC WQG for optimum temperature ranges for Cutthroat Trout spawning, incubation and rearing periods (Figures 7.3 and 7.4).

#### Spawning

Overall, spawning temperature observations in Dry Creek in 2022 were slightly cooler than in prior years. MWMxT exceeded the optimal temperature range for spawning in all years at DRY-WQ06/07, and for all years at DRY-WQ05 except for 2020. In 2017 and 2018 MWMxT at these stations surpassed the upper bound of optimum (10°C) near the beginning of the spawning period, and by midway through the spawning period the temperature had reached >16°C. Since 2019, MWMxT exceedances have been fewer and of smaller magnitude. At DRY-WQ04, MWMxT was mostly within the optimal range in 2016, 2017 and 2021, but in other years (including 2022) it did not reach optimum until late in the spawning period. Dry Creek near the confluence with the Fording (DRY-WQ01) had MWMxT within spawning

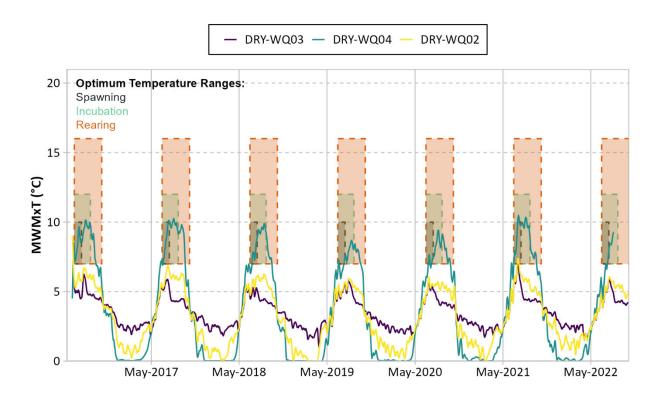


Figure 7.3: Mean Weekly Maximum Temperatures (MWMxT) at Monitoring Stations in Dry Creek Watershed Upstream of Influence of the Sedimentation Ponds

Note: Westslope Cutthroat Trout optimal temperature ranges are indicated for key activity periods.

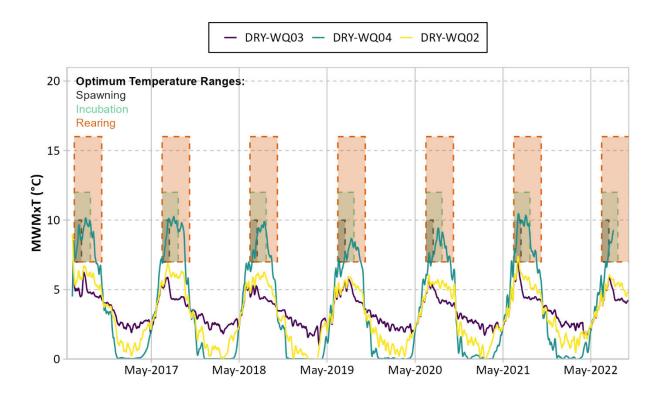


Figure 7.4: Mean Weekly Maximum Temperatures (MWMxT) at Monitoring Stations in Lower Dry Creek and Fording River Overlayed on Westslope Cutthroat Trout Optimum Temperature Ranges

optimum each year but in 2016, 2017 and 2021 this station exceeded optimum by 1 to 2°C in the latter half of the spawning period. In 2022, DRY-WQ01, 05, 07 and TRB5 stations had similar temperatures during spawning, and all were within optimum for the period. Observations in East Tributary have been similar in all years 2016 to 2022.

#### Incubation

MWMxT during the incubation period in Dry Creek in 2022 were cooler than in previous years. MWMxT at DRY-WQ06/07 and DRY-WQ05 exceeded the incubation optimum temperature range by 5-6°C for most of the incubation period in 2017 and 2018, but generally remained within optimum in 2019 – 2022, although there were exceedances of 1 to 3°C for parts of the period. MWMxT at DRY-WQ04 was within the optimal range for incubation in 2016, 2017, 2021, and 2022 (where data exist) but was below optimum until late in the incubation period in 2018 and 2019. DRY-WQ01 and FRD-WQ01 both had MWMxT within optimum for the entire incubation period. Observations in East Tributary were slightly cooler in 2022 than most previous years but were less than optima throughout the record.

#### Rearing

MWMxT during the rearing period in Dry Creek in 2022 were cooler than in previous years. In 2017 and 2018, the MWMxT at DRY-WQ06/07 and DRY-WQ05 exceeded the upper bound of optimum by 1 to 2°C for brief periods, but otherwise temperatures were within optimum. Since 2019 MWMxT did not exceeded optimum rearing temperature at these locations, but in 2020 and 2021 was less than optimum for roughly two weeks near the end of the rearing period. MWMxT at DRY-WQ04 reached optimum rearing temperature each year, but not for the full period; in 2022 the data gap after August prevented conclusions for the full period in 2022. MWMxT at DRY-WQ01 in 2022 was within rearing optimum for a shorter time and reached a lower maximum temperature than in previous years. Maximum rearing temperature at DRY-WQ05 and DRY-WQ06 were roughly 4°C cooler in 2022 compared to previous years. The two stations in Tributary 5 had MWMxT that was similar to DRY-WQ05. MWMxT observations in East Tributary in 2022 were similar to previous years. Growing season (i.e., the period when weekly average temperature is greater than 5°C) was summarized by year and monitoring site (Table 7.1). Overall, the available observations indicate that all locations in Dry Creek in 2022 had water temperatures that may have limited fish recruitment; that is, GSDD was less than the 800 degree day threshold proposed in Coleman and Fausch (2007).

Prior to changes in operation of the sedimentation ponds, the outlet of the sedimentation ponds and the section of Dry Creek immediately downstream often exceeded 1000 GSDD, and exceeded 800 GSDD near the confluence with the Fording River. In the years following the operational change (i.e., 2020 to 2022) the growing season has been shorter and cooler.

Table 7.1: Duration and Intensity of the Growing Season (defined in Table 2.6) for Monitoring Sites in Dry Creek and Fording River from June or September 2016 through October 2021

| Site Description             | Site           | Year              | Number of               | Growing Season |             |               |               |       |  |
|------------------------------|----------------|-------------------|-------------------------|----------------|-------------|---------------|---------------|-------|--|
|                              |                |                   | days with<br>valid data | Start Date     | End<br>Date | Length (days) | Gap<br>(days) | GSDD  |  |
| East Tributary               | DRY-WQ03       | 2016              | 208                     | 19-Jul         | 04-Oct      | 79            | 0             | 346   |  |
| •                            |                | 20171             | 365                     | -              | =           | 0             | -             | 0     |  |
|                              |                | 2018 <sup>1</sup> | 365                     | -              | -           | 0             | -             | 0     |  |
|                              |                | 2019 <sup>1</sup> | 365                     | -              | -           | 0             | -             | 0     |  |
|                              |                | 2020 <sup>1</sup> | 366                     | -              | -           | 0             | -             | 0     |  |
|                              |                | 2021              | 365                     | 24-Jun         | 01-Oct      | 100           | 0             | 434   |  |
|                              |                | 2022              | 297                     | -              | =           | 0             | =             | 0     |  |
| Dry Creek upstream of the    | DRY-WQ04       | 2016 <sup>2</sup> | 208                     | =              | 08-Oct      | =             | =             | =     |  |
| confluence with East         | -              | 2017              | 365                     | 30-May         | 03-Oct      | 127           | 0             | 959   |  |
| Tributary                    |                | 2018              | 365                     | 22-May         | 29-Sep      | 130           | 0             | 922   |  |
| •                            |                | 2019              | 365                     | 31-May         | 28-Sep      |               | 0             | 796   |  |
|                              |                | 2020              | 366                     | 12-Jun         | 12-Oct      | 123           | 0             | 834   |  |
|                              |                | 2021              | 365                     | 10-Jun         | 07-Oct      | 120           | 0             | 910   |  |
|                              |                | 2022              | 216                     | 25-Jun         | -           | _             | -             | -     |  |
| Dry Creek downstream of      | DRY-WQ02       | 2016              | 208                     | 16-Jul         | 04-Oct      | 81            | 0             | 403   |  |
| the confluence with the East | •              | 2017              | 365                     | 19-Aug         | 17-Sep      | 30            | 0             | 150   |  |
| Tributary                    |                | 2018              | 365                     | 29-Jul         | 17-Sep      | 51            | 0             | 241   |  |
| •                            |                | 2019              | 343                     | 03-Aug         | 25-Sep      | 53            | 0             | 246   |  |
|                              |                | 2020 <sup>1</sup> | 366                     | -              | -           | 0             | -             | 0     |  |
|                              |                | 2021              | 365                     | 23-Jun         | 04-Oct      | 103           | 0             | 506   |  |
|                              |                | 2022              | 297                     | 26-Jul         | 08-Oct      | 75            | 0             | 341   |  |
| Settling pond outlet channel | DRY-WQ06       | 2016 <sup>2</sup> | 115                     | =              | 12-Oct      | _             | -             | _     |  |
|                              | •              | 2017              | 364                     | 25-May         | 11-Oct      | 139           | 1             | 1,589 |  |
|                              |                | 2018              | 365                     | 18-May         | 04-Oct      | 140           | 0             | 1,523 |  |
|                              |                | 2019              | 365                     | 24-May         | 03-Oct      | 133           | 0             | 1,300 |  |
|                              |                | 2020 <sup>3</sup> | 280                     | 26-May         | 04-Oct      | 132           | 0             | 1,017 |  |
|                              | DRY-WQ07       | 2021 <sup>2</sup> | 189                     | -              | 05-Oct      | -             | -             | -     |  |
|                              | •              | 2022              | 297                     | 23-Jun         | 12-Oct      | 112           | 0             | 726   |  |
| Downstream of the settling   | DRY-WQ05       | 2016 <sup>2</sup> | 115                     | -              | 12-Oct      | _             | -             | _     |  |
| pond outlet channel          | •              | 2017              | 365                     | 29-May         | 09-Oct      | 134           | 0             | 1,419 |  |
| •                            |                | 2018              | 365                     | 22-May         | 02-Oct      | 134           | 0             | 1,309 |  |
|                              |                | 2019              | 365                     | 30-May         | 01-Oct      |               | 0             | 1,023 |  |
|                              |                | 2020              | 366                     | 12-Jun         | 12-Oct      | 123           | 0             | 850   |  |
|                              |                | 2021              | 296                     | 12-Jun         | 04-Oct      |               | 0             | 793   |  |
|                              |                | 2022              | 137                     | 24-Jun         | 12-Oct      |               | 0             | 707   |  |
| Dry Creek upstream of the    | DRY-WQ01       | 2016 <sup>2</sup> | 208                     | -              | 09-Oct      |               | -             | -     |  |
| confluence with Fording      | •              | 2017              | 365                     | 29-May         | 01-Oct      |               | 0             | 841   |  |
| River                        |                | 2018              | 365                     | 22-May         | 28-Sep      | 129           | 0             | 854   |  |
|                              |                | 2019              | 365                     | 30-May         | 27-Sep      | 121           | 0             | 767   |  |
|                              |                | 2020              | 366                     | 11-Jun         | 11-Oct      |               | 0             | 694   |  |
|                              |                | 2021              | 365                     | 12-Jun         | 05-Oct      |               | 0             | 737   |  |
|                              |                | 2022              | 296                     | 27-Jun         | 11-Oct      |               | 0             | 652   |  |
| Trib 5 Upstream              | LC_DRY_US_TRB5 | 2022 <sup>4</sup> | 130                     | 27-Jun         | 12-Oct      | 108           | 29            | -     |  |
| Trib 5 Downstream            | LC_DRY_DS_TRB5 | 2022              | 159                     | 28-Jun         | 12-Oct      |               | 0             | 693   |  |
| THE J DOWNSHEAM              | r~_nu_no_nu    | 2022              | 137                     | 20-j un        | 12-00       | 10/           | U             | 093   |  |

<sup>&</sup>lt;sup>1</sup> Weekly average temperatures never exceeded 5°C, no growing season occurred.

Note: Stations with installation dates too late in the year to measure growing season were omitted for that year.

<sup>&</sup>lt;sup>2</sup> Growing season could not be estimated because the period of record does not cover the entire growing season.

 $<sup>^{\</sup>rm 3}$  Record of growing season was cut short when temperature logger was removed.

<sup>&</sup>lt;sup>4</sup> Growing degree days could not be estimated because data gaps during the growing season exceed 28 days.

In 2022, all stations, including those downstream of the sedimentation ponds, had less than 800 GSDD. Other locations in the watershed tend to be cooler (i.e., the East Tributary, Dry Creek downstream of the East Tributary, and Tributary 5) and either do not meet the minimum temperatures for a growing season or do so and have a low GSDD. DRY-WQ04 has had intermediate growing seasons (i.e., 796 to 959 GSDD) in the past but a data gap in 2022 prevented calculation of GSDD at this site.

Water temperature monitoring has been ongoing in Dry Creek since 2016, representing a seven-year period of record. Within the monitoring period, stations upstream of the Dry Creek Sedimentation Ponds have had fairly consistent annual trends in water temperature. The upstream-most station (DRY-WQ04) reaches daily mean temperatures of 8 to 10°C in summer and near zero in winter. Downstream, the input of the East Tributary cools Dry Creek in the summer and warms it in the winter. In 2022 results for stations in this upper part of the watershed area were similar to past years. Further downstream, changes to sedimentation pond management have changed the temperature regime in summer from temperatures regularly >16°C daily mean, to a high of ~8°C in 2022. Dry Creek downstream of the outlet is no longer warmed by the sedimentation ponds during spring and fall.

The changes in operations are reflected in two metrics that are specific to fish health: mean weekly temperature and growing season. Mean weekly temperature within the fish-bearing portions of Dry Creek (i.e., from the downstream of the East Tributary to the Fording confluence, represented by DRY-WQ02,WQ05 and WQ01) indicate that from 2017-2019 Dry Creek at times exceed optimum temperature for spawning, incubation and rearing, but in recent years has been more than 1°C colder than optimum for portions (i.e., 10 to 40% at DRY-WQ05 and WQ01) or nearly all (i.e., >95% at DRY-WQ02) of the activity periods. The 2022 growing season downstream of the East Tributary (DRY-WQ02) had low GSDD but was broadly consistent with past years (341 GSDD in 2022). At the station in Dry Creek downstream of the sedimentation pond outlet (DRY-WQ05), growing season reached a maximum of 1,419 GSDD in 2017 but fell to 793 in 2021 and 707 in 2022. The GSDD recorded near the Fording confluence (DRY-WQ01) has consistently been lower than near the sedimentation ponds, and also declined from a high of 854 GSDD in 2018, to 737 in 2021 and 652 in 2022.

Cumulatively these results suggest that as water management approaches naturalize during the growing season (bypassing sedimentation ponds), the fish-bearing portion of Dry Creek (i.e., downstream of the East Tributary) has water temperatures that may pose challenges to fish growth and recruitment. Portions of the spawning, incubation and rearing activity stages are outside of the BC WQG stated optimums for WCT by more than 1°C, while the growing season measured at three stations between the East Tributary and the confluence were all below the 800

GSDD threshold to meet minimum requirements for interior Cutthroat Trout population recruitment (Coleman and Fausch 2007).

## 7.2.1.1 **Summary**

Water temperature monitoring results in 2022 suggest that as water management approaches naturalization, the portion of Dry Creek inhabited by fish (i.e., downstream of the East Tributary), has water temperatures that may pose challenges to fish growth and recruitment. Portions of the spawning, incubation and rearing activity stages are more than 1°C less than the BC WQG optimum for Cutthroat Trout, and the growing season measured at three stations between the East Tributary and the confluence with the Fording River were all below the 800 GSDD threshold recommended to meet minimum requirements for interior Cutthroat Trout population recruitment (Coleman and Fausch 2007).

# 7.2.2 Dissolved Oxygen

DO is an important water quality parameter relevant to all aquatic life, and particularly salmonids such as WCT, which are sensitive to low DO concentrations (COSEWIC 2016).

In 2022, in situ DO measurements collected at water quality monitoring stations in Dry Creek (excluding LC DC3 and LC SPDC due to lack of fish presence, five stations in total) were evaluated to assess mean annual and mean monthly (30-day mean) and instantaneous DO concentrations relative to the BCWQGs (BCMOECCS 2019) and important WCT life history stages. None of the stations exhibited annual minimum or 30-day mean DO concentrations in 2022 that were below the 30-day mean guideline of 8 mg/L or the instantaneous guideline of 5 mg/L (BCWQG applicable all life stages other than buried embryo/alevin (Table 7.2, Appendix Table C.4). However, mean 30-day DO concentrations were below the BCWQG for the protection of buried embryos and alevins (11 mg/L) at all monitoring stations from July to September in 2022, and occasionally in January, May, June, and October (Table 7.2). These results from 2022 are similar to prior years when DO at all or most monitoring stations was below the BCWQG for the protection of buried embryos and alevins in the summer months (2012 to 2022; Appendix Table G.1). In 2022, monthly mean DO concentrations ranged between 9.9 mg/L and 11.2 mg/L from July to September (Table 7.2). These results are consistent with DO concentrations observed at the reference area (LC DCEF) in all years (Appendix Table G.1), indicating that the occurrence of DO below the guideline in 2022 was not due to a mine-related influence. Overall, DO concentrations in Dry Creek are not considered limiting for juvenile or adult WCT.

The WCT spawning period in Dry Creek has been observed from mid-June to early July and eggs incubate in gravel redds for 6 to 7 weeks prior to hatching (Northcote and Hartman 1988).



Table 7.2: Monthly Mean Dissolved Oxygen Concentrations (mg/L) in Dry Creek, 2022

| Month     | LC_DCEF | LC_DCDS | LC_DC2 | LC_DC4 | LC_DC1 |
|-----------|---------|---------|--------|--------|--------|
| January   | 10.5    | 11.8    | 11.7   | 12.0   | 11.6   |
| February  | 11.1    | 11.9    | 12.1   | 11.7   | 12.0   |
| March     | 11.0    | 12.0    | 12.0   | 11.7   | 12.0   |
| April     | 11.8    | 12.1    | 12.0   | 12.2   | 12.1   |
| May       | 10.5    | 10.7    | 11.1   | 11.0   | 11.2   |
| June      | 11.2    | 10.9    | 11.0   | 10.9   | 11.0   |
| July      | 10.9    | 9.90    | 10.2   | 10.2   | 10.2   |
| August    | 10.4    | 10.1    | 10.3   | 10.3   | 10.4   |
| September | 10.6    | 10.6    | 10.6   | 10.7   | 10.8   |
| October   | 10.6    | 11.1    | 11.1   | 10.9   | 11.2   |
| November  | 11.4    | 12.2    | 12.3   | 12.0   | 12.4   |
| December  | 11.1    | 12.2    | 12.5   | 12.0   | 12.1   |

Mean dissolved oxygen (DO) concentration lower than water column long-term BCWQG of 11 mg/L for buried embryo/alevin life stages (guideline was applied for all months except April, see notes for details).

Note: Spawning, incubation, and alevin stages for westslope cutthroat trout were included in the application of buried embryo/alevin guideline values, and were applicable to at least some portion of each month except April. The timing of life history stages for this species is approximated from COSEWIC (2016), McPhail and Baxter (1996), and McPhail (2007).

Fry typically spend a further 1 to 2 weeks in the interstitial spaces of gravel prior to emergence in early to mid-August depending on temperature and accumulated thermal units (ATUs). Mean monthly DO conditions in Dry Creek in 2022 suggest that WCT embryos and alevins may have experienced hypoxic; however, *in situ* measurements may not be sufficient for classifying conditions in Dry Creek. Secondly, as indicated above, similar conditions were observed at the reference area (LC\_DCEF) suggesting that the decreased DO concentrations may not be mine-related (Table 7.2).

### 7.2.3 Instream Flow

The annual hydrograph at the LC\_DC1 gauge in Dry Creek from 2011 to 2022 and WSC 08NK018 gauge in the Fording River from 1970 to 2022 is shown in Figure 7.5 and 7.6, respectively. The hydrographs demonstrate a strong seasonal trend at both the LC\_DC1 and WSC 08NK018 gauge that is broadly typical of snowmelt-dominated streams, generally with peak flow occurring between April and June and low flow occurring between November and March. The timing of peak flow at LC\_DC1 occurs approximately one month earlier than at the WSC gauge in the Fording River, where peak flows almost always occur in June (Table 7.3), a time at which flows begin to recede rapidly in Dry Creek (Table 7.4). A summary of data gaps at LC\_DC1 is presented Table 7.5; there are no data gaps in the mean daily flow data at WSC gauge from 1970 to 2022. In 2011, 2012, and 2013, there are less than 6 months of data with significant data gaps from December to July. In 2014, although there was only one month with no data, all other months only had 32% or less data available per month. The dates of minimum and maximum daily average flow for each year relative to mean annual discharge (MAD) at LC\_DC1 are shown in Table 7.6. Peak daily flows in 2017 and 2019 exceeded 1000% of MAD (0.240 m³/s) at LC\_DC1, while lowest minimum daily flow was at 3% of MAD in 2013.

Monthly flow statistics at the LC\_DC1 and WSC gauge from 2011 to 2022 are provided in Table 7.5. The timing of peak and low mean monthly flows in Dry Creek varies slightly from year to year, whereas the timing of peak and low mean monthly flow at Fording River has been consistent since 2011 (with the exception of 2015 and 2017; Table 7.6). The maximum mean monthly flow at LC\_DC1 in 2014 and 2019 were low, with less than 200% of MAD (73% and 184% of MAD, respectively; Table 7.4). This is partly a result of significant data gaps in 2014 that included the period of peak flow (May and June; Figure 7.5). The low magnitude of the maximum mean monthly flow in 2019 was not observed at the WSC gauge.

Average daily flow during key WCT activity periods at LC\_DC1 are presented in Table 7.5; data from 2011 and 2012 were omitted due to significant data gaps (Table 7.5).

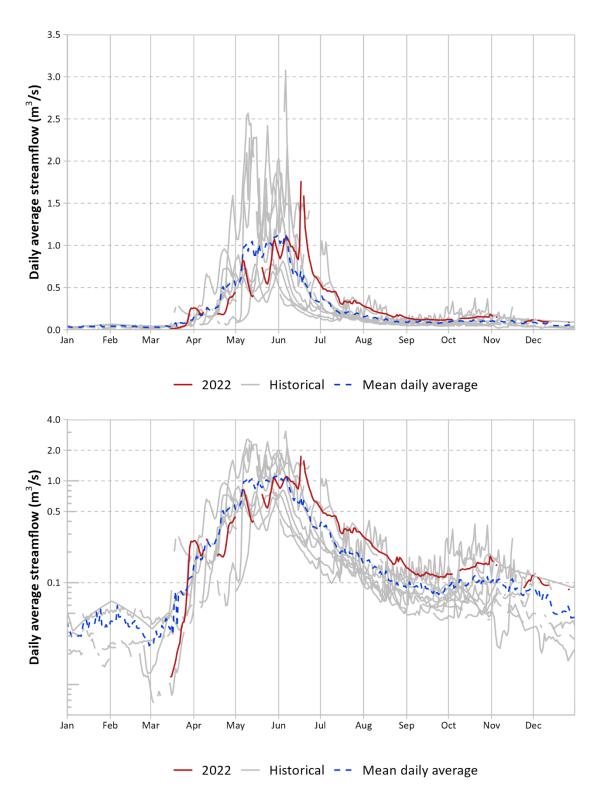


Figure 7.5: Annual Hydrograph at Dry Creek (LC\_DC1) for Each Year from 2011 to 2022 on Normal (upper) and Log Scale (lower)

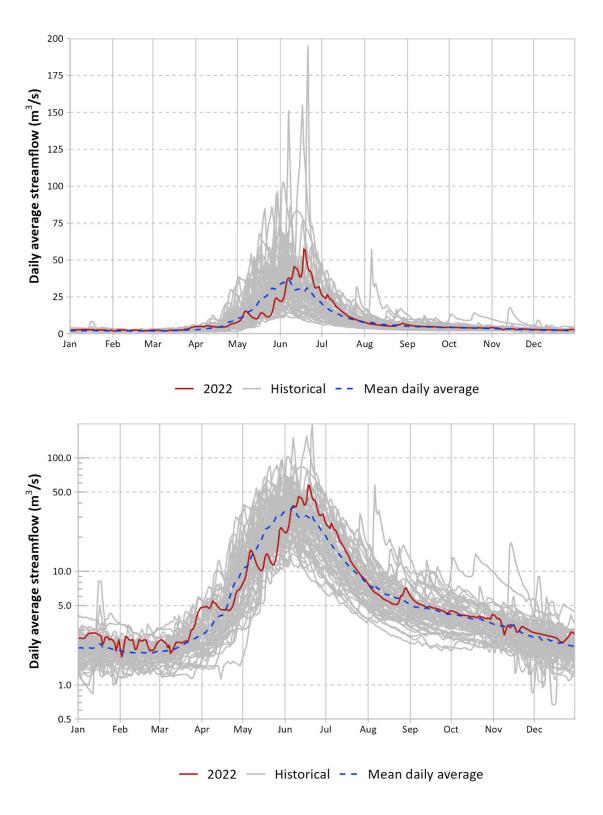


Figure 7.6: Annual Hydrograph for WSC 08NK018 from 1970 to 2022 on Normal (upper) and Log Scale (lower)

Table 7.3: Mean Daily Flow at LC\_DC1 during Key Westslope Cutthroat Trout Activity Periods as Defined in Teck (2021)

|         | Mean Flow (m <sup>3</sup> /s) |                         |                       |                         |                                       |  |  |  |  |  |
|---------|-------------------------------|-------------------------|-----------------------|-------------------------|---------------------------------------|--|--|--|--|--|
| Year    | Over - Wintering <sup>1</sup> | Rearing                 | Spawning              | Early<br>Incubation     | Late Incubation July 11 to October 31 |  |  |  |  |  |
|         | October 11 to<br>May 27       | May 28 to<br>October 10 | June 12 to<br>July 11 | June 12 to<br>August 12 |                                       |  |  |  |  |  |
| 2013    | 0.270                         | 0.402                   | 0.789                 | 0.420                   | 0.192                                 |  |  |  |  |  |
| 2014    | 0.182                         | 0.120                   | 0.256                 | 0.151                   | 0.106                                 |  |  |  |  |  |
| 2015    | 0.297                         | 0.177                   | 0.206                 | 0.162                   | 0.084                                 |  |  |  |  |  |
| 2016    | 0.165                         | 0.146                   | 0.166                 | 0.148                   | 0.101                                 |  |  |  |  |  |
| 2017    | 0.346                         | 0.286                   | 0.329                 | 0.226                   | 0.103                                 |  |  |  |  |  |
| 2018    | 0.374                         | 0.173                   | 0.246                 | 0.194                   | 0.107                                 |  |  |  |  |  |
| 2019    | 0.150                         | 0.275                   | 0.441                 | 0.361                   | 0.163                                 |  |  |  |  |  |
| 2020    | 0.279                         | 0.382                   | 0.609                 | 0.367                   | 0.106                                 |  |  |  |  |  |
| 2021    | 0.209                         | 0.246                   | 0.287                 | 0.202                   | 0.088                                 |  |  |  |  |  |
| 2022    | 0.214                         | 0.408                   | 0.754                 | 0.512                   | 0.188                                 |  |  |  |  |  |
| Mean    | 0.238                         | 0.241                   | 0.356                 | 0.249                   | 0.119                                 |  |  |  |  |  |
| Std dev | 0.077                         | 0.108                   | 0.230                 | 0.130                   | 0.041                                 |  |  |  |  |  |

<sup>&</sup>lt;sup>1</sup>Overwintering period starts on October 11 of the previous year and goes to May 27 of the current year.

Bold values are highest and lowest on record.

Table 7.4: Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual Discharge (MAD), at LC\_DC1 and WSC 08NK018 from 2011 to 2022

| Year | Month | Discl      | harge at LC_1 | DC1 <sup>1,2</sup> | % of MAD <sup>3</sup> | Discha       | charge at WSC 08NK018 |              | 0/ 03/15   |
|------|-------|------------|---------------|--------------------|-----------------------|--------------|-----------------------|--------------|------------|
|      |       | Average    | Minimum       | Maximum            |                       | Average      | Minimum               | Maximum      | % of MAD   |
| 2011 | Jan   | NA         | NA            | NA                 | NA                    | 2.21         | 1.36                  | 2.55         | 28%        |
|      | Feb   | NA         | NA            | NA                 | NA                    | 2.11         | 1.73                  | 2.47         | 26%        |
|      | Mar   | NA         | NA            | NA                 | NA                    | 2.14         | 1.68                  | 2.81         | 27%        |
|      | Apr   | NA         | NA            | NA                 | NA                    | 3.18         | 2.67                  | 4.49         | 40%        |
|      | May   | NA         | NA            | NA                 | NA                    | 18.85        | 4.39                  | 38.10        | 237%       |
|      | Jun   | NA         | NA            | NA                 | NA                    | 41.47        | 28.10                 | 54.00        | 520%       |
|      | Jul   | NA         | NA            | NA                 | NA                    | 17.65        | 8.19                  | 34.00        | 221%       |
|      | Aug   | NA         | NA            | NA                 | NA                    | 5.65         | 4.34                  | 8.00         | 71%        |
|      | Sep   | -          | -             | -                  | _                     | 4.04         | 3.63                  | 4.91         | 51%        |
|      | Oct   | 0.060      | 0.043         | 0.092              | 25%                   | 4.13         | 3.66                  | 5.06         | 52%        |
|      | Nov   | -          | -             | -                  |                       | 3.23         | 2.52                  | 3.89         | 41%        |
|      | Dec   | NA         | NA            | NA                 | NA                    | 2.77         | 2.43                  | 3.30         | 35%        |
| 2012 | Jan   | NA         | NA            | NA                 | NA                    | 2.39         | 1.36                  | 2.68         | 30%        |
| 2012 | Feb   | NA         | NA            | NA                 | NA                    | 2.29         | 1.97                  | 2.46         | 29%        |
|      | Mar   | NA         | NA            | NA                 | NA                    | 2.46         | 2.22                  | 3.01         | 31%        |
|      |       | NA         | NA            | NA                 | NA<br>NA              | 9.78         | 2.72                  | 29.90        | 123%       |
|      | Apr   |            |               |                    |                       |              |                       |              |            |
|      | May   | NA         | NA            | NA                 | NA                    | 29.27        | 16.40                 | 53.00        | 367%       |
|      | Jun   | -<br>> T A | -<br>> T A    | -<br>> 1 A         | -<br>>TA              | 43.77        | 26.20                 | 65.10        | 549%       |
|      | Jul   | NA         | NA            | NA                 | NA                    | 24.37        | 12.40                 | 42.30        | 306%       |
|      | Aug   | -          | -             | -                  | -                     | 8.00         | 5.57                  | 11.80        | 100%       |
|      | Sep   | -          | -             | -                  | -                     | 4.39         | 3.52                  | 5.43         | 55%        |
|      | Oct   | 0.069      | 0.061         | 0.094              | 29%                   | 3.70         | 3.42                  | 4.79         | 46%        |
|      | Nov   | 0.074      | 0.040         | 0.154              | 31%                   | 4.02         | 3.20                  | 4.68         | 50%        |
|      | Dec   | NA         | NA            | NA                 | NA                    | 2.95         | 2.01                  | 4.04         | 37%        |
| 2013 | Jan   | -          | -             | -                  | -                     | 2.39         | 1.79                  | 2.90         | 30%        |
|      | Feb   | 0.025      | 0.022         | 0.027              | 10%                   | 2.16         | 1.48                  | 2.58         | 27%        |
|      | Mar   | -          | -             | -                  | -                     | 2.67         | 2.16                  | 3.66         | 33%        |
|      | Apr   | 0.135      | 0.058         | 0.243              | 56%                   | 5.91         | 4.17                  | 7.86         | 74%        |
|      | May   | 1.224      | 0.103         | 2.275              | 511%                  | 31.21        | 7.19                  | 52.10        | 392%       |
|      | Jun   | -          | -             | -                  | -                     | 47.92        | 24.60                 | 195.00       | 601%       |
|      | Jul   | 0.384      | 0.103         | 1.053              | 160%                  | 17.56        | 9.20                  | 33.90        | 220%       |
|      | Aug   | 0.205      | 0.083         | 0.408              | 86%                   | 8.73         | 5.69                  | 14.40        | 110%       |
|      | Sep   | 0.140      | 0.098         | 0.274              | 58%                   | 5.58         | 5.16                  | 6.74         | 70%        |
|      | Oct   | 0.218      | 0.141         | 0.376              | 91%                   | 5.18         | 4.32                  | 6.60         | 65%        |
|      | Nov   | -          | -             | -                  | -                     | 3.51         | 1.69                  | 4.47         | 44%        |
|      | Dec   | NA         | NA            | NA                 | NA                    | 2.34         | 0.95                  | 3.33         | 29%        |
| 2014 | Jan   | NA         | NA            | NA                 | NA                    | 2.27         | 1.45                  | 2.56         | 29%        |
|      | Feb   | NA         | NA            | NA                 | NA                    | 1.86         | 1.69                  | 2.13         | 23%        |
|      | Mar   | NA         | NA            | NA                 | NA                    | 2.08         | 1.76                  | 2.40         | 26%        |
|      | Apr   | NA         | NA            | NA                 | NA                    | 4.81         | 2.36                  | 7.39         | 60%        |
|      | May   | NA         | NA            | NA                 | NA                    | 26.20        | 9.09                  | 58.60        | 329%       |
|      | Jun   | NA         | NA            | NA                 | NA                    | 35.81        | 24.70                 | 47.50        | 449%       |
|      | Jul   | 0.174      | 0.124         | 0.261              | 73%                   | 13.60        | 7.22                  | 23.30        | 171%       |
|      | Aug   | 0.084      | 0.058         | 0.201              | 35%                   | 5.72         | 4.91                  | 7.05         | 72%        |
|      |       | -          | -             | -                  | -                     | 7.01         | 5.17                  | 10.00        | 88%        |
|      | Sep   | 0.091      | 0.065         | 0.146              | 38%                   | 4.38         | 3.81                  | 5.23         | 55%        |
|      | Oct   |            |               |                    |                       |              |                       |              |            |
|      | Nov   | -<br>NA    | -<br>NA       | -<br>NA            | -<br>NA               | 3.04<br>2.51 | 2.20<br>1.58          | 4.15<br>2.94 | 38%<br>31% |

<sup>&</sup>lt;sup>1</sup> "NA" indicates months with no data.

Note: Blue shading indicates highest mean monthly discharge and orange shading indicates the lowest mean monthly discharge for each year.

<sup>&</sup>lt;sup>2</sup> "-" Indicate months with less than 20 days of data.

 $<sup>^{3}</sup>$  MAD at LC\_DC1 = 0.238 m $^{3}$ /s

 $<sup>^{4}</sup>$  MAD at WSC 08KN018 = 7.96 m $^{3}$ /s

Table 7.4: Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual Discharge (MAD), at LC\_DC1 and WSC 08NK018 from 2011 to 2022

| Year | Month      | Disc    | harge at LC_i | DC1 <sup>1,2</sup> | % of MAD <sup>3</sup> | Discha  | Discharge at WSC 08NK018 |         | % of MAD <sup>4</sup> |
|------|------------|---------|---------------|--------------------|-----------------------|---------|--------------------------|---------|-----------------------|
|      |            | Average |               | Maximum            |                       | Average | Minimum                  | Maximum |                       |
| 2015 | Jan        | NA      | NA            | NA                 | NA                    | 2.34    | 1.98                     | 2.49    | 29%                   |
|      | Feb        | NA      | NA            | NA                 | NA                    | 2.43    | 1.70                     | 3.39    | 31%                   |
|      | Mar        | -       | -             | -                  | -                     | 3.42    | 1.63                     | 5.90    | 43%                   |
|      | Apr        | -       | -             | -                  | -                     | 7.20    | 4.59                     | 15.30   | 90%                   |
|      | May        | 0.598   | 0.434         | 0.774              | 250%                  | 16.53   | 11.90                    | 25.70   | 207%                  |
|      | Jun        | 0.397   | 0.168         | 0.815              | 166%                  | 17.50   | 8.88                     | 32.80   | 220%                  |
|      | Jul        | 0.143   | 0.100         | 0.203              | 60%                   | 6.65    | 5.14                     | 8.75    | 83%                   |
|      | Aug        | 0.076   | 0.056         | 0.103              | 32%                   | 4.62    | 4.03                     | 5.26    | 58%                   |
|      | Sep        | 0.072   | 0.053         | 0.086              | 30%                   | 4.37    | 3.92                     | 4.95    | 55%                   |
|      | Oct        | 0.066   | 0.048         | 0.103              | 27%                   | 3.64    | 3.27                     | 4.02    | 46%                   |
|      | Nov        | 0.040   | 0.023         | 0.061              | 17%                   | 2.77    | 1.76                     | 3.71    | 35%                   |
|      | Dec        | 0.026   | 0.017         | 0.037              | 11%                   | 2.21    | 1.59                     | 3.22    | 28%                   |
| 2016 | Jan        | 0.048   | 0.034         | 0.064              | 20%                   | 2.33    | 1.62                     | 2.61    | 29%                   |
|      | Feb        | 0.052   | 0.037         | 0.066              | 22%                   | 1.90    | 1.22                     | 2.16    | 24%                   |
|      | Mar        | 0.046   | 0.034         | 0.105              | 19%                   | 2.22    | 1.95                     | 2.70    | 28%                   |
|      | Apr        | 0.569   | 0.129         | 0.959              | 237%                  | 11.58   | 2.98                     | 21.40   | 145%                  |
|      | May        | 0.534   | 0.334         | 0.780              | 223%                  | 16.55   | 12.10                    | 21.30   | 208%                  |
|      | Jun        | 0.266   | 0.137         | 0.519              | 111%                  | 11.82   | 7.46                     | 18.20   | 148%                  |
|      | Jul        | 0.138   | 0.098         | 0.192              | 58%                   | 8.01    | 6.16                     | 13.80   | 101%                  |
|      | Aug        | 0.077   | 0.050         | 0.117              | 32%                   | 5.62    | 4.16                     | 7.45    | 71%                   |
|      | Sep        | 0.055   | 0.048         | 0.065              | 23%                   | 3.78    | 3.60                     | 4.10    | 47%                   |
|      | Oct        | 0.142   | 0.073         | 0.209              | 59%                   | 4.92    | 3.90                     | 6.18    | 62%                   |
|      | Nov        | 0.140   | 0.118         | 0.182              | 58%                   | 4.63    | 3.33                     | 5.38    | 58%                   |
|      | Dec        | 0.103   | 0.090         | 0.117              | 43%                   | 2.45    | 1.55                     | 3.10    | 31%                   |
| 2017 | Jan        | NA      | NA            | NA                 | NA                    | 2.71    | 2.25                     | 3.36    | 34%                   |
| 2017 | Feb        | NA      | NA            | NA                 | NA                    | 2.04    | 1.69                     | 2.27    | 26%                   |
|      | Mar        | -       | -             | -                  | -                     | 2.54    | 1.62                     | 3.61    | 32%                   |
|      | Apr        | 0.253   | 0.124         | 0.468              | 105%                  | 5.81    | 3.75                     | 9.03    | 73%                   |
|      | May        | 1.548   | 0.340         | 2.420              | 646%                  | 26.90   | 8.08                     | 44.80   | 338%                  |
|      | Jun        | 0.756   | 0.274         | 1.688              | 315%                  | 26.95   | 13.50                    | 46.40   | 338%                  |
|      | Jul        | 0.176   | 0.124         | 0.263              | 74%                   | 8.33    | 5.06                     | 13.20   | 105%                  |
|      | Aug        | 0.105   | 0.079         | 0.203              | 44%                   | 4.06    | 3.07                     | 4.94    | 51%                   |
|      | Sep        | 0.081   | 0.074         | 0.091              | 34%                   | 2.83    | 2.61                     | 3.04    | 36%                   |
|      | Oct        | 0.102   | 0.080         | 0.191              | 43%                   | 2.85    | 2.49                     | 3.53    | 36%                   |
|      | Nov        | 0.102   | 0.070         | 0.133              | 38%                   | 2.83    | 1.91                     | 3.59    | 35%                   |
|      | Dec        | -       | -             | -                  | -                     | 1.81    | 1.19                     | 3.24    | 23%                   |
| 2018 | Jan        | 0.049   | 0.043         | 0.055              | 20%                   | 1.96    | 1.31                     | 2.41    | 25%                   |
| 2010 | Feb        | 0.049   | 0.045         | 0.055              | 20%                   | 1.63    | 1.54                     | 1.77    | 20%                   |
|      | Mar        | 0.051   | 0.043         | 0.037              | 24%                   | 1.95    | 1.65                     | 2.20    | 24%                   |
|      |            | 0.440   | 0.064         | 1.593              | 183%                  | 5.52    | 1.77                     | 24.00   | 69%                   |
|      | Apr<br>May | 1.519   | 0.642         | 2.567              | 634%                  | 34.01   | 15.90                    | 50.00   | 427%                  |
|      | Jun        | 0.278   | 0.042         | 0.422              | 116%                  | 16.50   | 12.10                    | 25.90   | 207%                  |
|      | -          |         |               |                    |                       |         |                          |         | 119%                  |
|      | Jul        | 0.187   | 0.131         | 0.317              | 78%                   | 9.45    | 6.00                     | 13.50   |                       |
|      | Aug        | 0.097   | 0.066         | 0.136              | 40%                   | 4.24    | 3.60                     | 5.70    | 53%                   |
|      | Sep        | 0.105   | 0.079         | 0.147              | 44%                   | 3.28    | 3.15                     | 3.56    | 41%                   |
|      | Oct        | 0.078   | 0.046         | 0.120              | 33%                   | 3.23    | 3.15                     | 3.35    | 41%                   |
|      | Nov        | - 0.040 | 0.025         | - 0.050            | - 170/                | 3.03    | 2.65                     | 3.23    | 38%                   |
|      | Dec        | 0.040   | 0.035         | 0.050              | 17%                   | 2.28    | 1.79                     | 3.00    | 29%                   |

<sup>&</sup>lt;sup>1</sup> "NA" indicates months with no data.

Note: Blue shading indicates highest mean monthly discharge and orange shading indicates the lowest mean monthly discharge for each year.

<sup>&</sup>lt;sup>2</sup> "-" Indicate months with less than 20 days of data.

 $<sup>^{3}</sup>$  MAD at LC\_DC1 = 0.240 m $^{3}$ /s

 $<sup>^{4}</sup>$  MAD at WSC 08KN018 = 7.97 m $^{3}$ /s

Table 7.4: Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual Discharge (MAD), at LC\_DC1 and WSC 08NK018 from 2011 to 2022

| Year | Month      | Disc    | harge at LC_ | DC1 <sup>1,2</sup> | % of MAD <sup>3</sup> | Discha  | rge at WSC 0 | 8NK018  | 4                     |
|------|------------|---------|--------------|--------------------|-----------------------|---------|--------------|---------|-----------------------|
|      |            | Average | Minimum      | Maximum            |                       | Average | Minimum      | Maximum | % of MAD <sup>4</sup> |
| 2019 | Jan        | NA      | NA           | NA                 | -                     | 1.92    | 1.58         | 2.24    | 24%                   |
|      | Feb        | NA      | NA           | NA                 | -                     | 1.64    | 1.43         | 1.98    | 21%                   |
|      | Mar        | NA      | NA           | NA                 | -                     | 2.20    | 1.17         | 4.20    | 28%                   |
|      | Apr        | NA      | NA           | NA                 | -                     | 3.65    | 2.96         | 4.85    | 46%                   |
|      | May        | 0.393   | 0.082        | 0.777              | 164%                  | 10.48   | 4.34         | 22.70   | 131%                  |
|      | Jun        | 0.441   | 0.224        | 0.726              | 184%                  | 18.88   | 12.90        | 29.30   | 237%                  |
|      | Jul        | 0.397   | 0.245        | 0.586              | 166%                  | 14.04   | 9.80         | 19.80   | 176%                  |
|      | Aug        | 0.163   | 0.107        | 0.274              | 68%                   | 6.89    | 5.08         | 9.32    | 86%                   |
|      | Sep        | 0.101   | 0.082        | 0.127              | 42%                   | 4.53    | 4.17         | 4.96    | 57%                   |
|      |            | 0.102   | 0.092        | 0.135              | 43%                   | 3.66    | 2.47         | 4.33    | 46%                   |
|      | Oct<br>Nov | -       | -            | -                  | -                     | 2.86    | 2.00         | 3.41    | 36%                   |
|      |            |         |              |                    |                       |         |              |         |                       |
| 2020 | Dec        | -       | -            | -                  | -                     | 2.60    | 2.08         | 3.45    | 33%                   |
| 2020 | Jan        | -       | -            | -                  | -                     | 2.00    | 1.42         | 2.68    | 25%                   |
|      | Feb        | -       | -            | -                  | -                     | 1.98    | 1.72         | 2.29    | 25%                   |
|      | Mar        | 0.022   | 0.007        | 0.060              | 9%                    | 2.26    | 1.63         | 3.03    | 28%                   |
|      | Apr        | 0.411   | 0.056        | 0.738              | 172%                  | 5.24    | 2.78         | 9.67    | 66%                   |
|      | May        | 1.009   | 0.567        | 1.985              | 421%                  | 18.47   | 9.86         | 58.90   | 232%                  |
|      | Jun        | 1.044   | 0.333        | 2.033              | 436%                  | 31.14   | 18.90        | 66.10   | 391%                  |
|      | Jul        | 0.229   | 0.144        | 0.354              | 96%                   | 12.83   | 6.98         | 23.20   | 161%                  |
|      | Aug        | 0.116   | 0.078        | 0.153              | 48%                   | 5.15    | 3.92         | 7.16    | 65%                   |
|      | Sep        | 0.065   | 0.057        | 0.085              | 27%                   | 3.52    | 3.25         | 3.87    | 44%                   |
|      | Oct        | 0.061   | 0.045        | 0.068              | 26%                   | 3.00    | 2.09         | 3.22    | 38%                   |
|      | Nov        | 0.084   | 0.064        | 0.106              | 35%                   | 3.06    | 2.02         | 3.51    | 38%                   |
|      | Dec        | -       | -            | -                  | -                     | 2.40    | 1.78         | 3.06    | 30%                   |
| 2021 | Jan        | -       | -            | -                  | -                     | 2.27    | 1.85         | 2.66    | 28%                   |
|      | Feb        | -       | -            | -                  | -                     | 1.95    | 1.83         | 2.33    | 24%                   |
|      | Mar        | 0.109   | 0.013        | 0.284              | 46%                   | 3.04    | 1.87         | 4.45    | 38%                   |
|      | Apr        | 0.265   | 0.153        | 0.453              | 111%                  | 4.99    | 3.75         | 7.42    | 63%                   |
|      | May        | 0.862   | 0.453        | 1.736              | 360%                  | 16.60   | 8.42         | 28.40   | 208%                  |
|      | Jun        | 0.583   | 0.245        | 1.329              | 243%                  | 24.72   | 15.70        | 49.40   | 310%                  |
|      | Jul        | 0.162   | 0.099        | 0.230              | 68%                   | 8.76    | 5.30         | 14.70   | 110%                  |
|      | Aug        | 0.105   | 0.073        | 0.160              | 44%                   | 5.92    | 4.30         | 7.88    | 74%                   |
|      | Sep        | 0.069   | 0.051        | 0.096              | 29%                   | 4.41    | 3.59         | 5.59    | 55%                   |
|      | Oct        | 0.055   | 0.045        | 0.096              | 23%                   | 3.14    | 2.86         | 3.94    | 39%                   |
|      | Nov        | 0.097   | 0.051        | 0.275              | 40%                   | 3.67    | 2.76         | 6.05    | 46%                   |
|      | Dec        | -       | -            | -                  | -                     | 3.19    | 2.23         | 4.62    | 40%                   |
| 202  | 2 Jan      | NA      | NA           | NA                 | NA                    | 2.60    | 1.99         | 2.88    | 33%                   |
|      | Feb        | NA      | NA           | NA                 | NA                    | 2.28    | 1.76         | 2.67    | 29%                   |
|      | Mar        | -       | -            | -                  | -                     | 2.70    | 1.89         | 4.78    | 34%                   |
|      | Apr        | 0.256   | 0.179        | 0.426              | 107%                  | 5.21    | 4.50         | 7.41    | 65%                   |
|      | May        | 0.685   | 0.393        | 1.071              | 286%                  | 13.62   | 7.84         | 24.30   | 171%                  |
|      | Jun        | 0.944   | 0.564        | 1.765              | 394%                  | 37.70   | 21.80        | 57.30   | 473%                  |
|      | Jul        | 0.384   | 0.292        | 0.540              | 160%                  | 16.09   | 8.07         | 26.50   | 202%                  |
|      | Aug        | 0.199   | 0.146        | 0.283              | 83%                   | 6.09    | 5.10         | 7.76    | 76%                   |
|      | Sep        | 0.121   | 0.113        | 0.140              | 51%                   | 4.91    | 4.29         | 6.09    | 62%                   |
|      | Oct        | 0.143   | 0.121        | 0.181              | 60%                   | 4.07    | 3.80         | 4.49    | 51%                   |
|      | Nov        | -       | -            | -                  | -                     | 3.29    | 2.75         | 4.16    | 41%                   |
|      | Dec        | _       | -            | _                  | -                     | 2.68    | 2.36         | 2.92    | 34%                   |

<sup>&</sup>lt;sup>1</sup> "NA" indicates months with no data.

Note: Blue shading indicates highest mean monthly discharge and orange shading indicates the lowest mean monthly discharge for each year.

<sup>&</sup>lt;sup>2</sup> "-" Indicate months with less than 20 days of data.

 $<sup>^{3}</sup>$  MAD at LC\_DC1 = 0.238 m $^{3}$ /s

 $<sup>^{4}</sup>$  MAD at WSC 08KN $018 = 7.96 \text{ m}^{3}/\text{s}$ 

Table 7.5: Summary Statistics of Mean Monthly Discharge as a Percent of Mean Annual Discharge (MAD), at LC\_DC1 and WSC 08NK018 from 2011 to 2022

| Year |      |      |      |      |      | % Cor | nplete <sup>1</sup> |      |      |      |      |      |         |
|------|------|------|------|------|------|-------|---------------------|------|------|------|------|------|---------|
|      | Jan  | Feb  | Mar  | Apr  | May  | Jun   | Jul                 | Aug  | Sep  | Oct  | Nov  | Dec  | Average |
| 2011 | -    | -    | -    | -    | -    | -     | -                   | -    | 100% | 76%  | 7%   | -    | 15%     |
| 2012 | -    | -    | -    | -    | -    | 63%   | -                   | 13%  | 54%  | 100% | 69%  | -    | 25%     |
| 2013 | 18%  | 23%  | 20%  | 28%  | 31%  | 19%   | 31%                 | 31%  | 32%  | 31%  | 20%  | -    | 24%     |
| 2014 | -    | -    | -    | -    | -    | -     | 74%                 | 100% | 29%  | 100% | 49%  | -    | 29%     |
| 2015 | -    | -    | 24%  | 26%  | 100% | 100%  | 100%                | 100% | 100% | 100% | 100% | 100% | 71%     |
| 2016 | 100% | 100% | 100% | 100% | 100% | 100%  | 100%                | 100% | 100% | 100% | 100% | 100% | 100%    |
| 2017 | -    | -    | 34%  | 100% | 85%  | 84%   | 85%                 | 100% | 100% | 90%  | 70%  | 5%   | 63%     |
| 2018 | 63%  | 92%  | 94%  | 86%  | 100% | 100%  | 100%                | 100% | 100% | 100% | 44%  | 74%  | 88%     |
| 2019 | -    | -    | -    | 2%   | 100% | 100%  | 100%                | 100% | 100% | 92%  | 79%  | 75%  | 62%     |
| 2020 | 88%  | 86%  | 91%  | 94%  | 100% | 100%  | 100%                | 100% | 100% | 93%  | 92%  | 84%  | 94%     |
| 2021 | 88%  | 79%  | 100% | 100% | 100% | 100%  | 100%                | 100% | 100% | 100% | 92%  | 74%  | 95%     |
| 2022 | 67%  | 67%  | 84%  | 91%  | 100% | 100%  | 100%                | 100% | 100% | 100% | 79%  | 88%  | 90%     |

<sup>&</sup>lt;sup>1</sup> Based on the total number of days within each month (Jan-Dec) and in each year (Total) that data was available.

Note: Highlighted cells indicate months with less than 60% data completeness.

Table 7.6: Date of Minimum and Maximum Daily Average Streamflow per Year from 2001 to 2022 Recorded at LC\_DC1

| Year | Date of      | Date of      | Minimum Flow | Maximum Flow | Minimum Flow | Maximum Flow |
|------|--------------|--------------|--------------|--------------|--------------|--------------|
|      | Minimum Flow | Maximum Flow | $(m^3/s)$    | $(m^3/s)$    | (% of MAD¹)  | (% of MAD¹)  |
| 2011 | -            | -            | -            | -            | -            | -            |
| 2012 | -            | -            | -            | -            | -            | -            |
| 2013 | 11-Jan       | 11-May       | 0.02         | 2.28         | 8%           | 948%         |
| 2014 | -            | -            | -            | -            | -            | -            |
| 2015 | 26-Dec       | 4-Jun        | 0.02         | 0.81         | 7%           | 340%         |
| 2016 | 5-Jan        | 23-Apr       | 0.03         | 0.96         | 14%          | 400%         |
| 2017 | 11-Nov       | 24-May       | 0.07         | 2.42         | 29%          | 1008%        |
| 2018 | 16-Dec       | 10-May       | 0.04         | 2.57         | 15%          | 1070%        |
| 2019 | 7-Dec        | 15-May       | 0.04         | 0.78         | 15%          | 324%         |
| 2020 | 3-Mar        | 1-Jun        | 0.01         | 2.03         | 3%           | 847%         |
| 2021 | 28-Feb       | 28-May       | 0.01         | 1.74         | 5%           | 723%         |
| 2022 | 15-Mar       | 17-Jun       | 0.01         | 1.76         | 5%           | 735%         |

<sup>&</sup>quot;-" Indicates less than 6 months of data

<sup>&</sup>quot;-" Indicate months with no available data.

 $<sup>^{1}</sup>$  MAD at LC\_DC1 = 0.240 m $^{3}$ /s

Average flow during each WCT activity period from 2013 to 2022 have varied considerably from year to year across all activity periods, as indicated by the high standard deviation of mean flow. The average flow during the rearing and early incubation periods in 2022 was the highest on record; average flow during the early incubation period (0.512 m³/s) was 22% higher than the previous record high in 2013 (0.420 m³/s), and average flow during the rearing period (0.408 m³/s) was 1.5% higher than the previous record high in 2013 (0.402 m³/s; Table 7.3). If hydraulic habitat is limiting the Dry Creek WCT population, then the higher flows in summer and fall 2022 would likely be beneficial.

Table 7.7 indicates the years in which flows, as measured at LC\_DC1 from 2011 to 2022, met the flushing flow threshold of 1.0 m³/s for a 2-day duration (West *et al.* 2021). The flushing flow threshold was reached in 7 of the 12 years of data, including 2022, with 2019 being the only year in the last five years that did not reach the threshold. The record indicates that flushing flows have been occurring regularly in Dry Creek, but current sediment conditions cannot be directly inferred from this record and would require empirical confirmation.

Table 7.7: Indication of Whether the Historical Flows at LC\_DC1 Exceeded the Flushing Flow Threshold of 1.0 m<sup>3</sup>/s for a 2-Day Duration (threshold proposed in West *et al.* 2021)

| Year | Flushed | Days with no data <sup>1</sup> |
|------|---------|--------------------------------|
| 2011 | Unknown | 61                             |
| 2012 | Yes     | 42                             |
| 2013 | Yes     | 12                             |
| 2014 | Unknown | 61                             |
| 2015 | No      | 0                              |
| 2016 | No      | 0                              |
| 2017 | Yes     | 11                             |
| 2018 | Yes     | 1                              |
| 2019 | No      | 0                              |
| 2020 | Yes     | 2                              |
| 2021 | Yes     | 0                              |
| 2022 | Yes     | 8                              |

<sup>&</sup>lt;sup>1</sup> Number of days in May and June with no recorded flow data.

Note: Years marked as "unknown" did not exceed the threshold during periods when data were available and the data gaps precluded a determination.



## **7.2.3.1 Summary**

General trends of streamflow monitored in 2022 at the LC\_DC1 gauge in Dry Creek were consistent with historical records: high flows occurred in May and June, and a low flow period occurred between November and March. Average flows in 2022 during key WCT activity periods were broadly similar to previous years, except during rearing and early incubation periods when average flows in 2022 were the highest on record. The flushing flow threshold, measured as 1.0 m³/s for a 2-day duration, was met in Dry Creek at LC\_DC1 in 2022.

## 7.2.4 Calcite Coverage

Similar to previous years, in 2022, calcite concretion was not observed in Dry Creek during the Regional Calcite Monitoring Program. Calcite levels in Dry Creek continue to be below those expected to result in measurable biological effect, although there is a clear trend toward increased calcite presence.

In addition to the Regional Calcite Monitoring Program, Calcite Index (CI) was also measured concurrently with benthic invertebrate community sampling as part of the 2022 LCO Dry Creek LAEMP (Table 2.3). Benthic invertebrate sampling targeted riffle habitat, and calcite measurements were taken in the immediate proximity of benthic invertebrate sampling sites. Consistent with previous years, 2022 LCO Dry Creek LAEMP CI values at the reference location remained at 0, were highest at the most upstream mine-exposed station (LC\_DC3, CI = 0.88 to 0.97), and all Dry Creek monitoring locations were generally lower than values from 2019<sup>13</sup> and earlier (Table 7.8). Overall, in 2022 at Dry Creek, CI values increased from downstream to upstream at mine-exposed LAEMP monitoring locations, and there were changes in calcite coverage indicative of increased calcite deposition.

#### **7.3** Fish

The 5.5 km of LCO Dry Creek from the confluence of the UFR (km 0) to the LCO Dry Creek Head Pond spillway barrier (at 5.5 km) are accessible to fish. Upstream of the spillway barrier is considered non-fish bearing. East Tributary of LCO Dry Creek is accessible to WCT, though likely has negligible densities of fish due to summer temperatures which result in little to no growing season for WCT (Minnow 2022a).

The fish in LCO Dry Creek are considered part of the interbreeding UFR WCT population as the culverts at km 1 are partial barriers are passable for upstream movement during some

<sup>&</sup>lt;sup>13</sup> Measuring calcite in the presence of encrusting algae is challenging and potentially prone to errors. Encrusting material identified as calcite at several areas on Dry Creek and LC\_DCEF in 2019 was determined to be non-calcite following additional field consultation in 2020 and those values are considered erroneous.



Table 7.8: Calcite Index Values for Dry Creek, Grace Creek, and Fording River Areas, LCO Dry Creek LAEMP 2015 to 2022

| А         | Area    |          |          |          | Calcite I | ndex (CI) |          |          |          | Calcite index (CI') <sup>a</sup> |          |  |
|-----------|---------|----------|----------|----------|-----------|-----------|----------|----------|----------|----------------------------------|----------|--|
|           |         | Sep 2015 | Sep 2016 | Sep 2017 | Sep 2018  | Sep 2019  | Sep 2020 | Sep 2021 | Sep 2022 | Sep 2021                         | Sep 2022 |  |
|           |         |          |          |          | -         | 0.99      | 0        | 0        | 0        | -                                | 0        |  |
|           | LC_DCEF | -        | -        | -        |           | 0.96      | 0        | 0        | 0        | -                                | 0        |  |
|           |         |          |          |          |           | 1.19      | 0        | 0        | 0        | -                                | 0        |  |
|           |         |          |          |          |           | 1.12      | 0.1      | 0.1      | 0.97     | 0.02                             | 0.66     |  |
|           | LC_DC3  | -        | -        | -        | -         | 1.16      | 0.35     | 0.34     | 0.95     | 0.09                             | 0.52     |  |
|           |         |          |          |          |           | 1.36      | 0.62     | 0.78     | 0.88     | 0.33                             | 0.41     |  |
|           |         |          |          |          | 0.6       | 1         | 0        | 0        | 0.71     | 0                                | 0.4      |  |
|           | LC_DCDS | 0        | 8.0      | 0        | 1         | 1         | 0.1      | 0        | 0.79     | 0                                | 0.41     |  |
| Dry       |         |          |          |          | 1         | 1         | 0.02     | 0        | 0.58     | 0                                | 0.26     |  |
| Creek     | LC_DC2  |          | -        | -        | -         | 1         | 0        | 0.04     | 0.28     | 0.01                             | 0.06     |  |
|           |         | -        |          |          |           | 1         | 0        | 0.01     | 0.44     | 0                                | 0.12     |  |
|           |         |          |          |          |           | 1         | 0.03     | 0.09     | 0.75     | 0.02                             | 0.27     |  |
|           | LC_DC4  |          |          |          |           | 1         | 0        | 0.45     | 0.29     | 0.15                             | 0.09     |  |
|           |         | -        | -        | -        | -         | 0         | 0        | 0.06     | 0.29     | 0.02                             | 0.05     |  |
|           |         |          |          |          |           | 1         | 0        | 0.11     | 0.17     | 0                                | 0.04     |  |
|           |         | 0        | 0.6      | 0        | 0.92      | 1         | 0.12     | 0.45     | 0.39     | -                                | 0.14     |  |
|           | LC_DC1  |          |          |          | 1.1       | 1         | 0.19     | 0.59     | 0.2      | -                                | 0.07     |  |
|           |         |          |          |          | 1.1       | 1         | 0.41     | 0.43     | 0.26     | -                                | 0.07     |  |
|           |         |          |          |          | 1         | 1         | 0.94     | 0.96     | 0.91     | 0.63                             | 0.59     |  |
|           | LC_FRUS | 1        | 1        | 1        | 1         | 1         | 0.96     | 0.99     | 0.64     | 0.56                             | 0.28     |  |
| Fording   |         |          |          |          | 1         | 1         | 0.99     | 0.99     | 1.01     | 0.63                             | 0.69     |  |
| River     |         |          |          |          | 0.89      | 1         | 0.11     | 0.92     | 0.68     | 0.46                             | 0.32     |  |
|           | LC_FRB  | 1        | 1.4      | 1.2      | 0.85      | 1         | 0.03     | 0.87     | 0.83     | 0.38                             | 0.47     |  |
|           |         |          |          |          | 0.7       | 1         | 0.92     | 0.66     | 0.88     | 0.22                             | 0.33     |  |
| Grace     |         |          |          |          |           | 0         | 0        | 0        | 0.01     | 0                                | 0        |  |
| Creek     | LC_GRCK | -        | -        | -        | -         | 0.25      | 0        | 0        | 0        | 0                                | 0        |  |
| O O O O O |         |          |          |          |           | 0         | 0        | 0        | 0.19     | 0                                | 0.05     |  |

Notes: Italicized values indicate calcite index values considered erroneous due to encrusting algae presence. "-" indicates calcite data not recorded. Calcite monitoring in support of biological sampling was discontinued at LC\_SPDC, following operational changes in October 2020 (see Minnow 2021a for details). Calcite monitoring results from LC\_SPDC are therefore unavailable for 2021, and this area has been excluded from the table.

<sup>&</sup>lt;sup>a</sup> Calcite indices (Cl') were calculated using calcite proportion rather than calcite presence and therefore cannot be compared with previous years.

flow conditions (AJM Environmental Inc. & Higher Ground Consulting. 2023, WSP & Poisson 2023)., therefore trends in LCO Dry Creek are influenced by those in the larger UFR population and cannot be considered in isolation. For example, the number of spawners in the UFR population can influence how many fish are available to spawn in LCO Dry Creek, at the same time migratory access and possibly water temperature, which can change year to year, may also influence the amount of spawning. The number of redds can in turn influence juvenile densities. In contrast, other indicators, such as age-0 length at age and body condition of age-1s, reflect local conditions.

Between 2015 and 2022 there were a number of influences on fish habitat and/or the UFR fish population that make it challenging to assess trends in LCO Dry Creek fish metrics associated with any specific change or event. In Dry Creek, these operational influences include the Dry Creek Water Management System becoming operational (January 2015), seasonal water diversion to by-pass sedimentation pond (beginning September 2020) and the BRN spoil failure (October 2021). In addition, over the winter of 2018/2019 there was a decline in the adult population of the UFR (Evaluation of Cause Team 2021), which LCO Dry Creek is a part of. There were 25 WCT mortalities associated with a dewatering event October 2020 (Minnow 2021a). Moreover, after several years of consistent fish sampling throughout Dry Creek (2016 – 2019), minimal sampling was conducted in 2020 and 2021 due to concerns regarding fish handling, which limits the statistical comparisons that can be made with previous time periods. However, given the ten years of available data we can consider trends related to WCT in LCO Dry Creek over time with respect to number and distribution of redds, juvenile densities, body condition, and length. For age-0, length-at-age differences before and after implementation of the seasonal water diversion bypassing the sediment ponds are discussed.

#### 7.3.1 Redd Surveys

Using the survey methods introduced in 2021 (Smit 2022), the AUC model was used to estimate the total number of unique definitive nests an average observer would have been expected to count. This approach facilitates comparisons between years. Using the AUC model the estimates were 20 definitive nests in 2021 and 9 definitive nests in 2022. The number of nests observed in other parts of the UFR was also lower in 2022 than other years and may be associated with a relatively cold spring (Thorley et al. 2023a).

The total number of definitive nests counted in LCO Dry Creek in 2022 (n=10) was similar to the number of visible redds (which can consist of multiple nests) counted in 2015 to 2017 but was lower than from 2018 to 2021 (Table 7.9). However, these numbers are not strictly comparable as discussed below. Prior to 2020, the number of nests in a redd were not consistently recorded, nests were not recorded as definitive or potential, and only new redds were recorded.

Table 7.9: Total Redds Counted (2015 to 2020) and Total Definitive Nests Counted (2021 to 2022) in LCO Dry Creek Between 2015 and 2022

| Reach          | 2015 <sup>1</sup> | 2016 <sup>2</sup> | 2017 <sup>2</sup> | 2018 <sup>2</sup> | 2019 <sup>2</sup> | 2020 <sup>1</sup> | 2021 <sup>1</sup> | 2022 <sup>1</sup> |
|----------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1              | 9                 | 9                 | 6                 | 26                | 15                | 10                | 18                | 5                 |
| 2              | 0                 | 1                 | 1                 | 5                 | 5                 | 0                 | 0                 | 0                 |
| 3              | 0                 | 1                 | 2                 | 8                 | 2                 | 5                 | 0                 | 5                 |
| 4              | 0                 | 0                 | 0                 | 0                 | 0                 | 0                 | 0                 | 0                 |
| East Tributary | -                 | -                 | -                 | -                 | -                 | -                 | -                 | 0                 |
| Total          | 9                 | 11                | 9                 | 39                | 22                | 15                | 18                | 10                |

<sup>&</sup>lt;sup>1</sup> WSP & Poisson 2023

Nonetheless the redd data provides information on the spatial extent of spawning. Redds were observed upstream and downstream of the culverts located at km 1.0 in all years except 2015 and 2021 when they were only observed downstream of the culverts. No definitive nests were observed in the 1.1 km of Dry Creek East Tributary that was surveyed in 2022 (Table 7.9).

## 7.3.2 Density

Age-1 and age-2+ WCT were captured at three of the four sites sampled in 2022 in LCO Dry Creek (Table 7.10). The number of fish captured during the first electrofishing pass by site and year was used to estimate the densities of age-1 and age-2+ fish over time (Figure 7.7). The site (DRY1; located at km 0.55) that was sampled the most consistently from 2013 to 2022 (i.e., in 8 of 10 years) indicates that juvenile densities have been comparable over these and do not suggest any long-term trend (Figure 7.7). For the five sites sampled yearly from 2016 – 2019, densities have been similar for age-1s and have fluctuated more for age-2+, but are also not suggestive of a long-term trend.

Table 7.10: Summary of Fish Captured by Sampling Site, Kilometre (km), and Age-Class in 2022

| Site      | km*  | Reach | Age-1 | Age-2+ |
|-----------|------|-------|-------|--------|
| DRY-100o  | 0.12 | 1     | 0     | 10     |
| DRY1      | 0.56 | 1     | 1     | 5      |
| DRY-2400o | 2.37 | 2     | 0     | 1      |
| DRY4.3    | 4.37 | 4     | 0     | 0      |

<sup>\*</sup>Distance from the confluence of LCO Dry Creek and the UFR.



<sup>&</sup>lt;sup>2</sup> Faulkner et al., 2020. Total redds is assumed to be equivalent to total nests counted.

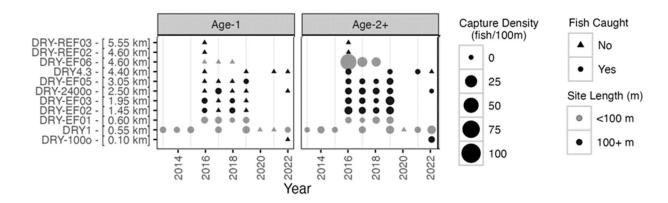


Figure 7.7: Densities of Fish Captured during Electrofishing in LCO Dry Creek on the First Pass by Year, Sampling Site, and Life Stage

## 7.3.3 Length frequency

Length categories for different age classes of WCT were developed based on data collected from 2013 to 2022 (Table 7.11). To do this, length frequency histograms were used to visualize the size structure of WCT captured by electrofishing under the assumption that size cutoffs between age-0, age-1, and age-2+ WCT can be identified from the length-frequency distributions (Figure 7.8; WSP & Poisson 2023). All fish greater than or equal to 200 mm in fork length were considered a single life stage grouping consisting of both subadult and adult fish. Age-0 and age-1 length categories vary across subpopulations in the UFR due to differences in growth among subpopulations (Thorley & Branton 2023). The age-2+ category includes multiple cohorts and includes fish with fork lengths greater than the maximum for age-1 fish and less than 200 mm.

Table 7.11: Length Categories for Life Stages of WCT in LCO Dry Creek

| Life Stage         | Fork Length |
|--------------------|-------------|
| Age-0              | <50 mm      |
| Age-1              | 50–89 mm    |
| Age-2+             | 90–199 mm   |
| Subadult and adult | ≥200 mm     |

For plotting purposes, data were grouped for the period before (2013 to 2017) and after (2019 to 2022) as a large decrease in the abundance of subadult and adult WCT occurred in the UFR in 2018 (WSP & Thorley 2023).

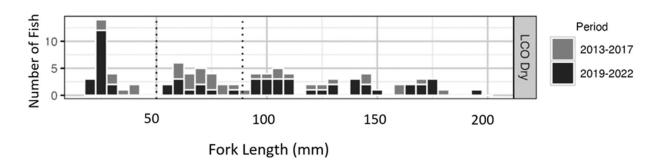


Figure 7.8: Number of Fish Captured by Electrofishing in LCO Dry Creek by Fork Length and Period

Note: Colour of bars represents the period before or after the decrease in counts of WCT during snorkel surveys that occurred between 2017 and 2019. The vertical dotted lines indicate the age-1 life stage cutoffs.

## 7.3.4 Length-at-age-0

The length of age-0 fish at the onset of winter is a determinant of overwintering survival (Coleman and Fausch 2007) and is sensitive to local conditions as indicated by the range of length at age-0s measured across the UFR (Thorley et al. 2023). Relatively few data are available for age-0s over the years in Dry Creek as sampling methodologies have not specifically targeted age-0s, though dip-net sampling that targets this age-class fish was implemented in 2022 (Figure 7.9). Water temperatures in the growing season influence the growth rates of fish, and GSDD have been lower in Dry Creek since the seasonal bypass of the sedimentation ponds was put into operation (Section 7.2.1). To explore the potential for changes in growth associated with these changes in temperature, a length-at-age analysis was conducted to estimate the length of age-0 fish separately for before and after the seasonal bypass was put into operation (WSP & Poisson 2023). Based on the limited available data, age-0 fish were shorter in 2022 compared to previous years (2015 and 2016). The length of age-0 fish was estimated to be 29% shorter (95% CI 53% shorter to 8% longer) after the seasonal bypass was put into operation (Thorley et al 2023a, WSP & Poisson 2023). These values were estimated as part of the larger UFR length-at-age model (Thorley et al. 2023) and are based on a very limited dataset including two years of data before the sediment pond bypass (2015 n=7 and 2016 n=2) and one year after (2022 n=17). These length estimates account for annual variation across the UFR as well as the expected extent of annual variation within Dry Creek. Given the small dataset there is considerable uncertainty as indicated by the range in 95% Cls. Additional years of age-0 data will reduce the uncertainty with respect to estimating the change in length.

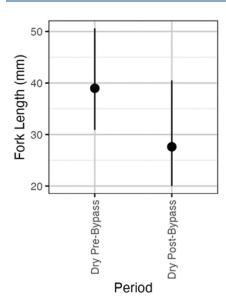


Figure 7.9: Estimated Fork Length of Age-0 Westslope Cutthroat Trout on 1 October in a Typical Year in LCO Dry Creek (with 95% Cls)

Note: The pre-bypass includes data from 2015 (n=7) and 2016 (n=2) and the post-bypass has data from 2022 (n=17).

#### 7.3.5 Condition

Body condition compares an individual's mass relative to its length, and is a measure of health and growth potential (Bentley and Schindler 2013). All else being equal, fish with higher body condition would be expected to have more energy stores for growth, reproduction, and metabolic processes than fish of a similar length but lower body condition. Body condition was estimated based on juvenile fish as sampling in LCO Dry Creek does not target larger size classes. It is expressed as the predicted weight of a 100 mm WCT to estimate the percent difference in body condition relative to a typical stream in the UFR (Thorley et al 2023b) including LCO Dry Creek, in a typical year (Figure 7.10). Body condition in 2022 was estimated to be higher than in 2021. From 2013 to 2022, body condition was variable in LCO Dry Creek but was consistently estimated to be higher than the typical body condition of fish in other parts of the UFR, which is represented by 0% in Figure 7.11. Otherwise, there is no apparent trend over time given the uncertainty represented by the error bars (Figure 7.10).

## **7.3.6 Summary**

Water temperature monitoring results in 2022 suggest that the portion of Dry Creek inhabited by fish (i.e., downstream of the East Tributary) now primarily feature water temperatures that may pose challenges to fish growth and recruitment. Portions of the spawning, incubation and rearing



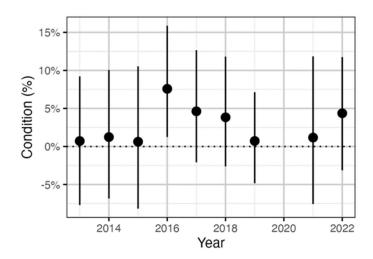


Figure 7.10: Body Condition in LCO Dry Creek Shown as the Percent Change in the Body Weight of a 100 mm Fish in a Typical Year Relative to a Typical Stream in the UFR Watershed (with 95% Cls)

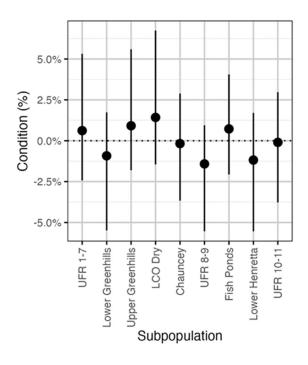


Figure 7.11: Body Condition Shown as the Percent Change in the Body weight of a 100 mm fish in a Typical Year Relative to a Typical Stream by Subpopulation (with 95% CIs)

Note: Subpopulations are different locations within the UFR watershed.



activity stages are outside of the BC WQG stated optimums for WCT by >1°C, while the growing season measured at three stations between the East Tributary and the confluence were all below the 800 GSDD threshold recommended to meet minimum requirements for interior Cutthroat Trout population recruitment (Coleman and Fausch 2007).

General trends of streamflow monitored in 2022 at the LC\_DC1 gauge in Dry Creek were consistent with historical records: high flows occurred in May and June, and a low flow period occurred between November and March. Average flows in 2022 during key WCT activity periods were broadly similar to previous years, except during rearing and early incubation periods when average flows in 2022 were the highest on record; biological effects from these high flows are unknown due to a lack of concurrent fish abundance monitoring. The flushing flow threshold, measured as 1.0 m³/s for a 2-day duration, was met in Dry Creek at LC\_DC1 in 2022.

Redds were observed above and below the culvert at km1 which is a barrier to upstream passage in some flow conditions. In 2022 and there were an estimated 9 definitive nests in compared to 20 in 2021. This decrease in nest counts was also observed throughout the UFR and may be associated with the cold early season water temperatures (Thorley et al 2023b). The total number of nests counted in 2022 was similar to the number of redds in 2015 to 2017, but lower than in 2018 to 2021. The densities of age-1 and age-2+ fish in 2022 were similar to previous years and show no apparent trend over time. Body condition was higher in 2022 than in 2021 but was variable over time indicating no long-term trends within LCO Dry Creek. However, the body condition of fish in LCO Dry Creek has been consistently higher than the typical body condition of fish in the UFR population. Based on a limited dataset, the age-0 fish were shorter in 2022 than in previous years with data (2015 and 2016). This may be related to a decrease in water temperatures after the seasonal sedimentation pond by-pass was put into operation in 2020.

# 8 SUMMARY

Changes to Dry Creek due to LCOII development have been evaluated by addressing five study questions, which focus on: 1) potential effects to water quality; 2) changes in toxicity; 3) potential effects to benthic invertebrate communities; 4) benthic invertebrate tissue selenium; and 5) fish and fish habitat.

Evaluation of Study Question #1 (potential effects to water quality) indicated that in general (2014 to 2022) concentrations of mine-related constituents including nitrate, total cadmium, and total selenium, have increased over time on Dry Creek since spoiling began in this watershed in 2015. Nitrate concentrations were above updated effects concentrations and dissolved nickel concentrations above proposed benchmarks Creek 2022. were in Dry in Constituent concentrations were more frequently elevated at areas LC DC3 (the Dry Creek area immediately downstream of LCOII spoiling and prior to DCWMS effects) and LC SPDC, LC DCDS, and LC DC2 (the areas immediately downstream of the DCWMS) than at areas LC DC4 and LC DC1, likely due to increasing distance from LCOII operations and input of groundwater from reference area LC DCEF between LC DC2 and LC DC4 (Golder 2019b). Similar trends constituents in aqueous were not detected at reference (LC DCEF and LC UC), in the Fording River downstream of Dry Creek, or in Grace Creek (LC GRCK), except for nitrate which showed increasing trends at LC DCEF, LC FRB and LC GRCK and total selenium which increased at LC DCEF, LC UC and LC FRB. Operational changes to the DCWMS including development and implementation of the seasonal bypass and modification of discharge channel area LC SPDC have successfully mitigated organoselenium concentrations in the surface water as well as selenium bioaccumulation and effects to biota.

Evaluation of Study Question #2 (changes in toxicity) indicated that chronic toxicity test occurring at LC\_DCDS and acute toxicity occurring at LC\_SPDC have not increased in 2022 relative to 2021 (Section 4). Acute toxicity testing of water from the outlet of the DCWMS as well as within Dry Creek showed no test failures in 2022. Chronic toxicity is monitored in Dry Creek directly downstream of the DCWMS (LC\_DCDS), under the regional chronic toxicity program. In 2022, nickel and/or nitrate were identified as potentially causing the observed effects on water fleas and amphipods. All chronic toxicity on rainbow trout and fathead minnow in 2022 were categorized as no effect. Overall, chronic toxicity results have shown a low proportion of adverse responses over time within Dry Creek (LC\_DCDS), with a frequency and magnitude of responses that was similar between 2019 to 2022 for most endpoints, and responses have been mostly limited to invertebrate endpoints.

Evaluation of Study Question #3 (potential effects to benthic invertebrate communities) indicated that in 2022 benthic invertebrate community total abundance and taxonomic richness were generally within regional normal ranges at Dry Creek LAEMP sampling areas. Benthic invertebrate communities in Dry Creek upstream of the DCWMS (LC\_DC3) had endpoints outside of normal ranges (particularly %EPT, %E, and %C) most often. Areas located closest to the DCWMS discharge also tended to have lower %E than other areas and compared to regional and site-specific normal ranges. In 2022, benthic invertebrate communities located upstream and downstream of the mouth of Dry Creek in the Fording River differed from each other; however, community endpoints were generally within regional normal ranges and showed no temporal variation. The benthic invertebrate community within Grace Creek also had endpoints within regional normal ranges, as expected, based on current lack of mine-related influence. Over the 2019 to 2022 monitoring period there have been decreases in total abundance, EPT and E abundance, and the proportion of EPT and E at all areas along Dry Creek. The proportions of EPT and E measured at the mine-exposed areas were almost always significantly lower than those associated with the community in the Dry Creek reference area. Specifically, between 2021 and 2022 there was a decrease in total abundance (driven by a decrease in EPT) at all stations on Dry Creek as well as the reference station and the minimally impacted station. Currently, there are no water quality parameters that point to a cause of this decrease. Overall, %E appeared to be the endpoint most likely linked to a mine-related influence. Both the relative proportion and total abundance of Ephemeroptera decreased at all mine-exposed areas on Dry Creek over the 2019 to 2022 monitoring period. Temporal changes in Dry Creek benthic invertebrate community structure were associated with increasing aqueous concentrations of mine-related constituents including nickel, nitrate, and selenium. It is therefore likely that mining activities are contributing to changes in the benthic invertebrate communities of Dry Creek. Overall, most Dry Creek benthic invertebrate community endpoints were within normal ranges at most areas, but some changes are occurring over time that are likely related to effects of increasing concentrations of mine-related constituents.

Evaluation of Study Question #4 (benthic invertebrate tissue selenium) in most areas of Dry Creek downstream of the DCWMS, benthic invertebrate tissue selenium concentrations were the same in 2022 as 2021 and lower than 2020, although were occasionally higher than regional normal ranges and reference concentrations (most often in May). Downstream of the DCWMS the decreases in benthic invertebrate tissue selenium concentrations measured in 2022 and 2021 relative to earlier years (2020) were primarily attributable to changes in the water management of the DCWMS (i.e., bypass the sedimentation ponds throughout most of the year and limiting use of the DCWMS to one rather than two sedimentation ponds). Within the Fording River, benthic invertebrate tissue selenium concentrations upstream and downstream of Dry Creek were

generally similar to each other and have remained unchanged in 2022 relative to earlier years (2019 to 2021), indicating that Dry Creek water quality has had limited or no influence on benthic invertebrate tissue selenium concentrations in area of the Fording River mainstem.

Evaluation of Study Question #5 (fish health and fish habitat) indicated the total number of nests counted in 2022 was similar to the number of redds counted in 2015 to 2017, but lower than in 2018 to 2021. There were fewer redds observed in 2022 than in 2021 in the UFR including in Dry Creek which may be associated with the cold early season water temperatures. Body condition and densities of age-1 and age-2+ fish were similar to previous years. The body condition of fish in Dry Creek has been consistently higher than the typical body condition of fish in the UFR population. Age-0 fish were shorter in 2022 than in previous years (2015 and 2016). This may be related to a decrease in water temperatures after the seasonal sedimentation pond by-pass was put into operation in 2020. Similar to previous years, in 2022, calcite concretion was not observed in Dry Creek during the Regional Calcite Monitoring Program. Calcite levels in Dry Creek continue to be below those expected to result in measurable biological effect, although there is a trend toward increased calcite presence.

The results from the Dry Creek LAEMP provide information that supports Teck's AMP (Teck 2021a), and Table 8.1 summarizes material presented in this report that is relevant to the AMP. The results from this study also supported the evaluation of biological triggers, which are intended to identify unexpected monitoring results that may lead to responses under the AMP response framework. Biological triggers were assessed at two mine-exposed Dry Creek areas, LC DC1 and LC DCDS (Appendix H). Results indicated that all the replicates were below the biological trigger values at LC DC1 and LC DCDS for %EPT (i.e., were indicative of a biological trigger). EPT at these areas has previously been flagged for further investigation in the RAEMP based on benthic invertebrate community results (Minnow 2020c). Approximately 15% of samples were higher than the biological trigger values at both LC DCDS and LC DC1 (2 of 15 and 3 of 20 samples, respectively), this is considerably lower than in 2021 where ~ 37% of samples were higher than trigger values at LC DCDS and 27% at LC DC1. Additional responses include development of a biokinetic model for selenium bioaccumulation and modifications to the DCWMS operations in an effort to decrease enhanced primary production and / or heterotrophic microbial activity in the sedimentation ponds that promotes the generation of organoselenium compounds. Monitoring of the benthic invertebrate selenium biological trigger at these areas (and other Dry Creek LAEMP areas) will continue under both the 2023 Dry Creek LAEMP and the RAEMP.

Table 8.1: Summary of Findings, Responses, and Adjustments Related to the Dry Creek LAEMP, 2022

| Key Question(s)   | Data Evaluation Process  | Outcome(s)   | Responses & Adjustments in 2022   | EMC Engagement   |
|---|--|--|---|--|
| Are aqueous concentrations of mine-related constituents elevated in relation to British Columbia Water Quality Guidelines (BCWQG) and EVWQP benchmarks, and are concentrations changing over time?  | Comparison of water quality data to reference areas (LC_DCEF for Dry Creek areas, LC_FRUS for area LC_FRB) regional and site-specific normal ranges, comparison to BCWQGs, EVWQP benchmarks, updated effects concentrations (UEC), and proposed benchmarks. Statistical analysis of temporal trends over time and among years. | Aqueous concentrations of nitrate, cadmium, selenium, and other constituents increased in 2022 in Dry Creek compared to baseline and 2021.   | Ongoing responses through AMP process (triggered in 2018). Implementation of Nitrate Compliance Action Plan, Modification of DCWMS, Implementation of the integrated effects assessment modelling investigation for nitrate, as well as other ongoing investigations into the effects of aqueous mine-related constituents on biota and selenium bioaccumulation. |  |
|   |  | Aqueous organoselenium concentrations showed inconsistent changes in 2022.   |   |  |
| Is acute or chronic toxicity occurring from water collected at the outlet of the DCWMS (LC_SPDC) or within Dry Creek (LC_DCDS), and is toxicity changing over time?   | Quarterly acute toxicity test at LC_SPDC. Comparison of chronic toxicity test results with results from reference area FR_UFR1 and pooled regional references, evaluation of frequency of test failures for acute toxicity tests, comparison to previous years' results.   | No acute toxicity test failures at LC_SPDC in 2022. Generally, no change in frequency or severity of potential adverse responses in chronic toxicity testing at LC_DCDS except for algae.  |   |  |
| Are benthic invertebrate community endpoints within normal ranges derived based on samples collected at regional and local reference areas within the Elk River as part of the Regional Aquatic Effects Monitoring Program (RAEMP), and are the endpoints changing over time? | endpoints to regional and site-specific normal ranges, statistical evaluation of spatial and   |  | Adjustments to DCWMS designed to mitigate water quality effects.  | 2022 data delivered to EMC February 8 2023, Presentation with 2022 data delivered to EMC on March 15, 2023. Written input from EMC on March draft data package received March 30, 2023. 2022 LAEMP report delivered to EMC by April 30, 2023 |
| compare to normal ranges and BCWQG or EVWQP benchmarks, and are they changing over time?  | Comparison of benthic invertebrate tissue selenium concentrations to regional normal range and EVWQP benchmarks, statistical evaluation of temporal and spatial trends relative to reference.  | In Dry Creek mean benthic invertebrate tissue selenium concentrations were below the EVWQP benthic invertebrate benchmark (13 mg/kg dw) but concentrations in individual samples were occasionally above the EVWQP level 1 benchmarks for to juvenile fish, benthic invertebrates, and juvenile birds (11, 13, and 15 mg/kg dw, respectively) at stations closest to the DCWMS (LC_DCDS and LC_DC2).  In the Fording River mean benthic invertebrate tissue selenium concentrations in 2022 were above the normal range in most sampling events. | Operational changes to DCWMS to minimize retention time in pond to reduce bioaccumulation potential.  | 2023 Study Design delivered by May 1, 2023   |
| Are changes in fish and fish habitat (including instream flow and calcite index) occurring within Dry Creek as a result of mine   | Flow, temperature, DO, redd survey, and calcite data with previous years' sampling, guidelines, and/or literature (specifically optimal temperature, DO, and flow ranges for different WCT life stages).   | There was no fish tissue Se sampling completed in 2022.  Mean weekly water temperatures were outside of guidelines in 2022.  Calcite concretion was not observed in Dry Creek; however, calcite presence continues to increase annually throughout Dry Creek.  Age-0 fish were shorter in 2022 than when last sampled in 2015 and 2016. This may be related to a decreased growth rate associated with lower water temperatures after the seasonal sediment pond by-pass was put into operation in 2020.   | The relationship between water temperature and age-<br>0 WCT growth is being evaluated as part of the<br>Population Monitoring program  |  |

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# 10 REFERENCES

- ADEPT Environmental Sciences Ltd. 2022. Elk Valley Selenium Speciation Monitoring Program: 2021 Annual Report. Submitted to Teck Coal Limited.
- Annear, T., Chisholm, I., Beecher, H., Locke, A., Aarrestad, P., Burkhart, N., Coomer, C, Estes, C., Hunt, J., Jacobson, R., Jobsis, G., Kauffman, J., Marshall, J., Mayes, K., Stalnaker, C., Wentworth, R. 2004. *Instream flows for riverine resource stewardship*. Cheyenne, WY: Instream Flow Council.
- BCMOE (British Columbia Ministry of Environment). 2017. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Water Protection & Sustainability Branch. Available from http://www2.gov.bc.ca/assets/gov/environment/air-landwater/water/waterquality/wqgs-wqos/bc\_env\_working\_water\_quality\_guidelines.pdf [Accessed June 2017].
- BCMOE. 2018. Approved Water Quality Guidelines for British Columbia. Accessed at http://www2.gov.bc.ca/gov/content/environment/air-land-water/water-quality/water-quality-guidelines/approved-water-quality-guidelines, April 2018.
- BCMOECCS (British Columbia Ministry of Environment and Climate Change Strategy). 2019. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture Summary Report. Updated August 2019.
- BCMOECCS. 2021. Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Water Quality Guideline Series, WGG-08. Prov. B.C. Victoria, B.C.
- Bear, E.A., T. E. McMahon, and A. V. Zale. 2007. Comparative Thermal Requirements of Westslope Cutthroat Trout and Rainbow Trout: Implications for Species Interactions and Development of Thermal Protection Standards, Transactions of the American Fisheries Society. Available online at: <a href="https://www.researchgate.net/publication/255593391\_Comparative\_Thermal\_Requirements\_of\_Westslope\_Cutthroat\_Trout\_and\_Rainbow\_Trout\_Implications\_for\_Species\_Interactions\_and\_Development\_of\_Thermal\_Protection\_Standards.">https://www.researchgate.net/publication/255593391\_Comparative\_Thermal\_Requirements\_of\_Westslope\_Cutthroat\_Trout\_and\_Rainbow\_Trout\_Implications\_for\_Species\_Interactions\_and\_Development\_of\_Thermal\_Protection\_Standards.</a>
- Bech, P. 1994. Lower Mainland Region Stream Inventory/Assessment Methods. Unpublished Manuscript LM 229. Ministry of Environment, Lands and Parks. Surrey, BC.
- Buchanan, S., T. Hatfield, K. Akaoka, and S. Faulkner. 2017. Dry Creek Fish Habitat Assessment Report. Consultant's report prepared for Teck Coal Limited by Ecofish Research Ltd., January 30, 2017.
- CCME (Canadian Council of Ministers of the Environment). 2004. Phosphorus: Canadian guidance framework for the management of freshwater systems. Canadian Environmental Quality Guidelines for the Protection of Aquatic Life, 1-5.
- CCME. 2016. Guidance manual for developing nutrient guidelines for rivers and streams.
- Canadian Council of Ministers of the Environment, Winnipeg.
- Coleman, M. A., & Fausch, K. D. 2007. Cold summer temperature limits recruitment of age-0 cutthroat trout in high-elevation Colorado streams. Transactions of the American Fisheries Society, 136(5), 1231–1244. https://doi.org/10.1577/t05-244.1Cope, S. 2020. Proprietor, Westslope Fisheries Ltd. Email conversation with Cait Good (Teck). January 7, 2020.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2016. COSEWIC assessment and status report on the Westslope Cutthroat Trout Oncorhynchus clarkii



- lewisi, Saskatchewan-Nelson River populations and Pacific populations in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 83 pp.
- Cope, S., C.J. Schwarz, A. Prince and J. Bisset. 2016. Upper Fording River Westslope Cutthroat Trout Population Assessment and Telemetry Project: Final Report. Report Prepared for Teck Coal Limited, Sparwood, BC. Report Prepared by Westslope Fisheries Ltd., Cranbrook, BC. 266 p.
- Cope, S. 2020. Upper Fording River Westslope Cutthroat Trout Population Monitoring Project: 2019. Report Prepared for Teck Coal Limited, Sparwood, BC. Report Prepared by Westslope Fisheries Ltd., Cranbrook, BC.
- de Bruyn, A. and S.N. Luoma. 2021. Selenium Species Bioaccumulation Tool Draft Version 2.0. Prepared for Mariah Arnold, Teck Coal Limited, Sparwood, BC. February. Project 19133414/MQ2 Task 4.
- EAO (British Columbia Environmental Assessment Office). 2013. Environmental Assessment Certificate # M13-02 Issued 25 September, 2013 to Teck Coal Limited for the Line Creek Operations Phase II. Available online at: https://projects.eao.gov.bc.ca/p/line-creek-operations-phase-ii/docs
- Ecofish (Ecofish Research Ltd.). 2017. Dry Creek Fish and Fish Habitat Monitoring Program Monitoring Program Year 1 Baseline Summary Report. Prepared by S. Faulkner, N. Swain, A. Yeomans-Routledge, and T. Hatfield. Prepared for Teck Coal Limited. March 10, 2017.
- Ecofish. 2018. Dry Creek Fish and Fish Habitat Monitoring Program Baseline Summary Report.

  Draft V1. Prepared by S. Faulkner, N. Swain, A. Yeomans-Routledge, and T. Hatfield.

  Prepared for Teck Coal Limited. February 22, 2018.
- Ecofish. 2019. Dry Creek Fish and fish Habitat Monitoring Program Year 1-3 Summary Report. Prepared by S. Faulkner, N. Swain, S. Buchanan, J. Krick, and T. Hatfield. Prepared for Teck Coal Limited. April 25, 2019.
- Ecofish. 2020a. Dry Creek Fish and Fish Habitat Monitoring Program Year 4 Summary Report. Prepared by S. Faulkner and T. Hatfield. Prepared for Teck Coal Limited. April 24, 2020.
- Ecofish. 2020b. Memorandum Re: Aquatic Data Integration Table (ADIT): Flow and Temperature Screening Values. Prepared for Teck Coal Ltd.
- ENV (British Columbia Ministry of Environment and Climate Change Strategy). 2013. Permit 106970 issued under the provisions of the *Environmental Management Act*. October 25, 2013.
- ENV. 2015. Approval of the Dry Creek Water Management Plan. February 20, 2015.
- ENV. 2017 Permit 5353 issued under the provisions of the Environmental Management. Act April 17, 2017
- ENV. 2021. Amended Permit 107517 issued under the provisions of the *Environmental Management Act*. March 11, 2021.
- ENV. 2023. Amended Permit 107517 issued under the provisions of the *Environmental Management Act*. January 27, 2023.
- Environment Canada. 1996. Biological Test Method: Acute Lethality Test Using *Daphnia* spp. Environmental Protections Series. Method Development and Applications Section. Environmental Technology Centre. May 1996.



- Environment Canada. 1998. Biological Test Method: Toxicity Tests Using Early Life Stages of Salmonid Fish (Rainbow Trout). Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report 1/RM/28. July 1998.
- Environment Canada. 2007a. Biological Test Method: Acute Lethality Test Using Rainbow Trout. Environmental Protections Series. Method Development And Applications Section. Environmental Technology Centre. May 2007.
- Environment Canada. 2007b. Biological Test Method: Test of Reproduction and Survival Using the Cladoceran *Ceriodaphnia dubia*. Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report EPS 1/RM/21. Second Edition. February 2007.
- Environment Canada. 2007c. Biological Test Method: Test for Measuring the Inhibition of Growth Using the Freshwater Macrophyte *Lemna minor*. Environmental Technology Centre, Ottawa, Ontario. Environmental Protection Series. Report 1/RM/37. Second Edition. January 2007.
- Environment Canada. 2012. Field Manual: Wadeable Streams. Canadian Aquatic Biomonitoring Network (CABIN). Government of Canada.
- Farnham, I.M., Singh, A.K., Stetzenbach, K.J., Johannesson, K.H. 2002. Treatment of nondetects in multivariate analysis of groundwater geochemistry data. Chemometrics and Intelligent Laboratory Systems. 60:265-281.
- Faulkner, S., Ammerlann, J., Swain, N., Ganshorn, K., and Hatfield, T. 2020, April 24. Dry Creek Fish and Fish Habitat Monitoring Program Year 4 Summary Report. Ecofish Research Ltd.
- Giller, P. S., & Twomey, H. (1993, November). Benthic macroinvertebrate community organization in two contrasting rivers: between-site differences and seasonal patterns. In biology and environment: proceedings of the Royal Irish Academy (pp. 115-126). Royal Irish Academy.
- Gillis, C. A., & Chalifour, M. 2010. Changes in the macrobenthic community structure following the introduction of the invasive algae Didymosphenia geminata in the Matapedia River (Québec, Canada). Hydrobiologia, 647(1), 63-70.
- Golder (Golder Associates Ltd.). 2014. Benchmark Derivation Report for Selenium. Annex E of the Elk Valley Water Quality Plan. Prepared for Teck Coal Limited. July.
- Golder. 2014a. Benchmark Derivation Report for Nitrate and Sulphate. Elk Valley Water Quality Plan. Report Number 13-1349-0006. July.
- Golder. 2014b. Benchmark Derivation Report for Selenium. Elk Valley Water Quality Plan. Report Number 13-1349-0006. July.
- Golder. 2016. LCO Dry Creek Flow Model Update. Consultant's Report prepared by Golder Associates Limited for Teck Coal Limited, October 5, 2016. Reference 1661889-2016-077-R-Rev1-1000.
- Golder. 2019a. LCO Dry Creek SDM Process: Flow Accretion Results. Presented to LCO Dry Creek Working Group, Sparwood BC. February 13, 2019.
- Golder. 2019b. LCO Dry Creek SDM Process: LCO Dry Creek Flow Accretion Study Update. Presented to LCO Dry Creek Working Group, Sparwood BC. October 29, 2019.
- Golder. 2020. 2019 Chronic Toxicity Program. Elk Valley Testing to Satisfy Permit Requirements. Prepared for Teck Coal Ltd., Sparwood, BC. April 2020.
- Golder. 2021a. 2020 Chronic Toxicity Program. Elk Valley Testing to Satisfy Permit Requirements. Prepared for Teck Coal Ltd., Sparwood, BC. April 2021.



- Golder. 2021b. Elk Valley Selenium Speciation Program. State of the Science Report. Prepared for Teck Coal Ltd., Sparwood, BC. March 26, 2021.
- Golder. 2021c. Preliminary Annelid Bioaccumulation Analysis. Prepared for Teck Coal Limited. June. Reference No. 20140948-2003-TM-Rev0.
- Golder. 2022. 2021 Chronic Toxicity Program. Elk Valley Testing to Satisfy Permit Requirements. Prepared for Teck Coal Ltd., Sparwood, BC. April 2022.
- Government of Canada. 2023. Historical Hydrometric Data: Station ID 08NK018. Available online at: https://wateroffice.ec.gc.ca/mainmenu/historical\_data\_index\_e.html. Accessed April 18, 2023.
- Hatfield, T., A. Buren, S. Faulkner. 2019. Dry Creek Fish and Fish Habitat Monitoring Program. Consultants memorandum prepared by Ecofish Research. Ltd. For Teck Coal Ltd. May 6, 2019.
- Hatfield, T., J. Chapman., and A. Harwood. 2022. Fish and Fish Habitat Effects Assessment: Dry Creek Water Conveyance and Supplementation Project. Consultant's report prepared for Teck Coal Limited by Ecofish Research Ltd., March 11, 2022.
- He, J.X., Bence, J.R., Johnson, J.E., Clapp, D.F., and Ebener, M.P. 2008. Modeling Variation in Mass-Length Relations and Condition Indices of Lake Trout and Chinook Salmon in Lake Huron: A Hierarchical Bayesian Approach. Trans. Am. Fish. Soc. 137(3): 801–817. doi:10.1577/T07-012.1.
- Healey, K., K. Akaoka, A. Baki, S. Faulkner, and T. Hatfield. 2016. Dry Creek Instream Flow Study. Consultant's report prepared by Ecofish Research Ltd. for Teck Coal Limited.
- Hellawell, J. M. 1989. Biological indicators of freshwater pollution and environmental management. Elsevier. London and New York, 546.
- Helsel, D.R. and Hirsch, R.M. 2002. Statistical Methods in Water Resources Techniques of Water Resources Investigations, Book 4, chapter A3. U.S. Geological Survey. 522 pages.
- Hirsch, R.M., Slack, J.R., and Smith, R.A. 1982. Techniques of trend analysis for monthly water quality data. Water Resources Research 18: 107-121.
- Hilborn, R., Bue, B.G., and Sharr, S. 1999. Estimating spawning escapements from periodic counts: a comparison of methods. Can. J. Fish. Aquat. Sci. 56(5): 888–896. doi:10.1139/f99-013.
- Hocking, M., K. Akaoka, A. Buren, E. Vogt, J. MacAdams, and T. Hatfield. 2020. 2019 Calcite Effects to Spawning Habitat Suitability of Westslope Cutthroat Trout. Consultant's report prepared for Teck Coal Ltd. by Ecofish Research Ltd. May 8, 2020.
- Hubbard, M. D., & Peters, W. L. 1978. Environmental requirements and pollution tolerance of Ephemeroptera. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory.
- Hunter, J. 1973. A discussion of game fish in the state of Washington as related to water requirements. Washington State Department of Game, Fishery Management Division, Olympia. 66pp. Available online at: https://wdfw.wa.gov/sites/default/files/publications/01831/wdfw01831.pdf
- Ings, J., and Weech, S. 2020. Study Design for the Regional Aquatic Effects Monitoring Program, 2021 to 2023. A Minnow Environmental Inc. Report, Teck Coal Limited, Sparwood, BC.



- KWL (Kerr Wood Leidal) 2021. 2020 LCO Hydrometric Program. Prepared for Teck Coal Ltd. Line Creek Operations, Sparwood, BC. March 26, 2021.
- Knowles, J. E., Frederick, C., & Whitworth, A. 2019. merTools: Tools for analyzing mixed effect regression models. Version 0.5.0.
- Levine, S.N. and Schindler, D.E. 1999. Influence of nitrogen to phosphorus supply ratios and physicochemical conditions on cyanobacteria and phytoplankton species composition in the Experimental Lakes Area, Canada. Can. J. Fish. Aquat. Sci. 556, 451-466.
- Lotic (Lotic Environmental). 2019. Teck Coal Ltd. Elk Valley 2018 Calcite Monitoring Program Annual Report and Program Assessment. Prepared for Teck Coal Ltd., Sparwood, BC. April 2019.
- Lotic 2020. Teck Coal Ltd. Elk Valley 2019 Calcite Monitoring Program Annual Report and Program Assessment. Prepared for Teck Coal Ltd., Sparwood, BC. April 2020.
- Lorax (Lorax Environmental Services Ltd.). 2020. Line Creek Operations Assessment of Selenium Speciation and Bioavailability in Dry Creek. Prepared for Teck Coal Ltd., Sparwood, BC. Project #A528-1. February 6, 2020.
- Luoma, S.N. 2021. Selenium Bioaccumulation in Annelids Collected from the Fording and Elk Rivers. Prepared for Teck Coal Limited. January.
- Mayhood, D., W. 2012. Cutthroat Trout Length Conversion Regressions. Freshwater Research Limited, Calgary, Alberta. Prepared for Fisheries and Oceans Canada. FWR Technical Note 2012-06-1.
- McPhail, J.D. 2007. The Freshwater Fishes of British Columbia, University of Alberta Press, Edmonton, AB.
- Minnow (Minnow Environmental Inc.). 2015. Dry Creek Local Aquatic Effects Monitoring Program, 2014. Prepared for Teck Coal Ltd., Sparwood, BC. Project #2547
- Minnow. 2016. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2017. Prepared for Teck Coal Ltd., Sparwood, BC. Project #157202.0081. May 2016.
- Minnow. 2017. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2016. Prepared for Teck Coal Ltd., Sparwood, BC. Project #167202.0073
- Minnow. 2018a. Elk River Watershed Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2015-2016. Prepared for Teck Coal Limited, Sparwood, BC. Project #2561. January 2018.
- Minnow. 2018b. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2017. Prepared for Teck Coal Ltd., Sparwood, BC. Project #177202.0049. May 2018.
- Minnow. 2018c. Study Design for Line Creek Operation's 2018 Local Aquatic Effects Monitoring Program (LAEMP) for Dry Creek. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #177202.0049.
- Minnow. 2019. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2018. Prepared for Teck Coal Ltd., Sparwood, BC. Project #187202.0050. May 2019.



- Minnow. 2020a. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2019. Prepared for Teck Coal Ltd., Sparwood, BC. Project #197202.0009. May 2020
- Minnow. 2020b. Study Design for Line Creek Operation's 2020 Local Aquatic Effects Monitoring Program (LAEMP) for Dry Creek. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #207202.0024.
- Minnow. 2020c. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2017 to 2019. Prepared for Teck Coal Limited, Sparwood, BC. November. Project 187202.0011.
- Minnow. 2020d. Evaluation of Nutrient Concentrations in the Elk River Watershed Final Report. Prepared for Teck Coal Limited, Sparwood, BC. November. Project 207202.0011.
- Minnow. 2021a. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2020. Prepared for Teck Coal Ltd., Sparwood, BC. Project #207202.0024. May 2021
- Minnow. 2021b. Study Design for Line Creek Operation's 2021 Local Aquatic Effects Monitoring Program (LAEMP) for Dry Creek. Prepared for Teck Coal Limited, Sparwood, British Columbia. May 2021. Project #207202.0024.
- Minnow. 2022a. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2021. Prepared for Teck Coal Ltd., Sparwood, BC. April 2022. Project #217202.0035.
- Minnow. 2022b. Study Design for Line Creek Operation's 2022 Local Aquatic Effects Monitoring Program (LAEMP) for Dry Creek. Prepared for Teck Coal Limited, Sparwood, British Columbia. May 2022. Project #217202.0019.
- Minnow. 2023 in prep. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2020 to 2022. Prepared for Teck Coal Limited, Sparwood, BC. November. Project 227202.0031.
- Nautilus and Interior Reforestation. 2011. Evaluation of the Effects of Selenium on Early Life Stage Development of Westslope Cutthroat Trout from the Elk Valley, BC. Prepared for the Elk Valley Selenium Task Force. November 2011.
- Northcote, T. and G. Hartman. 1988. The biology and significance of stream trout populations (Salmo spp.) living above and below waterfalls. Pol. Arch. Hydrobiol. 35:409–442.
- Nupqu and AJM (AJM Environmental Inc.). 2021. Dry Creek Fish and Fish Habitat Monitoring Program 2020. Prepared by Nupqu Limited Partnership. Prepared for Teck Coal Limited. February 2021.
- Oksanen, J., Blanchet, F. G., Friendly, M., Kindt, R., Legendre, P., McGlinn, D., ... & Wagner, H. (2019). vegan: Community Ecology Package. R package version 2.5–6. 2019.
- Oliver, G. G., and L. E. Fidler. 2001. Towards a Water Quality Guideline for Temperature in the Province of British Columbia. Prepared for Ministry of Environment, Lands and Parks, Water Management Branch, Water Quality Section, Victoria, B.C. Prepared by Aspen Applied Sciences Ltd., Cranbrook, B.C., 53 pp + appnds. Available online at: http://www.env.gov.bc.ca/wat/wq/BCguidelines/temptech/index.html. Accessed on January 17, 2017.
- Poff, N.L., D. Allan, M.B. Bain, J.R. Karr, K.L. Prestegaard, B.D. Richter, R.E. Sparks, and J.C. Stromberg. 1997. The Natural Flow Regime: A paradigm for river conservation and restoration. *BioScience*, 47, (11) 769–784. https://doi.org/10.2307/1313099



- Pohlert, T. 2016. Trend: non-parametric trend tests and change-point detection. R package version 0.2.0. https://CRAN.R-project.org/package=trend Province of British Columbia. 2013. British Columbia Field Sampling Manual (complete). Available from https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual?keyword=field&keyword=sampling&keyword=manual. Accessed December 15, 2017.
- R Core Team. 2020. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org
- Robinson, M.D. 2010. Effects of calcite deposition on benthic macroinvertebrate communities throughout the Elk River Watershed. Consultant's report prepared for Teck Coal Ltd. Prepared by Interior Reforestation Co. Ltd. 17 pg.
- Robinson, M.D., and R.J. MacDonald. 2014. Teck Coal Ltd 2013 Calcite Monitoring Program Elk Valley operations summary report. Prepared by Lotic Environmental Ltd. 12 pp + appendices. Teck (Teck Coal Limited). 2011. Line Creek Operations Phase II Project Environmental Assessment Certificate Application. December.
- Smit, R., Robinson, M.D., Brooks, J.L., and Thorley, J.L. 2022. Teck Salmonid Nest Survey Methods: Field Manual and Data Standards. Prepared by Lotic Environmental for Teck Coal.
- Su, Z., Adkison, M.D., and Van Alen, B.W. 2001. A hierarchical Bayesian model for estimating historical salmon escapement and escapement timing. Can. J. Fish. Aquat. Sci. 58(8): 1648–1662. doi:10.1139/f01-099.
- Suter, G.W.II. 2015. What is a Cause? In: S.B. Norton S.M. Cormier and G.W. Suter II (Eds.) Ecological Causal Assessment. CRC Press, Boca Raton pp. 17-251-270.
- Teck (Teck Coal Limited). 2011. Line Creek Operations Phase II Project Environmental Assessment Certificate Application. December.
- Teck. 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for Approval on July 22, 2014.
- Teck. 2016. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. July.
- Teck. 2018a. Permit 106970 Line Creek Operations Annual Report. March 31, 2018.
- Teck. 2018b. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. December
- Teck. 2019a. Permit 106970 Line Creek Operations Annual Report. March 31, 2019.
- Teck. 2019b Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley 2018 Annual Report. Prepared by Teck Coal Limited. July 31, 2019.
- Teck. 2020a. Permit 106970 Line Creek Operations Annual Report. March 31, 2020.
- Teck. 2020b. LCO Dry Creek SDM Process: Aquatic Effects of Monitored Water Quality. Presented to LCO Dry Creek Working Group, Sparwood BC. November 23, 2020.
- Teck. 2020c. Line Creek Operations Mine Water Management Plan. Teck Coal Ltd. June 30, 2020.
- Teck. 2020d. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. 2019 Annual Report. July 31, 2020.

- Teck. 2020e. LCO Dry Creek DCWMS Seasonal Bypass Preliminary Results. Presented to LCO Dry Creek Working Group, Sparwood BC. November 25, 2020.
- Teck. 2021a. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley 2021 Update. Prepared by Teck Coal Limited. December 15, 2021.
- Teck. 2021b. Permit 106970 Line Creek Operations 2020 Annual Water Report. March 31, 2020.
- Teck. 2021c. Line Creek Operations. Proposed Instream Flow Requirements, Site Performance Objectives, and updated Water Management Plan for Dry Creek. Teck Coal Ltd. May 2021.
- Teck. 2022. Annual Water Quality Report 2021. Prepared by Teck Coal Limited. March 31, 2022.
- Teck. 2023. Surface Water Quality Monitoring 2022 Annual Report 2022. Prepared by Teck Coal Limited. March 31, 2023. Therneau, T.M. 2017. Survival analysis. Package "survival" for R. April 4, 2017. https://cran.r-project.org/web/packages/survival/survival.pdf
- Therneau, T.M. 2017. Survival analysis. Package "survival" for R. April 4, 2017.
- Thorley, J.L., and Branton, M. 2023. Subject Matter Expert Report: Energetic Status at the Onset of Winter Based on Fork Length and Wet Weight. Evaluation of Cause Reduced Recruitment in the Harmer Creek Westslope Cutthroat Trout Population. A Poisson Consulting Ltd. Report, Teck Coal Ltd., Sparwood, BC.
- Thorley, J.L., Kortello, A.K. & M. Robinson. 2021. Upper Fording River Westslope Cutthroat Trout Population Monitoring 2020. A Poisson Consulting, Grylloblatta Consulting and Lotic Environmental report prepared for Teck Coal Ltd., Sparwood, BC.
- Thorley, J.L., Kortello, A.K., Brooks, J. & M. Robinson. 2022a. Upper Fording River Westslope Cutthroat Trout Population Monitoring 2021. A Poisson Consulting, Grylloblatta and Lotic Environmental report prepared for Teck Coal Ltd., Sparwood, BC.
- Thorley, J.L., Robinson, M., Brooks, J., and Kortello, A.K. 2022b. Study Design for upper Fording River Westslope Cutthroat Trout Population Monitoring in 2022. Teck Coal Limited, Sparwood, BC.
- Thorley, J.L., Smit, R., Brooks, J.L., and Robinson, M.D. 2022c. Teck Backpack Electrofishing Fish Density Surveys Field Methods and Data Collection Standards. Prepared by Lotic Environmental and Poisson Consulting for Teck Coal.
- Thorley, J.L., Kortello, A.D., and Brooks, J.L. 2023a. Upper Fording River Westslope Cutthroat Trout Population Monitoring 2022. A Poisson Consulting and Lotic Environmental report prepared for Teck Coal Ltd., Sparwood, BC.
- Thorley, J.L., Kortello, A.D., and Brooks, J. 2023b. UFR WCT Population Monitoring 2022. A Poisson Consulting Analysis Appendix. https://www.poissonconsulting.ca/f/888366171.
- USEPA (United States Environmental Protection Agency). 1996. Ecological Effects Test Guidelines. OPPTS 850.1400 Fish Early-Life Stage Toxicity Test. EPA-712-C-96-121, Public Draft.
- USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. 2nd Edition. EPA/600/R-99/064. Office of Water, Washington, DC, USA.



- USEPA. 2016. Aquatic Life Ambient Water Quality Criterion for Selenium Freshwater 2016. U.S. Environmental Protection Agency Office of Water, Washington, D.C. EPA 822-R-16-006.
- West, D., K. Akaoka, and T. Hatfield. 2021. Geomorphology PM information sheet. Input to the LCO Dry Creek Structured Decision-Making Process. Prepared for Teck Coal Ltd., Sparwood, BC.
- Wright, N., T. Jensma, H. Wright, K. Akaoka, M. Hocking, and T. Hatfield. 2018. 2017 Calcite Effects to Fish Spawning and Incubation. Draft V1. Consultant's report prepared for Teck Coal by Ecofish Research Ltd. February 19, 2018.
- Wolman, M.G. 1954. A Method of Sampling Coarse River-Bed Material. Transactions of the American Geophysical Union 35(6): 951-956.
- WSP Canada Inc. (WSP). 2023. 2022 Chronic Toxicity Program Elk Valley Testing to Satisfy Permit Requirements; Interpretive Report. Submitted to Teck Coal Ltd. April 2023.
- WSP Canada Inc. and Poisson Consulting Ltd. (WSP & Poisson) 2023. Line Creek Operations (LCO) Dry Creek 2022 Fish Population Monitoring. Report prepared for Teck Coal Ltd., Sparwood, BC. 35 pages.
- Wyatt, R.J. 2002. Estimating riverine fish population size from single- and multiple-pass removal sampling using a hierarchical model. Canadian Journal of Fisheries and Aquatic Sciences 59(4): 695–706.
- Zathey, N. Mitchell, S., and M.D. Robinson. 2021. Teck Coal Ltd. 2020 Calcite Monitoring Program Annual Report. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. 54 pp + appendices.

# APPENDIX A DATA ANALYSIS AND METHODS

#### APPENDIX A **METHODS**

| A1         | WATER QUALITY               | 1  |
|------------|-----------------------------|----|
| A1.1       | Overview                    |    |
|            | Sample Collection           |    |
| A1.3       | Laboratory Analysis         | 2  |
|            | Data Analysis               |    |
| <b>A2</b>  | ACUTE TOXICITY TESTING      | 8  |
| А3         | CHRONIC TOXICITY TESTING    | 9  |
| <b>A</b> 4 | PERIPHYTON                  | 10 |
| A4.1       | Overview                    |    |
| A4.2       | Sample Collection           | 10 |
| <b>A</b> 5 | BENTHIC INVERTEBRATES       | 11 |
| A5.1       | Overview                    | 11 |
| A5.2       | Community Structure         | 11 |
| A5.        | .2.1 Sample Collection      | 11 |
| A5.        | 2.2 Laboratory Analysis     | 11 |
| A5.        | .2.3 Supporting Measures    | 12 |
|            | .2.4 Data Analysis          |    |
| A5.3       | Benthic Invertebrate Tissue | 15 |
|            | .3.1 Sample Collection      |    |
|            | .3.2 Laboratory Analysis    |    |
| A5.        | .3.3 Data Analysis          | 16 |
| <b>A6</b>  | CALCITE                     | 19 |
| A6.1       | Sample Collection           |    |
| A6.2       | Data Analysis               | 19 |
| Α7         | REFERENCES                  | 20 |
|            |                             |    |

# **A1 WATER QUALITY**

### A1.1 Overview

Permit 107517 requires that Teck prepare annual reports that summarize monitoring data collected during the preceding calendar year at all locations specified in the permit. Observed concentrations were compared to Compliance Limits and Site Performance Objectives (SPO) specified in Permit 107517, Elk Valley Water Quality Plan (EVWQP) benchmarks, and to BC water quality guidelines for protection of aquatic life (BCWQG). Data were also plotted to identify increasing or decreasing trends over time. Water samples were collected at all areas concurrently with biological sampling. Methods are described as follows.

# A1.2 Sample Collection

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

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

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

Quality assurance and quality control (QA/QC) samples were collected in the field concurrent with water samples. One water chemistry field split duplicate was collected at a minimum of

10 % of samples. Equipment and travel blanks represented approximately 10% of the water chemistry samples submitted to the analytical laboratory.

## A1.3 Laboratory Analysis

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

Water samples were analyzed by ALS Environmental (ALS; Calgary, AB) for constituents consistent with Permit 107517 (i.e., conventional parameters, major ions, nutrients, and total and dissolved metals; Table A.1) using the following methods indicated in parentheses:

- total organic carbon (TOC) and dissolved organic carbon (DOC) (combustion method; American Public Health Association [APHA] 5310 for TOC);
- total suspended solids (TSS) and total dissolved solids (TDS; gravimetric method; APHA 2540 D and C for TSS and TDS, respectively);
- alkalinity (potentiometric titration; APHA 2320);
- turbidity (nephelometric method; APHA 2130 Turbidity);
- hardness, as CaCO₃ (by calculation; APHA 2340 B);
- total and dissolved metals, (collision cell inductively coupled plasma mass spectrometry and inductively coupled plasma - optical emission spectrophotometry; APHA 3030 B&E/ Environmental Protection Agency [EPA] SW-846 6020A, and EPA 3005A/6010B, respectively);
- bromide, chloride, fluoride, and sulphate (ion chromatography; APHA 4110 B);
- ammonia, as N (fluorescence; J. Env. Monit., 2005, 7:37-42);
- nitrate and nitrite, as N (ion chromatography; EPA 300.0);
- total Kjeldahl nitrogen (TKN) (fluorescence; APHA 4500-NORG D.);
- orthophosphate and total phosphorus (colourimetric method; APHA 4500-P Phosphorus).



Table A.1: Water Quality Parameters Required Under Permit 107517<sup>a</sup>

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

<sup>&</sup>lt;sup>a</sup> Parameters are consistent with those outlined in Table 27, Appendix 3 of Permit 107517.

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

Laboratory QA/QC associated with routine water sampling was described by Teck in the annual water quality report submitted under Permit 107517 (Teck 2023).

# A1.4 Data Analysis

Water quality data assessed included data for routine monitoring managed by Teck, and water samples collected at the biological monitoring stations concurrently with biological sampling. Water quality data were downloaded from Teck's EQuIS database, including:

- Nutrient concentrations (i.e., nitrate, nitrite, ammonia, total phosphorus, and orthophosphate); total and dissolved metals, selenium concentrations (i.e., total and dissolved selenium concentrations, and selenium speciation results including concentrations of selenate, selenite, dimethylselenoxide, methylseleninic acid, selenocyanate, selenomethionine, methaneselenonic acid, selenosulphate, and unknown selenium species);
- Concentrations of analytes with early warning triggers under the AMP (i.e., total dissolved solids, sulphate, total concentrations of antimony, barium, boron, lithium, manganese, molybdenum, nickel, selenium, uranium, and zinc, and dissolved concentrations of cadmium and cobalt);

- Concentrations of analytes with British Columbia Water Quality Guidelines (BCWQGs; BCMOECCS 2021a,b) and/or water quality benchmarks (Teck 2014, Golder 2017); and
- In situ water quality data (i.e., temperature, pH, specific conductivity, and DO).

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

Aqueous concentrations of the Order Constituents (dissolved cadmium, nitrate, total selenium, sulphate, TDS, and nickel; Teck 2014) measured at each monitoring area for the calendar year (i.e., January to December 2022) were compared to applicable EVWQP level 1, level 2 and/or level 3 benchmarks, proposed benchmarks, or updated effects concentrations (Golder 2014a, 2014b; Teck 2014; Table C.1). Total selenium and total cadmium concentrations were also compared to SPOs outlined in Permit 107517; for designated locations (LC\_UC, LC\_DCDS, and LC GRCK). Concentrations of the remaining constituents listed above were compared to applicable BCWQGs (BCMOECCS 2021a,b), if available. Order Constituents, constituents with early warning triggers under the AMP, constituents with an SPO, and nutrients (TKN, phosphorus and orthophosphate) were plotted using available data from 2012 to 2022 for each monitoring area individually relative to BCWQGs, EVWQP benchmarks, and proposed benchmarks, and updated effects concentrations (where applicable). Monthly mean concentrations of aqueous selenium species selenate, selenite, DMSeO, MeSe([V], and combined DMSeO and MeSe(IV) were plotted with benthic invertebrate tissue selenium concentrations for each Dry Creek area.

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

A Principal Component Analysis (PCA) was used to condense water quality results for use in benthic invertebrate community correlation analysis. A PCA is a multivariate approach which transforms a group of 'n' variables into a smaller new set of uncorrelated variables (the principal components; PCs). The principal components are defined to be linear combinations of the original 'n' variables. A PCA was conducted using K-M mean water chemistry parameters calculated from 2019 to 2022 for the biological monitoring stations reported in the LAEMP except LC FRUS. LC FRUS is located on the Fording River upstream of Dry Creek and was excluded due to the large distance relative to Dry Creek. For each year, four seasons were defined: winter (December to March), early spring (May), spring (June) and summer (July). Each season had to have at least one recorded result. The yearly mean was calculated as the mean of the seasonal means. If there were missing data for any season, the entire year was excluded. A PCA cannot incorporate values below the LRL, therefore any parameters with >25% of the mean values below the LRL were excluded from the PCA. Kaplan-Meier mean values at the LRL were replaced with the LRL (Farnham et al. 2002). When there was more than one LRL for a given parameter, or detected values were below the highest LRL, these values were replaced with the highest LRL. The contribution of individual parameters to the first two principal components were quantified by calculating their correlation using a Pearson's correlation coefficient. The PCA and correlation analyses were conducted in R (R Core Team 2022).

Quantitative tests for temporal trends in monthly mean concentrations of Order Constituents, constituents with early warning triggers under the AMP, and constituents that have previously been identified by SDM and/or AMP response frameworks were completed using available data from 2012 to 2022. The analyses were completed individually for each monitoring area using two different approaches: 1) a non-parametric seasonal Kendall test and 2) a censored regression Analysis of Variance (ANOVA) model with factors Year and Month.

The non-parametric seasonal Kendall test described by Hirsch et al. (1982) was conducted using scripts written in R software (R Core Team 2022). The seasonal Kendall test assesses temporal trends separately for each season (or month in this case) and combines the results for each season into an overall test for trend. The test is non-parametric and assesses whether there is a monotonic increasing or monotonic decreasing trend over time. The test was conducted by calculating the test statistic  $S_i$  which is equal to the sum of the number of increases and decreases from a time period t to all time periods after t for each observation in season t. The overall test statistic t0 is computed as the sum of t1 for all seasons. The significance of the observed t2 is determined by comparing it to a critical value of t3 (at the significance level t4 = 0.05) determined from the exact sampling distribution of t5 (calculated by determining all possible permutations and combinations of t5 based on the increases and decreases from the number of pairwise comparisons made; Hirsch et al. 1982). If more than

45 pairwise comparisons are made (equivalent to the number of pairwise comparisons for n = 10 in a single season), then the normal approximation is used to calculate a p-value and to assess significance (Hirsch et al. 1982). The standard normal deviate Z is calculated as:

$$Z = \begin{cases} \frac{S-1}{\sqrt{\sigma_S}} & \text{if } S > 0\\ 0 & \text{if } S = 0\\ \frac{S+1}{\sqrt{\sigma_S}} & \text{if } S < 0 \end{cases}$$

where  $\sigma_S = \sum_{i=1}^k \frac{n_i(n_i-1)(2n_i+5) - \sum_{T_i} t_i(t_i-1)(2t_i+5)}{18}$  and  $n_i$  is the number of samples in month  $i,t_i$  is the number of tied values for each tied value  $T_i$ , and k is the number of seasons (Hirsch et al. 1982).

An estimate of the trend slope over time was estimated by computing the median of all slopes between data pairs within the same month (Helsel and Hirsch 2002). The slope was reported as a change in concentration per year and as a percentage change in concentration per year. The intercept of a line through the time series was estimated as the median intercept of all lines through each point with the estimated slope (Pohlert 2016). The trend analysis was only conducted with a minimum number of five pairwise comparisons, the minimum number required for all consecutive increases or decrease to be significant at  $\alpha = 0.05$ .

An ANOVA model with factors Year and Month was also used to assess temporal changes in monthly mean concentrations for parameters each water quality area (reference and mine-exposed) from 2012 to 2022. Only years with at least six months and only areas with at least three years of data were included in the analysis. Replication at area LC\_FRUS was too low from 2015 onwards for analysis of temporal effects using this test methodology. Because of the presence of LRLs for most parameters, a censored regression ANOVA model was used and a log-normal distribution of the response variable was assumed and fit with maximum likelihood estimation for each area. The significance of each term in the model was assessed using likelihood-ratio tests to determine if there is a significant change in log-likelihood with the addition of the term in the model. This tested for an overall difference among years (including the Month term in the model controlled for seasonal effects within a year). If the Year term was significant ( $\alpha = 0.05$ ) then post-hoc contrasts were conducted to test for pairwise differences among years with an  $\alpha = 0.05$  in a Tukey's Honestly Significant Difference (HSD) test which corrects for the number of comparisons. For each year, a percent magnitude of difference from the base year (i.e., first year with minimum number of months) was calculated as:

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

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

The analysis was completed twice, once evaluating the significance and direction of change in each endpoint at each area since the base year, and once comparing the 2022 annual mean against all historical means and the previous year (2021).

Complete results for statistical testing of Dry Creek LAEMP water quality data from 2012 to 2022 can be found in Tables C.2 and C.3 (i.e., all constituents evaluated). Time-series figures of water quality constituents plotted against BCWQGs, regional benchmarks and normal ranges (where applicable) were included in Appendix C for constituents that were not the focus on more detailed interpretation (i.e., did not meet the criteria listed above).

# **A2 ACUTE TOXICITY TESTING**

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

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

# A3 CHRONIC TOXICITY TESTING

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

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

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

# **A4 PERIPHYTON**

#### A4.1 Overview

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

## A4.2 Sample Collection

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

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

Photos were collected to document current conditions of periphyton conditions as well as presence of bryophytes.

# **A5 BENTHIC INVERTEBRATES**

#### A5.1 Overview

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

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

Benthic invertebrate samples were collected to address study questions related to community structure, and invertebrate tissue accumulation of selenium. Consistent with other LAEMPs and the RAEMP (Minnow 2021a,b, Minnow and Lotic 2021), benthic invertebrate sampling was completed in September. Individual water samples for routine water quality analysis and selenium speciation analysis were collected from each monitoring area during the sampling event, concurrently with the collection of biological samples (Section A1.2).

#### **A5.2** Community Structure

#### A5.2.1 Sample Collection

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

#### A5.2.2 Laboratory Analysis



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

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

#### A5.2.3 Supporting Measures

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

#### A5.2.4 Data Analysis

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

non-Chironomidae Diptera, and Oligochaeta. Community data were plotted to show changes over time relative to regional normal ranges<sup>1</sup> as well as site-specific normal ranges<sup>2</sup>.

Only two Dry Creek areas (LC\_DCDS and LC\_DC1) were sampled prior to 2018, limiting statistical assessments of changes in benthic community endpoints over time to previous LAEMP cycles. Several statistical tests were employed in 2022 to address the temporal component of study question #3 (i.e., are benthic invertebrate endpoints changing over time?), to evaluate spatial differences in the benthic invertebrate community, and to also assess correlations between changes in benthic invertebrate community endpoints and potentially influencing variables (e.g., benthic invertebrate tissue selenium, water chemistry, substrate composition, calcite index, water quality variables, principal component axes from PCA analysis, *in situ* water quality measurements, and habitat variables). The regional and site-specific normal ranges used for evaluation of benthic invertebrate community are applicable only to data from September. As such, benthic invertebrate community data collected in September were the focus of data analyses and interpretation unless otherwise noted below. All statistics were conducted in R (R Core Team 2022).

Temporal changes in benthic invertebrate community endpoints from mine-exposed Dry Creek LAEMP areas relative to reference were assessed using a two-way ANOVA. This was completed for two data groupings: 1) mine-exposed areas of Dry Creek compared to the reference area LC\_DCEF, and 2) the Fording River downstream (LC\_FRB) and upstream (LC\_FRUS; "reference" for the purposes of the analyses) of Dry Creek to evaluate the potential influence of Dry Creek on the benthic invertebrate community in the Fording River.

Benthic invertebrate community endpoints evaluated across years were those listed above. For each endpoint, an overall ANOVA model with factors Year, Area and Year  $\times$  Area was fit. The ANOVA models and contrasts were conducted in R (R Core Team 2022) using customized scripts. The best transformation for each end point was chosen as the transformation for which a Shapiro-Wilk's test on the residuals gave the highest p-value (i.e., most normally distributed). Significance of the spatial and temporal pairwise comparisons were assessed separately with an  $\alpha$  of 0.1 in a Tukey's HSD which corrects for the number of comparisons.

<sup>&</sup>lt;sup>1</sup> The reference normal range as presented in the RAEMP represents the 2.5<sup>th</sup> and 75<sup>th</sup> percentiles of the distribution of reference area data (pooled 2012 to 2019 data) reported in the 2017 to 2019 RAEMP report (Minnow 2020).

<sup>&</sup>lt;sup>2</sup> Site-specific normal ranges represent the 2.5<sup>th</sup> and 97.5 percentile for a given area as determined by habitat predictors for a given site in relation to the complete set of Elk Valley monitoring areas. The site-specific normal ranges were estimated using regression modelling as presented in the RAEMP (Minnow 2020).

For each year, a magnitude of difference from the base year (i.e., first year with data) was calculated as:

$$\frac{Year_i - Base\ Year}{SDBase\ Year}$$

For each area, a magnitude of difference from the reference area was calculated as:

$$\frac{Exp - Ref}{SDRef}$$

Tables for visualizing the ANOVA results were prepared in Microsoft Excel, and plots were prepared in R (R Core Team 2022).

Benthic invertebrate community data were collected in multiple seasons (May, June September, and December) in 2021 and earlier. Data from all seasons were plotted over time to visualize temporal changes, and those collected in September were compared to relative to the regional normal (reference area) range and site-specific normal range. Plots were also prepared that display results from September of each year when replicated samples were collected (2019 to 2022) to show the spatial and temporal variability in benthic invertebrate endpoints for September only relative to the regional and site-specific normal ranges.

An assessment of whether changes in physical and chemical parameters may be related to variability in benthic invertebrate community structure was conducted for September from 2019 to 20223 data across all Dry Creek and Fording River areas (i.e., September data only from LC\_DCEF, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DC1, LC\_FRUS, LC\_FRB, and LC\_GRCK). Spearman Rank Correlations were conducted with benthic invertebrate community endpoints including total abundance. taxonomic richness, %EPT. %Ephemeroptera, %Plecoptera, %Trichoptera, %Oligochaeta, %Chironomidae, and %Non-Chironomidae Diptera, against a variety of physical and chemical parameters (including water quality variables, substrate characteristics, habitat variables, and in situ water quality measurements). For water chemistry parameters, annual mean concentrations were calculated for different seasons and then averaged across the year prior to the benthic sampling date (2019 to 2022). Seasons were defined based on changes in water chemistry across a year and designed to capture high and low concentration periods throughout a year. For each year, four seasons were defined: winter (December to March), early spring (May), spring (June) and summer (July). Each season had to have at least one record. Spearman rank correlation analysis is a non-parametric method that tests for monotonic

<sup>&</sup>lt;sup>3</sup> September benthic invertebrate data were only collected at LC DC1 and LC DCDS prior to 2019, so integration of all Dry Creek sampling areas in correlation analysis is only possible from 2019 onwards.

increases, with significantly positive or negative correlation coefficients (rho) suggesting an increase or decrease, respectively, in the ranked data with increasing years. Significant correlations were assessed at alpha = 0.05, Bonferroni corrected for 47 independent comparisons (corrected alpha = 0.05/47 = 0.00106). Water chemistry parameters were also analyzed using PCA (see Section A1.4 for details) to combine multiple water quality variables into PC1 and PC2, which were also included in the correlation analysis. To ensure correlations were comparable among different parameters only complete records (i.e., a value for every water and benthic invertebrate community endpoint) were included in the analysis. Scatterplots of area-wise data indicating relationships and r-values for significantly correlated benthic invertebrate community endpoints were generated to visualize relationships.

#### A5.3 Benthic Invertebrate Tissue

#### A5.3.1 Sample Collection

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

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

#### A5.3.2 Laboratory Analysis

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

#### A5.3.3 Data Analysis

Composite-taxa benthic invertebrate tissue selenium concentrations were plotted for all areas for 2018 to 2022 relative to:

- the normal (reference area) range (i.e., 1.41 mg/kg dw 7.79 mg/kg dw), defined as the 2.5<sup>th</sup> and 97.5<sup>th</sup> percentiles of tissue selenium concentrations measured in reference areas that have not been disturbed by mining in historical studies completed in the Elk River watershed from 1996 to 2019 reported in the RAEMP (Minnow 2020);
- corresponding EVWQP effect benchmarks (outlined in Table F.1);
- shading indicating the Dry Creek Water Management System (DCWMS) operational status (DCWMS Operational, DCWMS Operational – Sedimentation Pond 1 only, Bypass Operational/Sedimentation Pond 1 Refilling, Bypass Operational/Dewatering, and Bypass Operational).

Benthic invertebrate tissue selenium data are available for temporal comparisons for all areas from December 2018 onwards, and for areas LC\_DC1, LC\_DCDS, LC\_FRUS, and LC\_FRB data are available prior to December 2018 as well.

Teck has developed a selenium speciation bioaccumulation tool to help predict and interpret bioaccumulation in areas with detectable organoselenium species (deBruyn and Luoma 2021). For every 2022 biological sampling event, predicted benthic invertebrate tissue selenium concentrations were generated from water quality data (specifically, selenium speciation data and sulphate concentrations) using this bioaccumulation tool and presented alongside field-measured tissue concentrations.

Changes in composite-taxa benthic invertebrate tissue selenium concentrations were compared among months in 2022 for all Dry Creek monitoring areas (including reference; LC\_DCEF) and for the Fording River sampling areas (LC\_FRUS and LC\_FRB). Area

differences were quantified using an ANOVA with factors Area and Month and their interaction. The factor Month included March, May, early June, late June, September, and December for each of the sampling areas. Response variables were log<sub>10</sub> transformed where necessary to meet the assumption of normality, which was tested using a Shapiro-Wilks test and Q-Q normal plots of the model residuals. When this assumption could not be met, response variables were rank transformed. The significance of the main effects and interaction terms of the ANOVA were assessed using an α of 0.05, and the results of these determined which post-hoc comparisons were then conducted.

When the interaction between Area and Month was significant, it indicated that the differences among the areas changed across months. Post-hoc comparisons were then conducted to 1) test for differences among months for each area, and 2) test for differences among the exposed and reference areas in each month. When the Month was significant rather than the Area and the interaction between Month and Area, it indicated that there were no differences between the areas and monthly differences remained unchanged across areas and post-hoc comparisons were conducted to 1) test for differences between the first month of 2022 sampling and each subsequent month for all areas, and 2) test for differences between the exposed and reference areas in all months.

For all significant post-hoc temporal comparisons, an MOD between years was calculated as:

$$MOD_{Month} = \frac{MCT_{month2} - MCT_{month1}}{MCT_{month1}} \times 100\%$$

For significant spatial comparisons, a MOD was calculated between the exposed and reference areas within each month as:

$$MOD = \frac{MCT_{Exposed} - MCT_{Reference}}{MCT_{Reference}} \times 100\%$$

The MCT was calculated as a back-transformed estimated marginal mean. When the analysis was done on the rank-transformed scale, the observed effect size was estimated using median values instead of marginal means.

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

# A6 CALCITE

# A6.1 Sample Collection

In addition to the CABIN requirements, measurements of calcite presence and concretion were conducted on 100 particles (pebbles) at each biological sampling location concurrent with (and using the same particles as) the 100-pebble count. Calcite presence (Cp) has historically been a binary assessment (i.e., presence [score = 1] or absence [score = 0]; Teck 2016, Lotic 2021). In 2021, an additional method for assessing calcite presence in lotic environments was included (Cp', Lotic 2021, Zathey 2021, Robinson et al. 2022) that scored the percent of the particle surface area covered by calcite as a decimal to the nearest 10<sup>th</sup> percentile (0.1, 0.2, 0.3, etc.; see Appendix I)<sup>4</sup>. The degree of concretion (Cc) was assessed by determining if the particle was removed with negligible resistance (not concreted; score = 0), noticeable resistance but removable (partially concreted; score = 1), or immovable (fully concreted; score = 2). If distinct particles were not visible due to heavy calcification, values of 1 (for presence) and 2 (for concretion) were recorded. If fines were encountered and calcite presence could not be visually confirmed, values of 0 (for presence) and 0 (for concretion) were recorded. If rocks were visible under fine material, the rock was selected for calcite measurements.

#### A6.2 Data Analysis

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

$$CI = C_p + C_c$$
 or  $CI = C_p' + C_c$ 

Where:

$$CI \ or \ CI' = Calcite \ Index^5$$
 
$$C_p = Calcite \ Presence \ Score = \frac{Number \ of \ particles \ with \ calcite}{100 \ (binary \ score)}$$
 
$$C_p' = Calcite \ Presence \ Score = \frac{Number \ of \ particles \ with \ calcite}{100 \ (proportional \ score)}$$
 
$$C_c = Calcite \ Concretion \ Score = \frac{Sum \ of \ particle \ concretion \ scores}{100}$$

<sup>&</sup>lt;sup>4</sup> The new calcite assessment method was developed under the Regional Calcite Monitoring Program as a means to better describe the degree, extent, and trends of calcite deposition (Zathey 2021)

<sup>&</sup>lt;sup>5</sup> CI refers to the binary assessment of Cp and CI refers to the proportional assessment of Cp .

# A7 REFERENCES

- APHA (American Public Health Association), American Water Works Association and Water Environment Federation. 1998. Standard Methods for the Examination of Water and Wastewater. 20th Edition. L.S. Clesceri, A.E. Greenberg and A.D. Eaton (Eds). APHA. Washington, D.C. Minnow. 2014. 2012 Biological Monitoring Program for Coal Mines in the Elk River Valley, B.C. Report Prepared for Teck Coal Limited, Sparwood, BC. March. Project #2456
- ASTM (American Society for Testing and Materials). 2013. Standard Guide for Conducting Early Life-Stage Toxicity Tests with Fishes. E1241-05, 29 p.
- BCMOECCS 2021a. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
- BCMOECCS. 2021b. Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Water Quality Guideline Series, WQG-08. Prov. B.C., Victoria B.C.
- de Bruyn, A. and S.N. Luoma. 2021. Selenium Species Bioaccumulation Tool Draft Version 2.0. Prepared for Mariah Arnold, Teck Coal Limited, Sparwood, BC. February. Project 19133414/MQ2 Task 4.
- Environment Canada. 1996. Biological Test Method: Acute Lethality Test Using *Daphnia* spp. Environmental Protections Series. Method Development and Applications Section. Environmental Technology Centre. May 1996.
- Environment Canada. 1998. Biological Test Method: Toxicity Tests Using Early Life Stages of Salmonid Fish (Rainbow Trout). Report EPS 1/RM/28, Second Edition. July.
- Environment Canada. 2007a. Biological Test Method: Acute Lethality Test Using Rainbow Trout. Environmental Protections Series. Method Development and Applications Section. Environmental Technology Centre. May 2007.
- Environment Canada. 2007b. Biological Test Method: Growth Inhibition Test Using a Freshwater Alga. Report EPS 1/RM/25. Second Edition. March.
- Environment Canada. 2007c. Biological Test Method: Test of Reproduction and Survival using the Cladoceran Ceriodaphnia dubia. Report EPS 1/RM/21 Second Edition. February.
- Environment Canada. 2012. Field Manual: Wadeable Streams. Canadian Aquatic Biomonitoring Network (CABIN).
- Environment Canada. 2014. Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples. Canadian Aquatic Biomonitoring Network (CABIN). May.
- Farnham, I.M., Singh, A.K., Stetzenbach, K.J., Johannesson, K.H. 2002. Treatment of nondetects in multivariate analysis of groundwater geochemistry data. Chemometrics and Intelligent Laboratory Systems. 60:265-281.

- Golder. 2014a. Benchmark Derivation Report for Nitrate and Sulphate. Elk Valley Water Quality Plan. Report Number 13-1349-0006. July.
- Golder. 2014b. Benchmark Derivation Report for Selenium. Elk Valley Water Quality Plan. Report Number 13-1349-0006. July.
- Golder. 2017. Coal Mountain Operations Aquatic Health Assessment Report. Submitted to Teck Coal Ltd. December.
- Helsel, D.R. and Hirsch, R.M. 2002. Statistical Methods in Water Resources Techniques of Water Resources Investigations, Book 4, chapter A3. U.S. Geological Survey. 522 pages.
- Hirsch, R.M., Slack, J.R., and Smith, R.A. 1982. Techniques of trend analysis for monthly water quality data. Water Resources Research 18: 107-121.
- Lotic (Lotic Environment Ltd.). 2021. Regional Calcite Monitoring Plan: Field Manual. Prepared for Teck Coal Limited by Lotic Environmental Ltd. May 2021.
- Minnow. 2020. Elk River Watershed Regional Aquatic Effects Monitoring Program (RAEMP) Final Report, 2017 to 2019. Prepared for Teck Coal Limited, Sparwood, British Columbia. November. Project #187202.0011.
- Minnow. 2021a. Study Design for the Regional Aquatic Effects Monitoring Program, 2021 to 2023. Prepared for Teck Coal Limited, Sparwood, BC. February. Project 207202.0006.
- Minnow. 2021b. Study Design for Line Creek Local Aquatic Effects Monitoring Program (LAEMP), 2021. Prepared for Teck Coal Limited, Sparwood, BC. May. Project 207202.0015.
- Minnow and Lotic. 2021. Study Design for Fording River Local Aquatic Effects Monitoring Program (LAEMP), 2021 to 2023. Prepared for Teck Coal Limited, Sparwood, BC. April. Project 217202.0011.
- Pohlert, T. 2016. Trend: non-parametric trend tests and change-point detection. R package version 0.2.0. https://CRAN.R-project.org/package=trend Province of British Columbia. 2013. British Columbia Field Sampling Manual (complete). Available from https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual?keyword=field&keyword=sampling&keyword=manual. Accessed December 15, 2017.
- Province of British Columbia. 2013. British Columbia Field Sampling Manual (complete). Available from https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual?keyword=field&keyword=sampling&keyword=manual. Accessed December 15, 2017.
- Province of British Columbia. 2016. British Columbia Environmental Laboratory Manual. Available https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-environmental-laboratory-manual. Accessed March 16, 2018.

- R Core Team. 2022. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org
- Robinson, M.D., Gordon, S., Otto, M. 2022. Teck Coal Ltd. 2021 Calcite Monitoring Program Annual Report. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. April 2022.
- Trapp, S., M. Matthies, I. Scheunert, and E.M. Topp. 1990. Modeling the bioconcentration of organic chemicals in plants. *Environmental Science and Technology.* 24:1246-1252.
- Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.
- Teck. 2023. Annual Water Quality Report 2022. Prepared by Teck Coal Limited. March 31, 2022.
- Teck. 2016. Water Quality Adaptive Management Plan (AMP) for Teck Coal Operations in the Elk Valley. July 2016.
- Therneau, T.M. 2017. Survival analysis. Package "survival" for R. April 4, 2017.
- USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. 2nd Edition. EPA/600/R-99/064. Office of Water, Washington, DC, USA.
- Zathey, N., Brooks, J., and Robinson, M.D. 2021. 2020 Line Creek Aquatic Monitoring Program. Prepared for Teck Coal Limited. December 2021.

# APPENDIX B DATA QUALITY REVIEW

# APPENDIX B DATA QUALITY REVIEW

| E | 31   | INTRODUCTION                                      | 1  |
|---|------|---|----|
|   | B1.1 | Introduction                                      |    |
|   |      | Quality Control Samples                           |    |
| E | 32   | WATER CHEMISTRY                                   | 4  |
|   | B2.1 | Laboratory Reporting Limits                       |    |
|   |      | Laboratory and Field Blanks                       |    |
|   | B2.3 | Data Precision                                    | 5  |
|   | B2.4 | Data Accuracy                                     | 6  |
|   |      | Hold Times  |    |
|   | B2.6 | Other Concerns                                    | 6  |
|   | B2.7 | Data Quality Statement                            | 7  |
| Е | 33   | BENTHIC INVERTEBRATE COMMUNITY                    | 8  |
|   | -    | Sub-Sampling Proportions, Precision, and Accuracy |    |
|   |      | Organism Sorting Efficiency                       |    |
|   |      | Taxonomic Identification Accuracy                 |    |
|   |      | Data Quality Statement                            |    |
| Е | 34   | BENTHIC INVERTEBRATE TISSUE CHEMISTRY             | 9  |
|   | B4.1 | Laboratory Reporting Limits                       |    |
|   |      | Data Accuracy and Precision                       |    |
|   |      | Data Quality Statement                            |    |
| E | 35   | DATA QUALITY REVIEW SUMMARY                       | 10 |
| E | 36   | REFERENCES  | 11 |
|   |      |   |    |

# **B1 INTRODUCTION**

#### **B1.1** Introduction

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

#### **B1.2** Quality Control Samples

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

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

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

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

# **B2 WATER CHEMISTRY**

# **B2.1** Laboratory Reporting Limits

The analytical reports for water chemistry from ALS Environmental (ALS; CG2205677, CG2208042, CG2212407, CG2212551, CG2212647, and CG2216696; Appendix J) and Brooks Applied Labs (BAL; see laboratory reports 2205247, 2206435, 22209181, 2209283, and 2212302; Appendix J) were examined to assess LRLs relative to analyte concentrations and applicable guidelines (Tables B.2 and B.3). Water quality data from 2022 were entered directly into Teck's EQuIS database and thus were assessed as part of Teck's annual water quality reporting for 2022. The LRLs for water quality analytes were assessed relative to British Columbia Water Quality Guidelines (BCWQG; BCMOECCS 2021a,b) for the protection of freshwater aquatic life, Elk Valley Water Quality Plan (EVWQP) benchmarks, screening values for water quality (Teck 2014), and relevant site-specific benchmarks. Several analytes were reported at concentrations below the LRL in 100% of samples (Tables B.2 and B.3). For those analytes with one or more result(s) below the LRL, achieved LRLs were consistently lower than the BCWQG, EVWQP benchmarks, and screening values for water quality, if relevant guidelines exist. Therefore, the achieved LRLs were appropriate for this study.

## **B2.2** Laboratory and Field Blanks

A total of 115 method blank samples were analyzed in the ALS laboratory reports (Appendix J). Of the 532 reported method blank results, only one result for total aluminum had a concentration above detection and therefore did not meet the laboratory DQO (see laboratory report CG2212647 in Appendix J). However, this result was only marginally above detection and so does not suggest significant laboratory contamination. A total of 10 method blank samples were analyzed in the BAL laboratory reports (see laboratory reports in Appendix J). Of the 201 reported method blank results, four total selenium results had detectable concentrations (see laboratory report 2206435 in Appendix J). However, as sample results were greater than 10-times the value of the elevated results in the method blanks, the potential impact of the elevated selenium in the above four MB samples is minimal. As the overall number of DQO exceedances was low (ALS: 0.19%; BAL: 1.99%), the impacted results were considered to have a negligible impact on data interpretability, and laboratory precision was overall considered excellent.

Three field blank and two trip blank samples were submitted to ALS for water chemistry analyses to assess the potential for field sampling contamination (see laboratory reports CG2208042, CG2212647, and CG2216696 in Appendix J). The same DQOs that were used for laboratory blanks were also used for field blanks (i.e., concentrations should be below the

LRL). Of the 273 individual analyte results measured in the field blank samples, 18 results (6.59%) were above the LRL and so did not meet the laboratory DQO (Table B.4). Of the above detectable results, 14 were from one field blank sample indicating significant contamination associated with this sample (see laboratory report CG2216696 in Appendix J). Of the 145 individual analyte results measured in the trip blank samples, only one (0.69% of results) were above the LRL and so did not meet the laboratory DQO (Table B.4; see laboratory report CG2208042 in Appendix J). As relatively few field and trip blank results did not meet the laboratory DQO (6.59% and 0.69%, respectively), potential field and laboratory contamination was considered low and laboratory precision was overall considered good.

Two field blank samples were submitted to BAL for aqueous selenium speciation analyses to assess potential field sampling contamination. Of the 22 analytes results measured in the field blank samples, only one result was above detection (dissolved selenium; Table B.5, see laboratory report 2209283 in Appendix J). While this result only represents 4.55% of all field blank results from BAL, this potential field contamination will be considered during data interpretation. Overall, potential field contamination was considered low and laboratory precision was considered good.

#### **B2.3** Data Precision

A total of 11 laboratory duplicate samples were used to evaluate precision within the ALS laboratory reports (Appendix J), and all 534 individual analyte results met the laboratory DQO. A total of eight laboratory duplicate samples were used to evaluate precision within the BAL laboratory reports (Appendix J), and all 32 individual analyte results met the laboratory DQO. Therefore, ALS laboratory and BAL analytical precision were considered excellent. Overall, water chemistry data was considered to have good field precision and reproducibility.

Three sets of field duplicate samples were collected to assess field sampling precision for water chemistry analyzed by ALS (Table B.6). Several relative percent differences (RPDs) could not be calculated as both analyte concentrations were below the LRL. Of the 205 RPDs that could be calculated, 11 RPDs were greater than 30% (5.37% of RPDs), including one RPD each for alkalinity (as CaCO<sub>3</sub> and as CO<sub>3</sub>), oxidation-reduction potential (ORP), turbidity, Total Kjeldahl Nitrogen (TKN), total organic carbon (TOC), total and dissolved aluminum, total titanium, dissolved cadmium, and dissolved copper (Table B.6). Of the 11 RPDs greater than 30%, two resulted from one analyte concentration in the pair being below the LRL, where greater variability is expected (TOC and dissolved aluminum). Since only 5.37% of calculable RPDs exceeded the DQO, water chemistry data was considered to have high field precision and reproducibility.

Three sets of field duplicate samples were collected to assess field sampling precision for water chemistry analyzed by BAL (Table B.7). Several RPDs could not be calculated as both analyte concentrations were below the LRL. Of the 14 RPDs that could be calculated, two were greater than 30% (two RPDs for methylseleninic acid; 14.3% of RPDs, Table B.7). One of the above RPDs greater than 30% resulted from one analyte concentration in the pair being near the LRL, where greater variability is expected. While only 14.3% of all calculable RPDs exceeded the DQO, 66.7% of RPDs for methylseleninic acid exceeded the DQO and this variability in field sampling will be taken into account during data interpretation.

#### **B2.4** Data Accuracy

Data accuracy within the ALS laboratory reports was evaluated based on results of 129 LCS and 11 MS samples (Appendix J). All 542 LCS results and 470 MS results met the laboratory DQO. Recovery could not be calculated in numerous MS samples as background levels were greater than or equal to one-times spike levels. However, as several other QC tests were successful and do not imply uncertainties as to ALS data accuracy, we are not concerned by MS recovery not being calculable in several MS samples. Overall, ALS laboratory analytical precision and accuracy was considered excellent.

Data accuracy within the BAL laboratory reports was evaluated based on results of 21 LCS, eight MS samples, eight MSD samples, and 16 RM samples (Appendix J). All 41 LCS results, 17 MS results, 17 MSD results, and 16 RM results met the laboratory DQO. Therefore, BAL laboratory analytical precision and accuracy was considered excellent.

#### **B2.5** Hold Times

The recommended hold times for pH and ORP analyses (0.25 hrs) were exceeded in all samples collected. As *in situ* pH and ORP were used for data interpretation, therefor, these pH and ORP exceedances had no impact on data interpretability. The preparation hold times for nitrate were exceed by two days in one sample and seven days in another sample (see laboratory reports CG2208042 and CG2212657 respectively; Appendix J). Nitrate hold time exceedances are not expected to impact conclusions that can be derived from the data but will still be taken into consideration during data interpretation. All hold times were met for selenium speciation samples submitted to BAL. Overall, few samples exceeded hold times and thus hold time exceedances are expected to have little effect on the interpretation of results.

#### **B2.6** Other Concerns

One total selenium and one dissolved selenium sample arrived at BAL in broken containers (see laboratory report 2212302 in Appendix J). Most of the total selenium sample volume was

lost, but enough volume was remaining to undergo an acid digest and subsequent analysis for selenium. Since it is unknown if contamination occurred during shipment or storage, the total recoverable selenium result for 2212302-16 is qualified as an estimate. All of the dissolved selenium sample was lost from the broken container. However, volume from the corresponding field filtered selenium speciation fraction (laboratory ID 2212302-06) was poured off into a new container to support the dissolved selenium analysis. This new dissolved selenium fraction (2212302-17) was preserved (pH < 2) upon receipt at BAL.

#### **B2.7** Data Quality Statement

Water chemistry data collected for the 2022 LCO Dry Creek LAEMP were of acceptable quality as characterized by good detectability, appropriate LRLs, negligible analyte concentrations in method blanks, minimal field contamination, excellent laboratory precision and accuracy, few hold time exceedances, and good field precision and reproducibility, with the exception for methylseleninic acid. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

# **B3 BENTHIC INVERTEBRATE COMMUNITY**

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

The analytical reports from Cordillera Consulting Inc. for benthic invertebrate community taxonomy (see Appendix J for laboratory reports) were examined to assess sub-sampling accuracy. For all samples, Canadian Aquatic Biomonitoring Network (CABIN) protocols were followed for sub-sampling (i.e., identification of a minimum 300 invertebrates), with a minimum of 5% of a sample being assessed. Of the 165 benthic invertebrate community samples analyzed, 36 were subsampled. The proportion of sub-sampled material ranged from 5 to 50% of the total sample material (Table B.8). Both the precision and accuracy of the sub-samples randomly chosen for sub-sample assessment (n = 2) met the DQO in all sub-samples (Table B.9). Thus, the precision and accuracy for sub-sampling of the benthic invertebrate community samples was considered excellent.

#### **B3.2** Organism Sorting Efficiency

To measure the effectiveness of the sorters, at least 10% of samples were selected at random for resorting analysis by a different sorter. Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was excellent, achieving 98.8% for the five community structure samples evaluated (Table B.10). As recovery in quality control samples was above the laboratory's DQO (95%), organism sorting efficiency was considered excellent.

#### **B3.3** Taxonomic Identification Accuracy

Cordillera Consulting Inc. performed an internal audit of taxonomic identification for at least 10% of all community structure samples (n = 4; Table B.11). The analysts reported total identification error rate (TIR) of 0%, percent difference in enumeration (PDE) of 0 to 0.397%, percent taxonomic disagreement (PTD) of 0.295 to 1.46%, and Bray Curtis Dissimilarity Index (BCDI, a measure of the differences in identifications between different analysts) of 0.003 to 0.013 (Table B.11). The laboratory DQO was based on TIR as per CABIN laboratory methods (< 5% TIR; Environment Canada 2014). As TIR was below 5% for all samples examined, the taxonomic accuracy of the analysis was considered excellent.

#### **B3.4** Data Quality Statement

Benthic community data collected for the 2022 LCO Dry Creek LAEMP were of good quality as characterized by excellent sorting efficiency, subsampling precision and accuracy, and taxonomic identification accuracy. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

# **B4 BENTHIC INVERTEBRATE TISSUE CHEMISTRY**

## **B4.1** Laboratory Reporting Limits

Analytical reports of benthic invertebrate tissue metal concentrations from TrichAnalytics (see laboratory reports in Appendix J) were examined to provide an inventory of analyte results below the LRL and to compare the LRLs for these analytes to available benchmarks (Table B.12). Most analyte concentrations were consistently above detection limits, except for antimony, arsenic, boron, mercury, and vanadium (2.08 to 31.3% of results). However, all results for selenium were above detection and selenium is the only analyte with an applicable guideline. Therefore, the achieved LRLs were appropriate for this study.

## **B4.2** Data Accuracy and Precision

Data accuracy and precision were evaluated based on the analysis of 12 CRM samples. Of the 260 analyte results, 12 titanium results could not be calculated as the certified concentrations were too close to the reportable detection limit (see laboratory reports in Appendix J). All 348 calculable CRM results met the laboratory DQO; therefore, laboratory accuracy and precision as determined by CRM analyses was considered excellent.

Laboratory precision was also evaluated by laboratory duplicate analysis of 14 benthic invertebrate tissue samples (see laboratory reports in Appendix J). Of the 420 analyte results, 59 results that were not calculated due to values below the detection limit. All 502 calculable duplicate results met the laboratory DQO; therefore, laboratory precision as determined by duplicate analyses was considered excellent.

#### **B4.3** Data Quality Statement

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

# **B5 DATA QUALITY REVIEW SUMMARY**

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

# **B6 REFERENCES**

- BCMOECCS (British Columbia Ministry of Environment and Climate Change Strategy). 2021a. Working Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Water Quality Guideline Series, WQG-08. Water Protection and Sustainability Branch, Province of British Columbia, Victoria, B.C.
- BCMOECCS. 2021b. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture Guideline Summary. Water Quality Guideline Series, WQG-20. Water Protection and Sustainability Branch, Province of British Columbia, Victoria, B.C.
- Environment Canada. 2014. CABIN (Canadian Aquatic Biomonitoring Network) Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples. Environment Canada. May 2014.
- Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.

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

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

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

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

| Physical Tests   | 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   | No. Sample Results < LRL  4 (36.4%) 11 (100%) 2 (18.2%) 2 (18.2%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%) 1 (9.09%) 4 (36.4%) 11 (100%) 11 (100%) 11 (100%) 11 (100%) 9 (81.8%) | - CONTRIBUTION OF THE PROPERTY |
|--|---|---|--|
| Total Suspended Solids   | 2<br>1<br>1<br>1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01   | 11 (100%) 2 (18.2%) 2 (18.2%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 4 (36.4%) 5 (45.5%) 4 (36.4%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%)   |  |
| Acidity (as CaCO <sub>3</sub> )   mg/L   | 2<br>1<br>1<br>1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01   | 11 (100%) 2 (18.2%) 2 (18.2%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 4 (36.4%) 5 (45.5%) 4 (36.4%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%)   |  |
| Alkalinity, Carbonate (as CO <sub>3</sub> )         mg/L         -   | 1<br>1<br>1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01 | 2 (18.2%) 2 (18.2%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 4 (36.4%) 5 (45.5%) 4 (36.4%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%)   |  |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )         mg/L         -   | 1<br>1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01             | 2 (18.2%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%) 1 (9.09%) 6 (54.5%) 11 (100%) 11 (100%) 5 (45.5%)   |  |
| Alkalinity, Hydroxide (as CaCO₃)         mg/L         -  | 1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.05<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01          | 11 (100%) 11 (100%) 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%) 1 (9.09%) 6 (54.5%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)   |  |
| Alkalinity, Hydroxide (as OH)         mg/L         -         <   | 1<br>0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.002<br>0.00005<br>0.01                 | 11 (100%)  11 (100%)  11 (100%)  5 (45.5%)  5 (45.5%)  2 (18.2%)  4 (36.4%)  5 (45.5%)  1 (9.09%)  6 (54.5%)  4 (36.4%)  11 (100%)  11 (100%)  5 (45.5%)  1 (9.09%)   | - 0<br>0 0<br>   |
| Anions And Nutrients  Bromide (Br)   | 0.1<br>0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01                | 11 (100%) 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%)   | - 0<br>0 0<br>   |
| Bromide (Br)         mg/L  | 0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.002<br>0.00005<br>0.01                      | 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)  | 0<br>-<br>-<br>-<br>-<br>0<br>0<br>0   |
| Ammonia, Total (as N)°         mg/L         0.777         4.04           Nitrite (as N) <sup>d</sup> mg/L         0.02         0.06           Total Kjeldahl Nitrogen         mg/L         ·         ·           Orthophosphate         mg/L         ·         ·           Phosphorus (P)-Total         mg/L         ·         ·           Dissolved Organic Carbon         mg/L         ·         ·           Total Organic Carbon         mg/L         ·         ·           Total Metals         Aluminum         mg/L         ·         ·           Antimony         mg/L         0.009         ·         ·           Arsenic         mg/L         0.009         ·         ·           Arsenic         mg/L         0.00013         ·         ·           Beryllium         μg/L         0.00013         ·         ·         ·           Bismuth         mg/L         1.2         ·         <  | 0.005<br>0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.002<br>0.00005<br>0.01                      | 11 (100%) 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)  | 0<br>-<br>-<br>-<br>-<br>0<br>0<br>0   |
| Nitrite (as N) <sup>d</sup> mg/L         0.02         0.06           Total Kjeldahl Nitrogen         mg/L             Orthophosphate         mg/L             Phosphorus (P)-Total         mg/L             Dissolved Organic Carbon         mg/L             Total Organic Carbon         mg/L             Total Metals               Aluminum         mg/L         0.009              Antimony         mg/L         0.009  | 0.001<br>0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01                                | 5 (45.5%) 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%) 1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)   | 0<br>-<br>-<br>-<br>-<br>0<br>0<br>0   |
| Total Kjeldahl Nitrogen         mg/L <td>0.5<br/>0.001<br/>0.002<br/>0.5<br/>0.5<br/>0.003<br/>0.0001<br/>0.0001<br/>0.002<br/>0.00005<br/>0.01</td> <td>5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)</td> <td>-<br/>-<br/>-<br/>-<br/>0<br/>0<br/>0</td>  | 0.5<br>0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.002<br>0.00005<br>0.01  | 5 (45.5%) 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)  | -<br>-<br>-<br>-<br>0<br>0<br>0  |
| Orthophosphate         mg/L         -  | 0.001<br>0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.002<br>0.00005<br>0.01<br>0.01                                       | 5 (45.5%) 2 (18.2%) 4 (36.4%) 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)  | -<br>-<br>-<br>0<br>0<br>0   |
| Phosphorus (P)-Total         mg/L  | 0.002<br>0.5<br>0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01<br>0.01   | 2 (18.2%)<br>4 (36.4%)<br>5 (45.5%)<br>1 (9.09%)<br>6 (54.5%)<br>4 (36.4%)<br>11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)  | -<br>-<br>0<br>0<br>0  |
| Dissolved Organic Carbon   mg/L  | 0.5<br>0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01<br>0.01   | 4 (36.4%)<br>5 (45.5%)<br>1 (9.09%)<br>6 (54.5%)<br>4 (36.4%)<br>11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)   | -<br>0<br>0<br>0   |
| Total Organic Carbon         mg/L         - <td>0.003<br/>0.0001<br/>0.0001<br/>0.02<br/>0.00005<br/>0.01<br/>0.01</td> <td>5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)</td> <td>-<br/>0<br/>0<br/>0<br/>-</td>   | 0.003<br>0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01<br>0.01  | 5 (45.5%)  1 (9.09%) 6 (54.5%) 4 (36.4%) 11 (100%) 11 (100%) 5 (45.5%) 1 (9.09%)  | -<br>0<br>0<br>0<br>-  |
| Aluminum       mg/L       -       -         Antimony       mg/L       0.009       -       -         Arsenic       mg/L       0.0005       -       -         Beryllium       μg/L       0.00013       -       -       -         Bismuth       mg/L       - <td>0.0001<br/>0.0001<br/>0.02<br/>0.00005<br/>0.01</td> <td>6 (54.5%)<br/>4 (36.4%)<br/>11 (100%)<br/>11 (100%)<br/>5 (45.5%)<br/>1 (9.09%)</td> <td>0<br/>0<br/>0<br/>-</td>   | 0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01   | 6 (54.5%)<br>4 (36.4%)<br>11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)  | 0<br>0<br>0<br>-   |
| Aluminum       mg/L       0.009       -       -         Arsenic       mg/L       -       0.005       -         Beryllium       μg/L       0.00013       -       -         Bismuth       mg/L       -       -       -         Boron       mg/L       1.2       -       -       -         Cadmium       μg/L       -   | 0.0001<br>0.0001<br>0.02<br>0.00005<br>0.01   | 6 (54.5%)<br>4 (36.4%)<br>11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)  | 0<br>0<br>0<br>-   |
| Antimony         mg/L         0.009           Arsenic         mg/L         0.00013           Beryllium         μg/L         0.00013           Bismuth         mg/L         -           Boron         mg/L         1.2           Cadmium         μg/L         -           Cobalt         μg/L         0.004         0.11           Copper         mg/L         -         -           Iron         mg/L         -         1         -           Lead         mg/L         0.0082         0.003         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.0025         -         -           Silver         mg/L         0.00005         0.0001         -         -           Tin         mg/L         -         -         -         -   | 0.0001<br>0.02<br>0.00005<br>0.01<br>0.01   | 4 (36.4%)<br>11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)   | 0 0 -  |
| Beryllium  | 0.02<br>0.00005<br>0.01<br>0.01   | 11 (100%)<br>11 (100%)<br>5 (45.5%)<br>1 (9.09%)  | 0 - 0  |
| Beryllium         μg/L         0.00013           Bismuth         mg/L         -         -         -         0           Boron         mg/L         1.2         -   | 0.00005<br>0.01<br>0.01   | 11 (100%)<br>5 (45.5%)<br>1 (9.09%)   | 0  |
| Bismuth         mg/L         1.2         -         -           Cadmium         μg/L         -         -         -           Cobalt         μg/L         0.004         0.11         -           Copper         mg/L         -         -         -           Iron         mg/L         0.0082         0.003         -           Lead         mg/L         0.0082         0.8155         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.0025         -         -           Silver         mg/L         0.00005         0.0001         -         -           Thallium         mg/L         0.0008         -         -         -         -           Tin         mg/L         -         -         -         -         -         -   | 0.01<br>0.01  | 5 (45.5%)<br>1 (9.09%)  | 0  |
| Boron         mg/L         1.2           Cadmium         μg/L         -         -         -           Cobalt         μg/L         0.004         0.11         -           Copper         mg/L         -         -         -           Iron         mg/L         -         1         -           Lead         mg/L         0.0082         0.003         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.0025         -         -           Silver         mg/L         0.00005         0.0001         -         (           Thallium         mg/L         0.0008         -         -         -         (           Tin         mg/L         -         -         -         -         -         -   | 0.01  | 1 (9.09%)   |  |
| Cobalt         μg/L         0.004         0.11         -           Copper         mg/L         -         -         -           Iron         mg/L         -         1         -           Lead         mg/L         0.0082         0.003         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.025         -         -           Silver         mg/L         0.00005         0.0001         -         (           Thallium         mg/L         0.0008         -         -         (           Tin         mg/L         -         -         -         -  |   | , ,   |  |
| Copper         mg/L         -  |   |   | 0  |
| Iron         mg/L         1         -           Lead         mg/L         0.0082         0.003         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.025         -         -           Silver         mg/L         0.00005         0.0001         -         -           Thallium         mg/L         0.0008         -         -         -         -           Tin         mg/L         -         -         -         -         -         -   | 0.0005  | 9 (81.8%)   | -  |
| Lead         mg/L         0.0082         0.003         -           Manganese         mg/L         0.7678         0.8155         -           Nickel         mg/L         0.025         -         -           Silver         mg/L         0.00005         0.0001         -         (           Thallium         mg/L         0.0008         -         -         (           Tin         mg/L         -         -         -         -         -   | 0.01  | 3 (27.3%)   | -  |
| Manganese         mg/L         0.7678         0.8155           Nickel         mg/L         0.025         -           Silver         mg/L         0.00005         0.0001         -         0           Thallium         mg/L         0.0008         -         -         0           Tin         mg/L         -         -         -         -         -  | 0.0001  | 8 (72.7%)   | 0  |
| Nickel         mg/L         0.025         -         -           Silver         mg/L         0.00005         0.0001         -         ()           Thallium         mg/L         0.0008         -         -         ()           Tin         mg/L         -         -         -         -         -         -   | 0.0001  | 1 (9.09%)   | 0  |
| Sliver         rig/L         0.00005         0.0001         0.0001           Thallium         mg/L         0.0008         -         -         -         0.0001           Tin         mg/L         -         <  | 0.0005  | 7 (63.6%)   | 0  |
| Tin mg/L 0.0008  | 0.00001   | 9 (81.8%)   | 0  |
| TIII IIIg/L  | 0.00001   | 11 (100%)   | 0  |
| Titanium   | 0.0001  | 11 (100%)   | -  |
| ntanium mg/L   | 0.0003  | 8 (72.7%)   | -  |
|  | 0.0005  | 6 (54.5%)   | -  |
| Zinc mg/L 0.0075 0.033 - Dissolved Metals  | 0.003   | 9 (81.8%)   | 0  |
| Aluminum mg/L 0.05 0.1   | 0.001   | 9 (81.8%)   | 0  |
|  | 0.0001  | 6 (54.5%)   | -  |
| , ,  | 0.0001  | 8 (72.7%)   | -  |
| Beryllium µg/L   | 0.02  | 11 (100%)   | -  |
|  | 0.0001  | 11 (100%)   | -  |
| Boron mg/L   | 0.01  | 6 (54.5%)   | -  |
| Chromium mg/L  | 0.0001  | 2 (18.2%)   | -  |
| Cobalt µg/L  | 0.1   | 11 (100%)   | -  |
|  | 0.0002  | 8 (72.7%)   | -  |
| Iron mg/L 0.35   | 0.01  | 10 (90.9%)  | -  |
| , and the second | 0.0001  | 11 (100%)   | -  |
| Manganese mg/L   | 0.0001  | 1 (9.09%)   | -  |
| Mercury µg/L   | 0.00005   | 11 (100%)   |  |
| Y H  | 0.0005  | 7 (63.6%)<br>11 (100%)  | 0 -  |
| Sliver Hig/L   | 0.00001   | 11 (100%)   | -  |
| mailium my/L   | 0.00001   | 11 (100%)   | -  |
| o l  |   | 11 (100%)   | -  |
|  | ()_()()().3   | 10 (90.9%)  | -  |
| Zinc mg/L  | 0.0003  | 7 (63.6%)   | -  |

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. The total number of samples in 2022 (n) was 11. EVWQP = Elk Valley Water Quality Plan; "-" = no applicable guideline exists.

<sup>&</sup>lt;sup>a</sup> British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCMOECCS 2021a,b)

<sup>&</sup>lt;sup>b</sup> Where more than one EVWQP Level 1 Benchmark or screening value was applicable, the most conservative (lowest) value was used.

<sup>&</sup>lt;sup>c</sup> Guideline is the most conservative (lowest), based on estimates of a maximum temperature of 20°C and a minimum pH of 9.0.

<sup>&</sup>lt;sup>d</sup> Minimum water quality guidelines for Nitrite (as N) reported in BCMOECCS (2021a) for chloride concentrations < 2 mg/L.

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

| Parameter                        | Units | Range of LRLs | No. Sample Results<br>< LRL |
|----------------------------------|-------|---------------|-----------------------------|
| DMSeO - Dimethylselenoxide       | mg/L  | 0.01          | 11 (100%)                   |
| MeSe(IV) - Methylseleninic Acid  | mg/L  | 0.01          | 9 (81.8%)                   |
| MeSe(VI) - Methaneselenonic Acid | mg/L  | 0.01          | 11 (100%)                   |
| Se(IV) - Selenite                | mg/L  | 0.01 to 0.02  | 2 (18.2%)                   |
| SeCN - Selenocyanate             | mg/L  | 0.01          | 11 (100%)                   |
| SeMe - Selenomethionine          | mg/L  | 0.01          | 11 (100%)                   |
| Selenosulfate                    | mg/L  | 0.01          | 11 (100%)                   |
| Selenium Unknown                 | mg/L  | 0.01          | 11 (100%)                   |

Notes: Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. No applicable guidelines exist for any analyte for which at least one result was below the LRL. The total number of samples in 2022 (n) was 11.

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

| Parameter   | Units        | No. Field Blank Results < LRL | No. Trip Blank Results < LRL |
|---|--------------|-------------------------------|------------------------------|
| Physical Tests  |              |                               |                              |
| Conductivity  | μS/cm        | 2 (66.7%)                     | 2 (100%)                     |
| Hardness (as CaCO <sub>3</sub> ) Hardness - Dissolved (as CaCO <sub>3</sub> )               | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Turbidity   | NTU          | 3 (100%)                      | 2 (100%)                     |
| Total Suspended Solids  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Total Dissolved Solids  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Acidity (as CaCO <sub>3</sub> ) Alkalinity, Bicarbonate (as HCO <sub>3</sub> )              | mg/L<br>mg/L | 3 (100%)<br>2 (66.7%)         | 2 (100%)<br>2 (100%)         |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> )   | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Alkalinity, Carbonate (as CO <sub>3</sub> )   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> ) Alkalinity, Hydroxide (as CaCO <sub>3</sub> ) | mg/L         | 3 (100%)                      | 2 (100%)<br>2 (100%)         |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> ) Alkalinity, Hydroxide (as OH)                 | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)                     |
| Alkalinity, Total (as CaCO <sub>3</sub> )   | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Anions And Nutrients  |              |                               |                              |
| Bromide<br>Chloride   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Fluoride  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Ammonia, Total (as N)   | mg/L         | 3 (100%)                      | 1 (50.0%)                    |
| Nitrate (as N)  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Nitrite (as N)<br>Total Kjeldahl Nitrogen   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Orthophosphate  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Total Phosphorus  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Sulphate  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Organic / Inorganic Carbon Dissolved Organic Carbon   | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Total Organic Carbon  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Total Metals  |              | ,                             | ` '                          |
| Aluminum<br>Antimony  | mg/L         | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Antimony<br>Arsenic   | mg/L<br>mg/L | 3 (100%)                      | 2 (100%) 2 (100%)            |
| Barium  | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Beryllium   | μg/L         | 3 (100%)                      | NA<br>2 (120%)               |
| Bismuth<br>Boron  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Cadmium   | µg/L         | 3 (100%)                      | 2 (100%)                     |
| Calcium   | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Chromium<br>Cobalt  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Copper  | μg/L<br>mg/L | 3 (100%)<br>2 (66.7%)         | NA<br>2 (100%)               |
| Iron  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Lead  | mg/L         | 3 (100%)<br>3 (100%)          | 2 (100%)                     |
| Lithium<br>Magnesium  | mg/L<br>mg/L | 2 (66.7%)                     | 2 (100%)<br>2 (100%)         |
| Manganese   | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Mercury   | μg/L         | 3 (100%)                      | NA (1999)                    |
| Molybdenum<br>Nickel  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Potassium   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Selenium  | μg/L         | 3 (100%)                      | NA                           |
| Silicon<br>Silver   | mg/L<br>mg/L | 2 (66.7%)<br>3 (100%)         | 2 (100%)<br>2 (100%)         |
| Sodium  | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Strontium   | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Sulphur<br>Thallium   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Tin   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Titanium  | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Uranium   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Vanadium<br>Zinc  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 2 (100%)<br>2 (100%)         |
| Dissolved Metals  | <u>9</u> ,   |                               | = (133.13)                   |
| Aluminum  | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Antimony<br>Arsenic   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
| Barium  | mg/L         | 2 (66.7%)                     | 1 (100%)                     |
| Beryllium   | μg/L         | 3 (100%)                      | 1 (100%)                     |
| Bismuth<br>Boron  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
| Cadmium   | μg/L         | 3 (100%)                      | NA                           |
| Calcium   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Chromium<br>Cobalt  | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Copper Copper   | μg/L<br>mg/L | 3 (100%)<br>2 (66.7%)         | 1 (100%)<br>1 (100%)         |
| Iron  | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Lead  | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Lithium<br>Magnesium  | mg/L<br>mg/L | 3 (100%)<br>2 (66.7%)         | 1 (100%)<br>2 (100%)         |
| Manganese   | mg/L         | 2 (66.7%)                     | 1 (100%)                     |
| Melyhdanum  | μg/L         | 3 (100%)                      | 1 (100%)                     |
| Molybdenum<br>Nickel  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
| Potassium   | mg/L         | 3 (100%)                      | 2 (100%)                     |
| Selenium  | μg/L         | 3 (100%)                      | 1 (100%)                     |
| Silicon<br>Silver   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
| Sodium  | mg/L         | 2 (66.7%)                     | 2 (100%)                     |
| Strontium   | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Sulphur<br>Thallium   | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
| Tin   | mg/L         | 2 (66.7%)                     | 1 (100%)                     |
| Titanium  | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Uranium<br>Vanadium   | mg/L         | 3 (100%)                      | 1 (100%)                     |
| Vanadium<br>Zinc  | mg/L<br>mg/L | 3 (100%)<br>3 (100%)          | 1 (100%)<br>1 (100%)         |
|   | mg/L         | J (10070)                     | 1 (10070)                    |

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

| Parameter Units    |      | Range of LRLs  | No. Field Blank Results<br>> LRL |  |  |
|--------------------|------|----------------|----------------------------------|--|--|
| Dissolved Selenium | μg/L | 0.165 to 0.198 | 1 (50%)                          |  |  |

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

Table B.6: Comparisons of Water Chemistry Duplicate Samples, LCO Dry Creek LAEMP, 2022

| Parameter  | Unit           | LC_FRUS_WS<br>_LAEMP_DRY_<br>2022-06_N | LC_CC1_WS_<br>LAEMP_DRY_<br>2022-06_N | RPD (%)       | LC_GRCK_WS<br>_LAEMP_DRY_<br>2022-09_N | LC_CC1_WS_<br>LAEMP_DRY_<br>2022-09_N | RPD (%)        | LC_FRB_WS_<br>LAEMP_DRY_<br>2022-11_N | LC_CC1_WS_<br>LAEMP_DRY_<br>2022-11_NP | RPD (%)       |
|--|----------------|--|---------------------------------------|---------------|--|---------------------------------------|----------------|---------------------------------------|--|---------------|
| Physical Tests Acidity (as CaCO <sub>3</sub> )   | mg/L           | <2.0                                   | <2.0                                  | _             | <2.0                                   | <2.0                                  | _              | <2.0                                  | <2.0                                   | _             |
| Alkalinity (as CaCO <sub>3</sub> )   | mg/L           | 155                                    | 155                                   | 0             | 167                                    | 175                                   | 4.68           | 211                                   | 211                                    | 0             |
| Alkalinity, Bicarbonate (as CaCO <sub>3</sub> ) Alkalinity, Bicarbonate (as HCO <sub>3</sub> ) | mg/L<br>mg/L   | 153<br>187                             | 151<br>184                            | 1.32<br>1.62  | 161<br>196                             | 170<br>207                            | 5.44<br>5.46   | 195<br>238                            | 199<br>243                             | 2.03          |
| Alkalinity, Carbonate (as CaCO <sub>3</sub> )  | mg/L           | 2                                      | 4.4                                   | 75.0          | 6.6                                    | 5.6                                   | 16.4           | 16.4                                  | 12.2                                   | 29.4          |
| Alkalinity, Carbonate (as CO <sub>3</sub> )  | mg/L           | 1.2                                    | 2.6                                   | 73.7          | 4                                      | 3.4                                   | 16.2           | 9.8                                   | 7.3                                    | 29.2          |
| Alkalinity, Hydroxide (as CaCO <sub>3</sub> )  Alkalinity, Hydroxide (as OH)                   | mg/L<br>mg/L   | <1.0<br><1.0                           | <1.0<br><1.0                          | -             | <1.0<br><1.0                           | <1.0<br><1.0                          | -              | <1.0<br><1.0                          | <1.0<br><1.0                           | -             |
| Conductivity   | μS/cm          | 487                                    | 483                                   | 0.825         | 374                                    | 374                                   | 0.00           | 862                                   | 856                                    | 0.70          |
| Hardness (as CaCO <sub>3</sub> ), Dissolved<br>Oxidation-Reduction Potential (ORP              | mg/L           | 256<br>315                             | 251                                   | 1.97<br>45.2  | 214<br>294                             | 215<br>282                            | 0.466          | 541<br>374                            | 545<br>352                             | 0.737         |
| pH   | mV<br>pH units | 8.18                                   | 499<br>8.23                           | 0.609         | 8.33                                   | 8.31                                  | 4.17<br>0.240  | 8.4                                   | 8.38                                   | 6.06<br>0.238 |
| Total Dissolved Solids (TDS)   | mg/L           | 323                                    | 320                                   | 0.933         | 237                                    | 248                                   | 4.54           | 596                                   | 597                                    | 0.168         |
| Total Suspended Solids (TSS) Turbidity   | mg/L<br>NTU    | 29<br>5.26                             | 27.9<br>8.25                          | 3.87<br>44.3  | 1.4<br>0.6                             | 1.4<br>0.75                           | 0<br>22.2      | <1.0<br>0.34                          | <1.0<br>0.36                           | 5.71          |
| Anions And Nutrients   | 1410           | 0.20                                   | 0.20                                  | 44.0          | 0.0                                    | 0.70                                  | EE.E           | 0.04                                  | 0.00                                   |               |
| Kjeldahl Nitrogen (TKN)  | mg/L           | 0.638                                  | 0.394                                 | 47.3          | <0.050                                 | <0.050                                | -              | 0.745                                 | 0.987                                  | 27.9          |
| Ammonia (as N)<br>Bromide  | mg/L<br>mg/L   | <0.0050<br><0.050                      | <0.0050<br><0.050                     | -             | <0.0050<br><0.050                      | <0.0050<br><0.050                     | -              | <0.0050<br><0.050                     | 0.0062<br><0.050                       | 21.43         |
| Chloride   | mg/L           | 1.27                                   | 1.13                                  | 11.7          | 0.17                                   | 0.18                                  | 5.71           | 5.4                                   | 5.22                                   | 3.39          |
| Fluoride<br>Nitrate (as N)   | mg/L<br>mg/L   | 0.136<br>6.21                          | 0.136<br>6.2                          | 0<br>0.161    | 0.144<br>0.0455                        | 0.146<br>0.0434                       | 1.38<br>4.72   | 0.168<br>14.3                         | 0.162<br>14.4                          | 3.64<br>0.697 |
| Nitrite (as N)   | mg/L           | 0.0035                                 | 0.0042                                | 18.2          | <0.0010                                | <0.0010                               | - 4.72         | 0.0035                                | 0.0033                                 | 5.88          |
| Orthophosphate, Dissolved (as P)   | mg/L           | <0.0010                                | 0.0011                                | -             | <0.0010                                | <0.0010                               | -              | <0.0010                               | <0.0010                                | -             |
| Phosphorus<br>Sulfate (as SO <sub>4</sub> )  | mg/L<br>mg/L   | 0.0218<br>77                           | 0.0219<br>76.8                        | 0.5<br>0.260  | 0.0054<br>46.8                         | 0.0048<br>47                          | 11.76<br>0.426 | <0.0020<br>232                        | <0.0020<br>234                         | 0.858         |
| Organic / Inorganic Carbon   |                |  |                                       |               |  |                                       | 0.720          |                                       |  |               |
| Carbon, Dissolved Organic (DOC)  | mg/L           | 2.02                                   | 2.02                                  | 0             | <0.50                                  | <0.50                                 | -              | 0.64                                  | 0.68                                   | 6.06          |
| Carbon, Total Organic (TOC)  Total Metals  | mg/L           | 1.94                                   | 1.98                                  | 2.04          | <0.50                                  | <0.50                                 | <u>-</u>       | <0.50                                 | 0.71                                   | 34.7          |
| Aluminum   | mg/L           | 0.136                                  | 0.168                                 | 21.1          | <0.0150                                | <0.0150                               | -              | 0.0054                                | 0.0037                                 | 37.4          |
| Antimony<br>Arsenic  | mg/L<br>mg/L   | 0.00014<br>0.00021                     | 0.00014<br>0.00021                    | 0             | <0.00010<br>0.00015                    | <0.00010<br>0.00017                   | -<br>12.50     | <0.00010<br><0.00010                  | <0.00010<br><0.00010                   | -             |
| Barium   | mg/L<br>mg/L   | 0.00021                                | 0.00021                               | 0.731         | 0.00015                                | 0.00017                               | 12.50          | 0.123                                 | 0.124                                  | 0.81          |
| Beryllium  | μg/L           | <0.020                                 | <0.020                                | -             | <0.020                                 | <0.020                                | -              | <0.020                                | <0.020                                 | -             |
| Bismuth<br>Boron   | mg/L<br>mg/L   | <0.000050<br><0.010                    | <0.000050<br><0.010                   | -             | <0.000050<br>0.016                     | <0.000050<br>0.017                    | 6.06           | <0.000050<br><0.010                   | <0.000050<br><0.010                    | -             |
| Cadmium  | μg/L           | 0.0535                                 | 0.0588                                | 9.44          | 0.0061                                 | 0.0063                                | 3.23           | 0.02                                  | 0.0255                                 | 24.2          |
| Calcium  | mg/L           | 61.2                                   | 60.6                                  | 0.985         | 49.2                                   | 49.3                                  | 0.203          | 113                                   | 112                                    | 0.889         |
| Chromium<br>Cobalt   | mg/L<br>μg/L   | 0.0004<br>0.12                         | 0.00034<br>0.13                       | 16.2<br>8.00  | 0.00022<br><0.10                       | 0.00023<br><0.10                      | 4.44           | 0.00014<br><0.10                      | 0.00016<br><0.10                       | 13.3          |
| Copper   | mg/L           | 0.0005                                 | 0.0005                                | 0             | <0.00050                               | <0.00050                              | -              | <0.00050                              | <0.00050                               | -             |
| Iron<br>Lead   | mg/L           | 0.185<br>0.000155                      | 0.202<br>0.00016                      | 8.79<br>3.17  | 0.017<br><0.000050                     | 0.017<br><0.000050                    | 0.00           | <0.010<br><0.000050                   | <0.010<br><0.00050                     | -             |
| Lead<br>Lithium  | mg/L<br>mg/L   | 0.000155                               | 0.00016                               | 0.604         | 0.0003                                 | 0.0072                                | 1.38           | 0.0289                                | 0.029                                  | 0.345         |
| Magnesium  | mg/L           | 24.1                                   | 24.5                                  | 1.65          | 18.1                                   | 17.7                                  | 2.23           | 48                                    | 49.6                                   | 3.28          |
| Manganese<br>Mercury   | mg/L<br>mg/L   | 0.0106<br><0.000050                    | 0.011<br><0.000050                    | 3.70          | 0.00378<br><0.000050                   | 0.00357<br><0.000050                  | 5.71<br>-      | 0.00164<br><0.0000050                 | 0.00151<br><0.0000050                  | 8.25          |
| Molybdenum   | mg/L           | 0.00133                                | 0.000988                              | 29.5          | 0.00134                                | 0.00139                               | 3.66           | 0.000806                              | 0.000844                               | 4.61          |
| Nickel   | mg/L           | 0.00185                                | 0.00191                               | 3.19          | <0.00050                               | <0.00050                              | -              | <0.00050                              | 0.00066                                | 27.59         |
| Potassium<br>Selenium  | mg/L<br>μg/L   | 0.958<br>25.5                          | 0.971<br>25.6                         | 1.35<br>0.391 | 0.653<br>1.82                          | 0.642<br>1.86                         | 1.70<br>2.17   | 1.4<br>55.8                           | 1.51<br>55.8                           | 7.56<br>0     |
| Silicon  | mg/L           | 2.21                                   | 2.29                                  | 3.56          | 2.88                                   | 2.81                                  | 2.46           | 2.67                                  | 2.62                                   | 1.89          |
| Silver   | mg/L           | <0.000010                              | <0.000010                             | - 0           | <0.000010                              | <0.000010                             | - 1 10         | <0.000010                             | <0.000010                              | - 2.04        |
| Sodium<br>Strontium  | mg/L<br>mg/L   | 1.6<br>0.088                           | 1.6<br>0.0878                         | 0.228         | 2.56<br>0.189                          | 2.53<br>0.19                          | 1.18<br>0.53   | 3.4<br>0.161                          | 3.47<br>0.158                          | 2.04<br>1.88  |
| Sulfur   | mg/L           | 27.5                                   | 27.6                                  | 0.363         | 15.5                                   | 15.4                                  | 0.65           | 86.2                                  | 85.9                                   | 0.35          |
| Thallium<br>Tin  | mg/L<br>mg/L   | <0.000010<br><0.00010                  | <0.000010<br><0.00010                 | -             | <0.00010<br><0.00010                   | <0.000010<br><0.00010                 | -              | <0.000010<br><0.00010                 | <0.000010<br><0.00010                  | -             |
| Titanium   | mg/L           | 0.00202                                | 0.00399                               | 65.6          | <0.00030                               | <0.00030                              | -              | <0.00030                              | <0.00030                               | -             |
| Uranium  | mg/L           | 0.00148                                | 0.00146                               | 1.36          | 0.000918                               | 0.000943                              | 2.69           | 0.00255                               | 0.0026                                 | 1.94          |
| Vanadium<br>Zinc   | mg/L<br>mg/L   | 0.00075<br>0.0039                      | 0.00088<br>0.0032                     | 16.0<br>19.7  | 0.00068<br><0.0030                     | 0.00069<br><0.0030                    | 1.46<br>-      | <0.00050<br><0.0030                   | <0.00050<br><0.0030                    | -             |
| Dissolved Metals   |                |  |                                       | 1             |  |                                       |                |                                       |  | T             |
| Aluminum<br>Antimony   | mg/L<br>mg/L   | 0.0021<br>0.00012                      | 0.0024<br>0.00012                     | 13.3<br>0     | <0.0010<br><0.00010                    | 0.0015<br><0.00010                    | 40.0           | <0.0010<br><0.00010                   | <0.0010<br>0.00011                     | 0<br>9.52     |
| Arsenic  | mg/L           | 0.00012                                | 0.00011                               | 0             | <0.00010                               | <0.00010                              | 0              | <0.00010                              | <0.00011                               | 0             |
| Barium   | mg/L           | 0.0499                                 | 0.0503                                | 0.798         | 0.0748                                 | 0.0761                                | 1.72           | 0.124                                 | 0.128                                  | 3.17          |
| Beryllium<br>Bismuth   | μg/L<br>mg/L   | <0.020<br><0.00050                     | <0.020<br><0.00050                    | 0             | <0.020<br><0.00050                     | <0.020<br><0.00050                    | 0              | <0.020<br><0.000050                   | <0.020<br><0.00050                     | 0             |
| Boron  | mg/L           | <0.010                                 | <0.010                                | 0             | 0.016                                  | 0.015                                 | 6.45           | <0.010                                | <0.010                                 | 0             |
| Cadmium<br>Calcium   | μg/L<br>mg/L   | 0.0216<br>62.5                         | 0.024<br>61                           | 10.5<br>2.43  | 0.006<br>51                            | 0.0058<br>51.6                        | 3.39<br>1.17   | 0.0186<br>127                         | 0.0291<br>131                          | 44.0<br>3.10  |
| Chromium   | mg/L           | 0.00011                                | <0.00010                              | 9.52          | 0.00025                                | 0.0002                                | 22.2           | 0.00017                               | 0.00017                                | 0             |
| Cobalt   | μg/L           | <0.10                                  | <0.10                                 | 0             | <0.10                                  | <0.10                                 | 0              | <0.10                                 | <0.10                                  | 0             |
| Copper<br>Iron   | mg/L<br>mg/L   | <0.00020<br><0.010                     | <0.00020<br><0.010                    | 0             | <0.00020<br><0.010                     | <0.00020<br><0.010                    | 0              | 0.00025<br><0.010                     | 0.00038<br><0.010                      | 41.3<br>0     |
| Lead   | mg/L           | <0.000050                              | <0.000050                             | 0             | <0.000050                              | <0.000050                             | 0              | <0.000050                             | <0.000050                              | 0             |
| Lithium<br>Magnesium   | mg/L<br>mg/L   | 0.0164<br>24.4                         | 0.0168<br>24                          | 2.41<br>1.65  | 0.0071<br>21                           | 0.007<br>21                           | 1.42<br>0      | 0.0307<br>54.4                        | 0.0312<br>52.9                         | 1.62<br>2.80  |
| Manganese  | mg/L           | 0.00169                                | 0.00164                               | 3.00          | 0.00084                                | 0.00072                               | 15.4           | 0.00129                               | 0.00127                                | 1.56          |
| Mercury  | mg/L           | <0.0000050                             | <0.000050                             | 0             | <0.0000050                             | <0.000050                             | 0              | <0.0000050                            | <0.000050                              | 0             |
| Molybdenum<br>Nickel   | mg/L<br>mg/L   | 0.0011<br>0.00135                      | 0.00112<br>0.00137                    | 1.80<br>1.47  | 0.00149<br><0.00050                    | 0.00143<br><0.00050                   | 4.11<br>0      | 0.00089<br><0.00050                   | 0.000887<br><0.00050                   | 0.338         |
| Potassium  | mg/L           | 0.954                                  | 0.96                                  | 0.627         | 0.649                                  | 0.654                                 | 0.767          | 1.48                                  | 1.45                                   | 2.05          |
| Selenium<br>Silicon  | μg/L<br>mg/l   | 24.2<br>1.96                           | 24.3<br>2.1                           | 0.412<br>6.90 | 2.43<br>2.92                           | 2.35<br>2.97                          | 3.35<br>1.70   | 60.9<br>2.42                          | 59.6<br>2.4                            | 2.16<br>0.830 |
| Silver   | mg/L<br>mg/L   | 1.96<br><0.000010                      | <0.00010                              | 0.90          | <0.000010                              | <0.000010                             | 1.70           | <0.00010                              | <0.000010                              | 0.830         |
| Sodium   | mg/L           | 1.53                                   | 1.54                                  | 0.651         | 2.8                                    | 2.8                                   | 0              | 3.52                                  | 3.35                                   | 4.95          |
| Strontium<br>Sulfur  | mg/L<br>mg/L   | 0.0932<br>26.8                         | 0.0937<br>28.3                        | 0.535<br>5.44 | 0.186<br>16.8                          | 0.189<br>16.3                         | 1.60<br>3.02   | 0.176<br>87.4                         | 0.172<br>85.4                          | 2.30<br>2.31  |
| Thallium   | mg/L           | <0.000010                              | <0.000010                             | -             | <0.000010                              | <0.000010                             | -              | <0.000010                             | <0.000010                              | -             |
| Tin  | mg/L           | <0.00010                               | <0.00010                              | -             | <0.00010                               | <0.00010                              | -              | <0.00010                              | <0.00010                               | -             |
| Titanium<br>Uranium  | mg/L<br>mg/L   | <0.00030<br>0.0015                     | <0.00030<br>0.00151                   | 0.664         | <0.00030<br>0.000902                   | <0.00030<br>0.000898                  | 0.444          | <0.00030<br>0.00256                   | <0.00030<br>0.00256                    | - 0           |
| Vanadium   | mg/L           | <0.00050                               | <0.00050                              | -             | <0.00050                               | <0.00050                              | -              | <0.00050                              | <0.00050                               | -             |
| Zinc   | mg/L           | 0.0012                                 | 0.0013                                | 8.00          | <0.0010                                | <0.0010                               | -              | 0.0013                                | 0.0013                                 | 0             |

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

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

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

| Parameter                       | Unit | LC_FRB_WS_LAEMP<br>_DRY_2022-11_N | LC_CC1_WS_LAEMP<br>_DRY_2022-11_NP | RPD<br>(%) | LC_GRCK_WS_LAEMP<br>_DRY_2022-09_N | LC_CC1_WS_LAEMP<br>_DRY_2022-09_N | RPD<br>(%) | LC_FRUS_WS_LAEMP<br>_LCO_DRY_2022-<br>06_NP | LC_CC1_WS_LAEMP<br>_DRY_2022-06_NP | RPD<br>(%) |
|---------------------------------|------|-----------------------------------|------------------------------------|------------|------------------------------------|-----------------------------------|------------|---|------------------------------------|------------|
| Total Selenium                  | μg/L | 46.1                              | 45.8                               | 0.65       | 1.69                               | 1.87                              | 10.1       | 23.7  | 23.4                               | 1.27       |
| Dissolved Selenium              | μg/L | 45.6                              | 47.4                               | 3.87       | 1.83                               | 1.81                              | 1.10       | 23.4  | 24.2                               | 3.36       |
| Dimethylselenoxide              | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 |            | 0   | 0                                  | -          |
| MeSe(IV) - Methylseleninic acid | μg/L | 0.004                             | 0                                  | 200        | 0                                  | 0                                 | -          | 0.004                                       | 0.008                              | 66.7       |
| Methaneselenonic Acid           | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 | -          | 0   | 0                                  | -          |
| Se(IV) - Selenite               | μg/L | 0.191                             | 0.176                              | 8.17       | 0.035                              | 0.032                             | 8.96       | 0.079                                       | 0.08                               | 1.26       |
| Se(VI) - Selenate               | μg/L | 50.6                              | 48.2                               | 4.86       | 1.85                               | 1.53                              | 18.9       | 21.3  | 21.2                               | 0.47       |
| SeCN - Selenocyanate            | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 | -          | 0   | 0                                  | -          |
| SeMe - Selenomethionine         | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 | -          | 0   | 0                                  | -          |
| Selenosulfate                   | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 | -          | 0   | 0                                  | -          |
| Unknown Selenium Species        | μg/L | 0                                 | 0                                  | -          | 0                                  | 0                                 | -          | 0   | 0                                  | -          |

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

Notes: " - " indicates no data available. LRL = Laboratory Reporting Limit. If one result in a duplicate pair was below the LRL, RPD was calculated using the LRL in place of the value below detection results. RPD was not calculated if both results were < LRL. "-" indicates that the RPD was not calculated.

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

| Sample ID                  | Laboratory ID | % Sampled | # Invertebrates |
|----------------------------|---------------|-----------|-----------------|
| LC_DCDS_BIC-01_2022-05_NP  | CC230046      | 5         | 435             |
| LC_DCDS_BIC-02_2022-05_NP  | CC230047      | 6         | 356             |
| LC_DCDS_BIC-03_2022-05_NP  | CC230048      | 11        | 361             |
| LC_DCDS_BIC-04_2022-05_NP  | CC230049      | 5         | 364             |
| LC_DCDS_BIC-05_2022-05_NP  | CC230050      | 5         | 351             |
| LC_DC1_BIC-1_2022-09-12_N  | CC231037      | 5         | 617             |
| LC_DC1_BIC-2_2022-09-12_N  | CC231038      | 10        | 339             |
| LC_DC1_BIC-3_2022-09-12_N  | CC231039      | 5         | 513             |
| LC_DC2_BIC-1_2022-09-14_N  | CC231040      | 14        | 329             |
| LC_DC2_BIC-2_2022-09-14_N  | CC231041      | 15        | 335             |
| LC_DC2_BIC-3_2022-09-14_N  | CC231042      | 8         | 335             |
| LC_DC3_BIC-1_2022-09-13_N  | CC231043      | 5         | 622             |
| LC_DC3_BIC-2_2022-09-13_N  | CC231044      | 8         | 343             |
| LC_DC3_BIC-3_2022-09-13_N  | CC231045      | 5         | 376             |
| LC_DC4_BIC-1_2022-09-12_N  | CC231046      | 7         | 334             |
| LC_DC4_BIC-2_2022-09-12_N  | CC231047      | 5         | 360             |
| LC_DC4_BIC-3_2022-09-12_N  | CC231048      | 13        | 385             |
| LC_DCDS_BIC-1_2022-09-13_N | CC231049      | 15        | 332             |
| LC_DCDS_BIC-2_2022-09-13_N | CC231050      | 8         | 320             |
| LC_DCDS_BIC-3_2022-09-13_N | CC231051      | 16        | 319             |
| LC_DCDS_BIC-4_2022-09-13_N | CC231052      | 8         | 346             |
| LC_DCDS_BIC-5_2022-09-13_N | CC231053      | 12        | 327             |
| LC_DCEF_BIC-1_2022-09-13_N | CC231054      | 12        | 334             |
| LC_DCEF_BIC-2_2022-09-13_N | CC231055      | 15        | 333             |
| LC_DCEF_BIC-3_2022-09-13_N | CC231056      | 12        | 342             |
| LC_FRB_BIC-1_2022-09-10_N  | CC231057      | 5         | 515             |
| LC_FRB_BIC-2_2022-09-10_N  | CC231058      | 5         | 443             |
| LC_FRB_BIC-3_2022-09-10_N  | CC231059      | 5         | 392             |
| LC_FRUS_BIC-1_2022-09-10_N | CC231060      | 7         | 353             |
| LC_FRUS_BIC-2_2022-09-10_N | CC231061      | 10        | 329             |
| LC_FRUS_BIC-3_2022-09-10_N | CC231062      | 14        | 348             |
| LC_GRCK_BIC-1_2022-09-14_N | CC231063      | 14        | 310             |
| LC_GRCK_BIC-2_2022-09-14_N | CC231064      | 50        | 411             |
| LC_GRCK_BIC-3_2022-09-14_N | CC231065      | 12        | 327             |
| LC_DCDS_BIC-1_2022-11_N    | CC232235      | 21        | 327             |
| LC_DCDS_BIC-2_2022-11_N    | CC232236      | 13        | 329             |

Notes: Only samples that were sub-sampled are displayed. All other benthic invertebrate community samples were examined in their entirety.

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

| Station ID               |                  | Organisms in Subsample |  |     |     |     |     |     |     | Precision<br>Error |     | Accuracy<br>Error |            |            |            |            |     |     |     |     |     |       |      |      |      |      |
|--------------------------|------------------|------------------------|--|-----|-----|-----|-----|-----|-----|--------------------|-----|-------------------|------------|------------|------------|------------|-----|-----|-----|-----|-----|-------|------|------|------|------|
| Sample ID                | Laboratory<br>ID | 1                      | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 10 |     |     |     | 16  | 17  | 18  | 19                 | 20  | Total             | Min<br>(%) | Max<br>(%) | Min<br>(%) | Max<br>(%) |     |     |     |     |     |       |      |      |      |      |
| LC_DCDS_BIC05_2022-05_NP | CC230050         | 349                    | 300                                    | 314 | 300 | 301 | 317 | 302 | 300 | 308                | 290 | 290               | 308        | 301        | 302        | 314        | 298 | 333 | 328 | 327 | 330 | 6,212 | 0    | 17   | 1    | 12   |
|                          |                  |                        | •                                      | •   | •   | •   |     |     |     | •                  | •   | •                 | •          | •          | •          |            |     |     |     |     | •   |       | 0.00 | 16.9 | 0.84 | 12.4 |

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

| Sample ID                  | Laboratory ID | Number of Organisms<br>Recovered<br>(Initial Sort) | Number of<br>Organisms in<br>Re-sort | Sorting<br>Efficiency |
|----------------------------|---------------|--|--------------------------------------|-----------------------|
| LC_DCDS_BIC-01_2022-05_NP  | CC230046      | 435  | 5                                    | 98.9%                 |
| LC_DC2_BIC-3_2022-09-14_N  | CC231042      | 335  | 4                                    | 98.8%                 |
| LC_DC3_BIC-2_2022-09-13_N  | CC231044      | 343  | 6                                    | 98.3%                 |
| LC_FRUS_BIC-3_2022-09-10_N | CC231062      | 348  | 3                                    | 99.1%                 |
| LC_DCDS_BIC-2_2022-11_N    | CC232236      | 329  | 5                                    | 98.5%                 |
|                            |               |  | Average                              | 98.8%                 |

Table B.11: Percent Benthic Invertebrate Community Organism Recovery<sup>a</sup>, LCO Dry Creek LAEMP, 2022

| Sample ID                  | Laboratory ID | Percent<br>Sampled (%) | Taxa<br>Identified | TIR (%) | PDE (%) | PTD (%) | BCDI  |
|----------------------------|---------------|------------------------|--------------------|---------|---------|---------|-------|
| LC_DCDS_BIC-03_2022-05_NP  | CC230048      | 11                     | 362                | 0       | 0.138   | 0.552   | 0.004 |
| LC_DC1_BIC-2_2022-09-12_N  | CC231038      | 10                     | 339                | 0       | 0.000   | 0.295   | 0.003 |
| LC_DC3_BIC-3_2022-09-13_N  | CC231045      | 5                      | 379                | 0       | 0.397   | 0.792   | 0.004 |
| LC_DCEF_BIC-3_2022-09-13_N | CC231056      | 12                     | 341                | 0       | 0.146   | 1.46    | 0.013 |

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

<sup>&</sup>lt;sup>a</sup> For error rationale and calculations, refer to Cordillera report (Appendix J).

Table B.12: Comparisons of Benthic Invertebrate Tissue Duplicates, LCO Dry Creek LAEMP, 2022

| Parameter | Units    | Range of LRLs  | No. Sample Results<br>< LRL |
|-----------|----------|----------------|-----------------------------|
| Antimony  | mg/kg dw | 0.003 to 0.004 | 1 (2.08%)                   |
| Arsenic   | mg/kg dw | 0.327 to 0.514 | 15 (31.3%)                  |
| Boron     | mg/kg dw | 0.067 to 0.107 | 2 (4.17%)                   |
| Mercury   | mg/kg dw | 0.022 to 0.029 | 5 (8.33%)                   |
| Vanadium  | mg/kg dw | 0.025 to 0.065 | 1 (2.08%)                   |

Notes: mg/kg = milligrams per kilogram dry weight. Only analytes with at least one result < Laboratory Reporting Limit (LRL) or LRL were above guidelines were displayed. No applicable guidelines exist for any analyte that had at least one result below the LRL. The total number of samples in 2022 (n) was 48.

## APPENDIX C WATER QUALITY

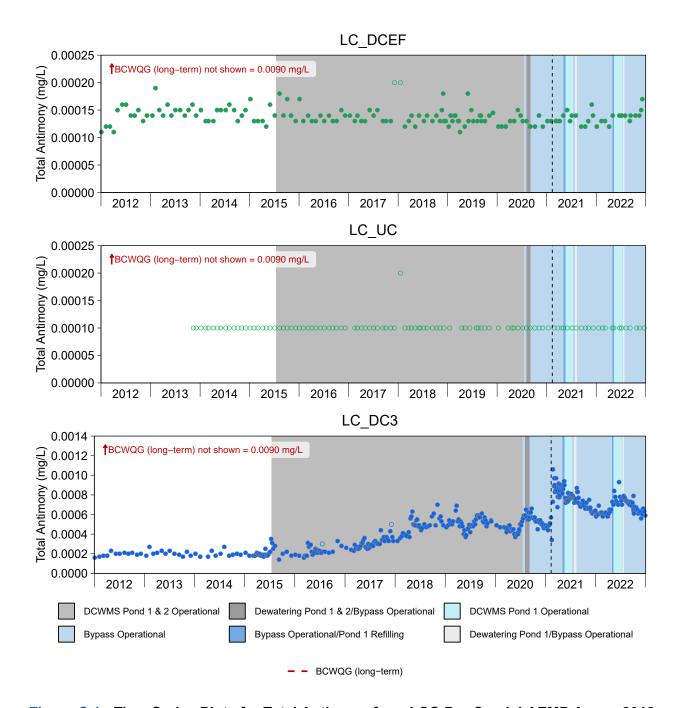


Figure C.1: Time Series Plots for Total Antimony from LCO Dry Creek LAEMP Areas, 2012 to 2022

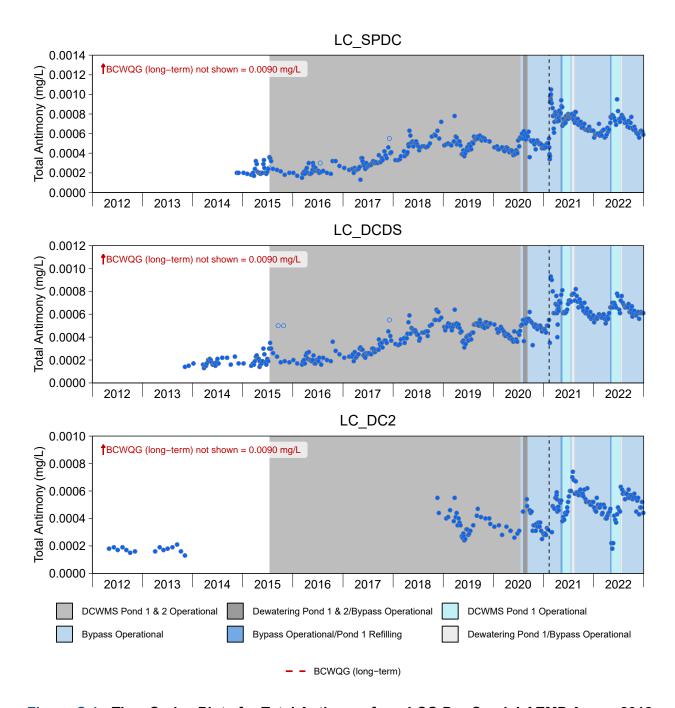


Figure C.1: Time Series Plots for Total Antimony from LCO Dry Creek LAEMP Areas, 2012 to 2022

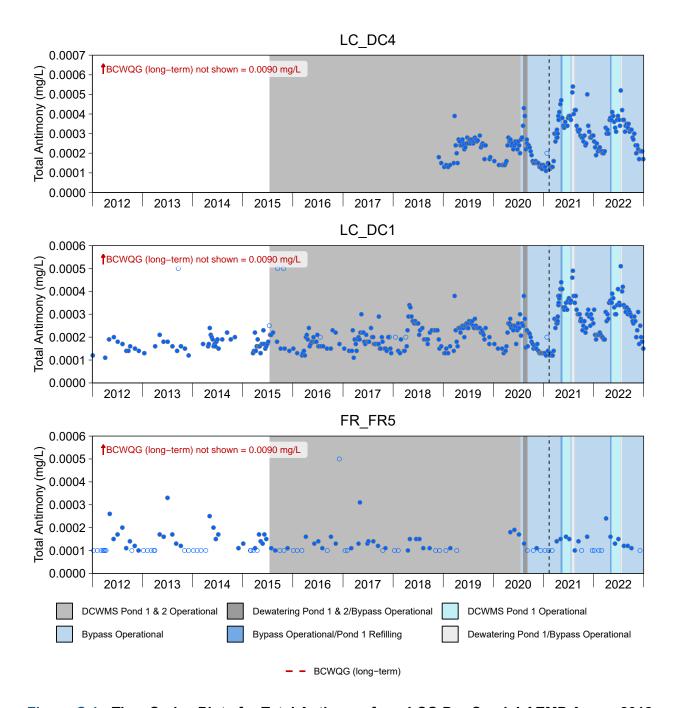


Figure C.1: Time Series Plots for Total Antimony from LCO Dry Creek LAEMP Areas, 2012 to 2022

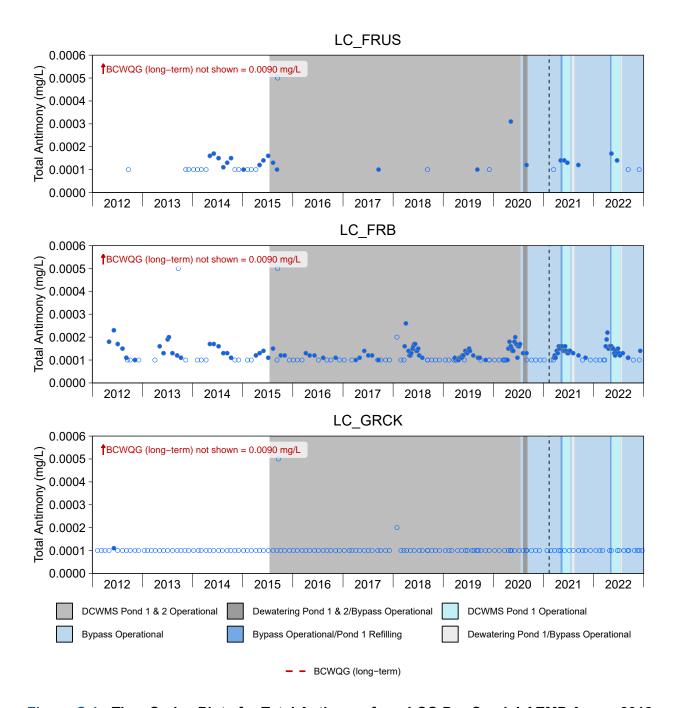


Figure C.1: Time Series Plots for Total Antimony from LCO Dry Creek LAEMP Areas, 2012 to 2022

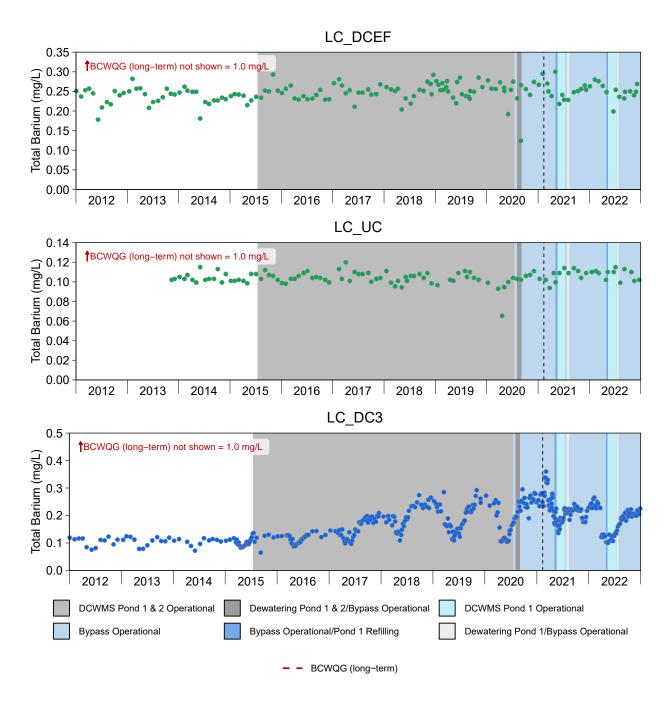


Figure C.2: Time Series Plots for Total Barium from LCO Dry Creek LAEMP Areas, 2012 to 2022

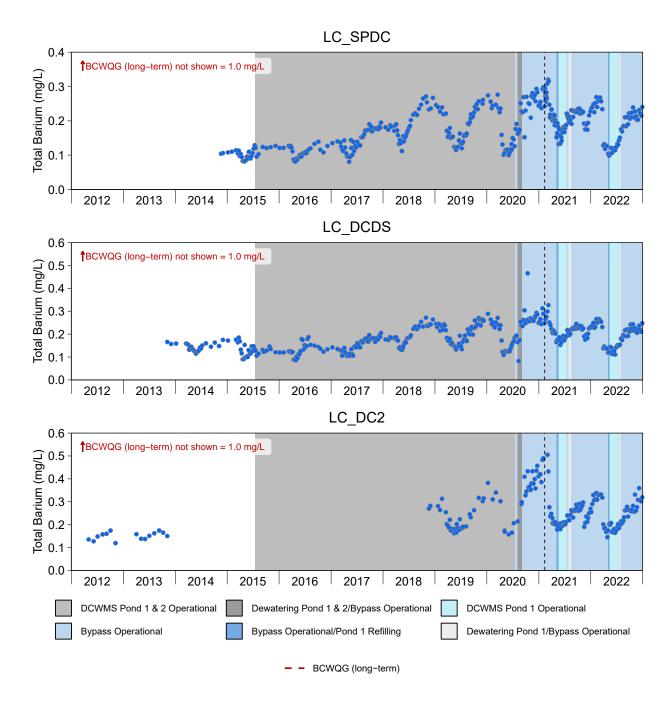


Figure C.2: Time Series Plots for Total Barium from LCO Dry Creek LAEMP Areas, 2012 to 2022

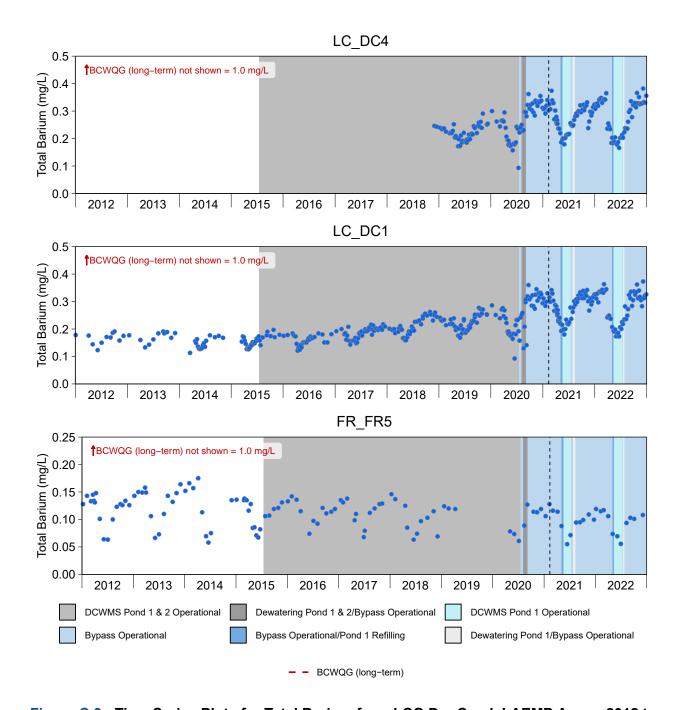


Figure C.2: Time Series Plots for Total Barium from LCO Dry Creek LAEMP Areas, 2012 to 2022

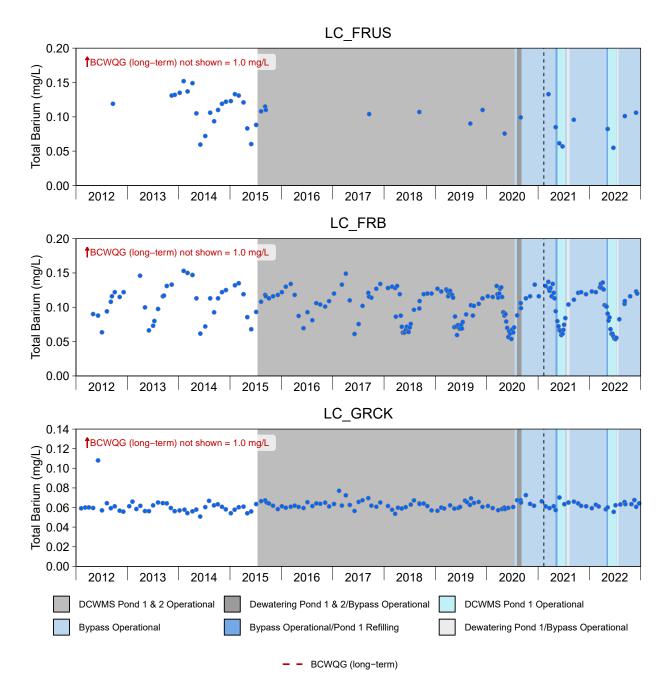


Figure C.2: Time Series Plots for Total Barium from LCO Dry Creek LAEMP Areas, 2012 to 2022

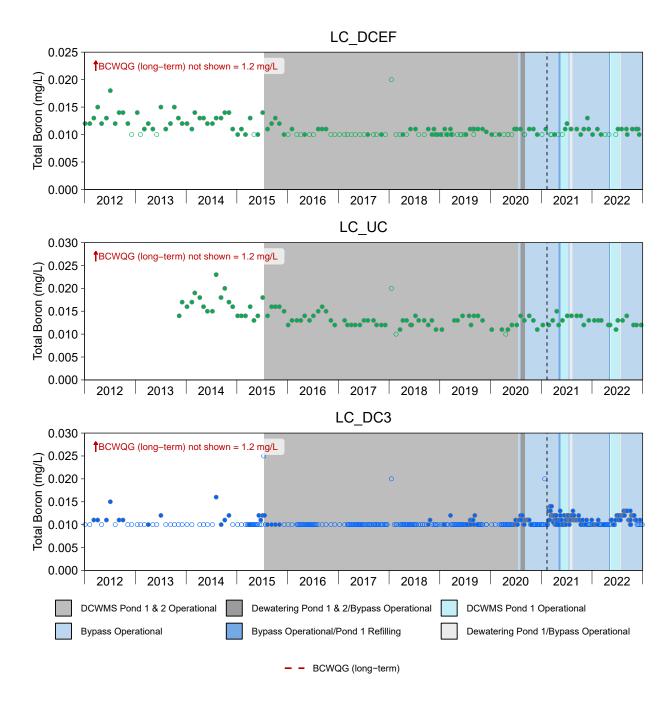


Figure C.3: Time Series Plots for Total Boron from LCO Dry Creek LAEMP Areas, 2012 to 2022

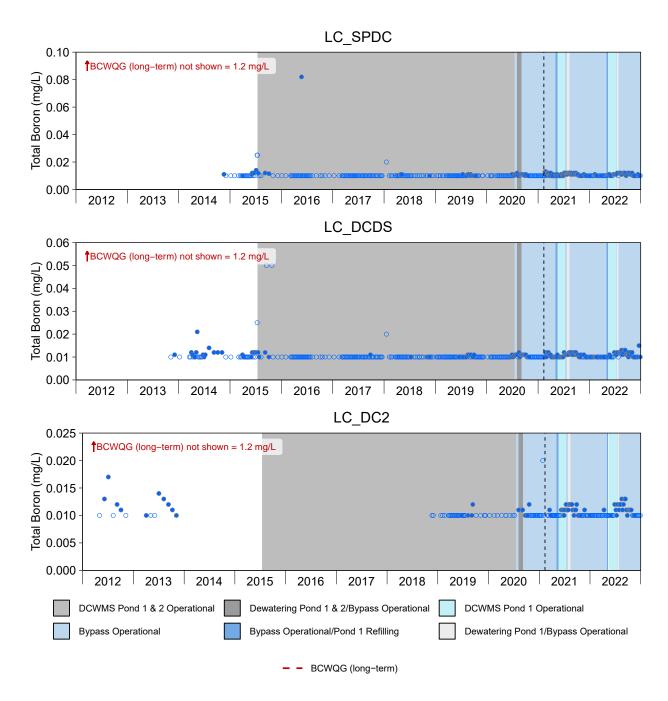


Figure C.3: Time Series Plots for Total Boron from LCO Dry Creek LAEMP Areas, 2012 to 2022

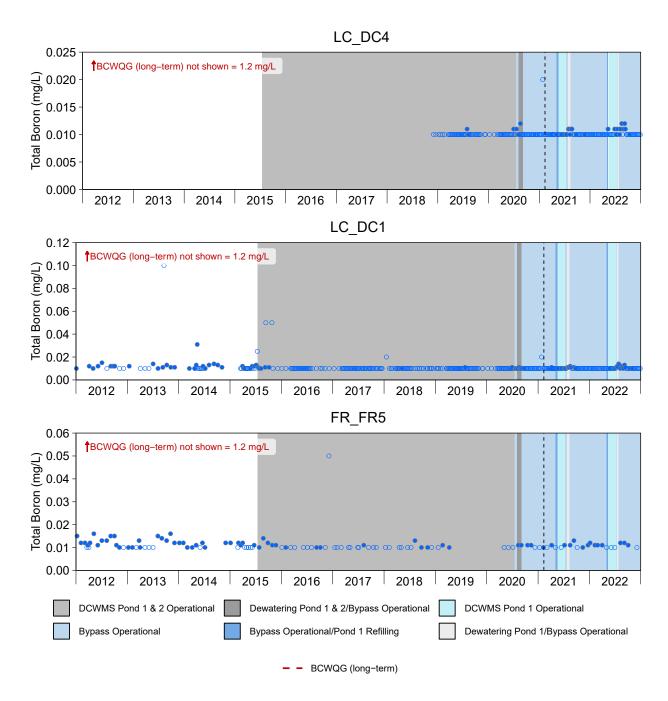


Figure C.3: Time Series Plots for Total Boron from LCO Dry Creek LAEMP Areas, 2012 to 2022

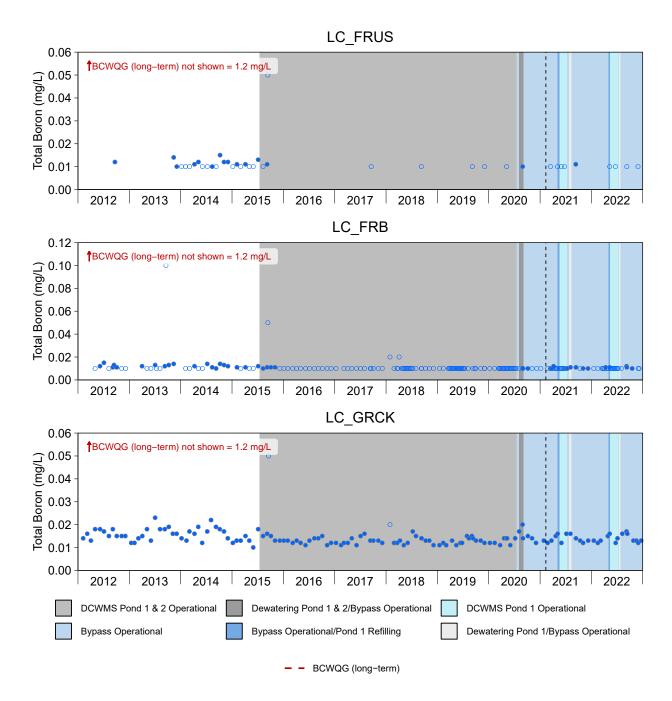


Figure C.3: Time Series Plots for Total Boron from LCO Dry Creek LAEMP Areas, 2012 to 2022

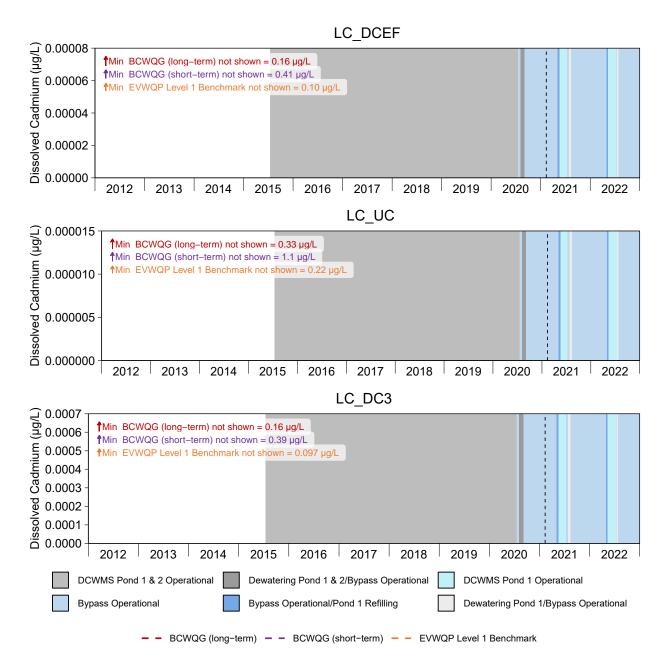


Figure C.4: Time Series Plots for Dissolved Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

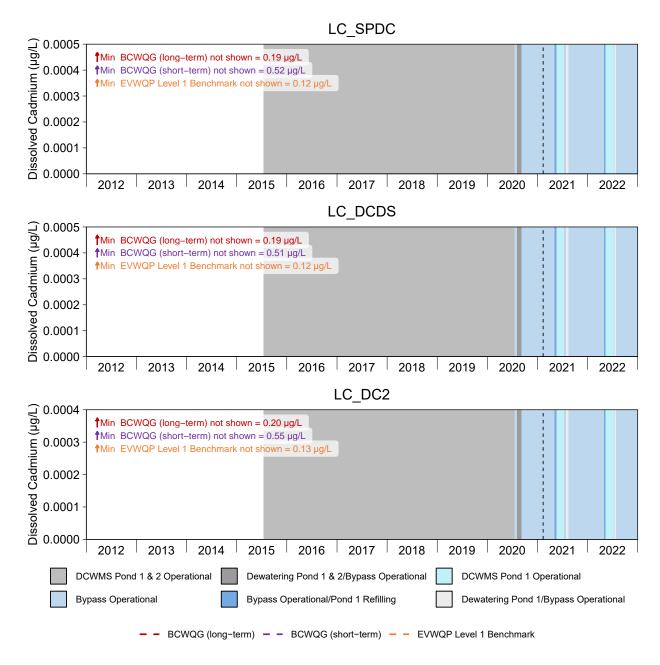


Figure C.4: Time Series Plots for Dissolved Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

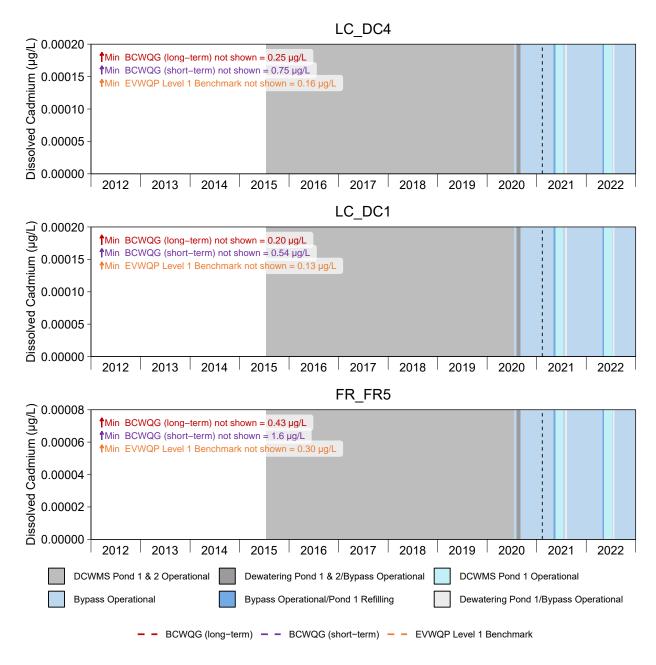


Figure C.4: Time Series Plots for Dissolved Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

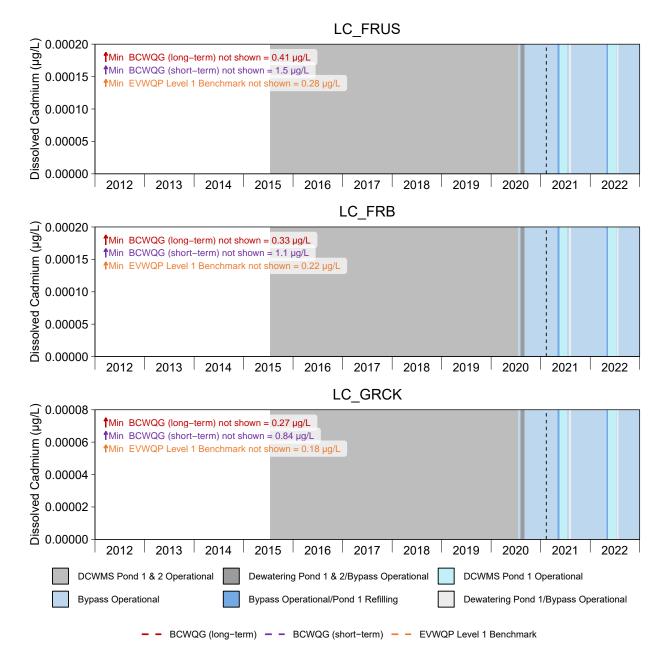


Figure C.4: Time Series Plots for Dissolved Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

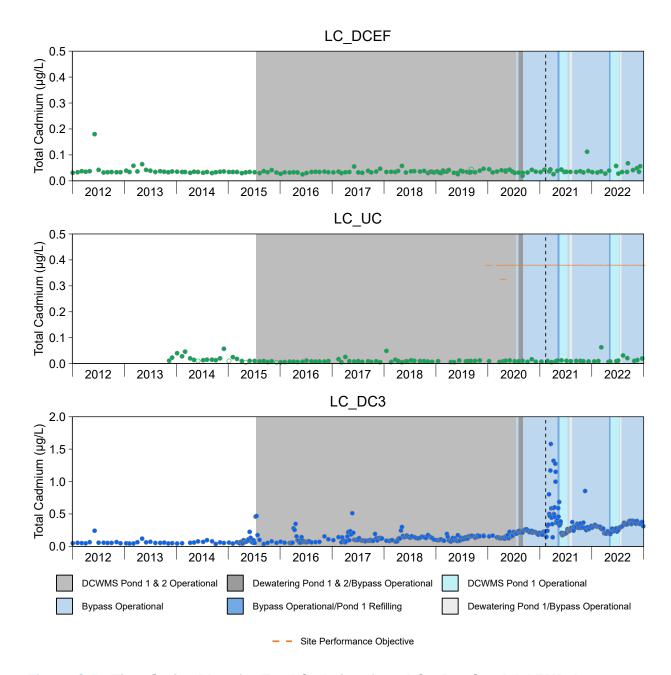


Figure C.5: Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

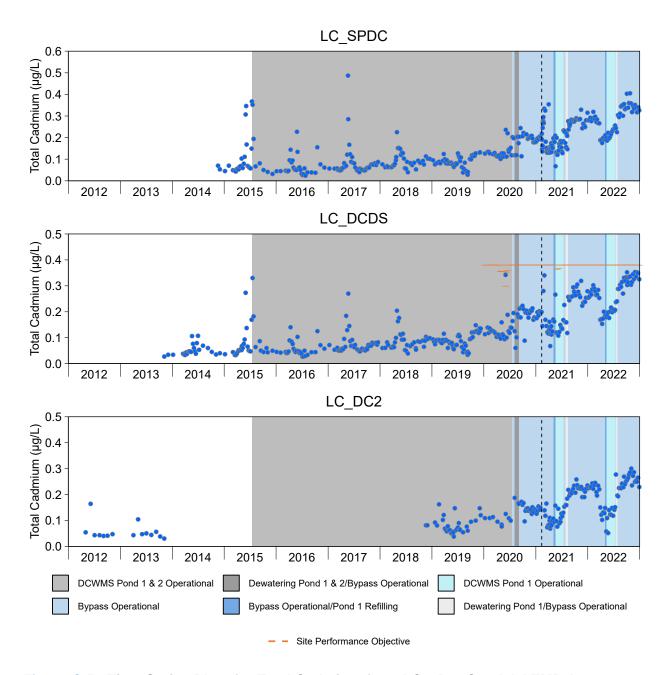


Figure C.5: Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

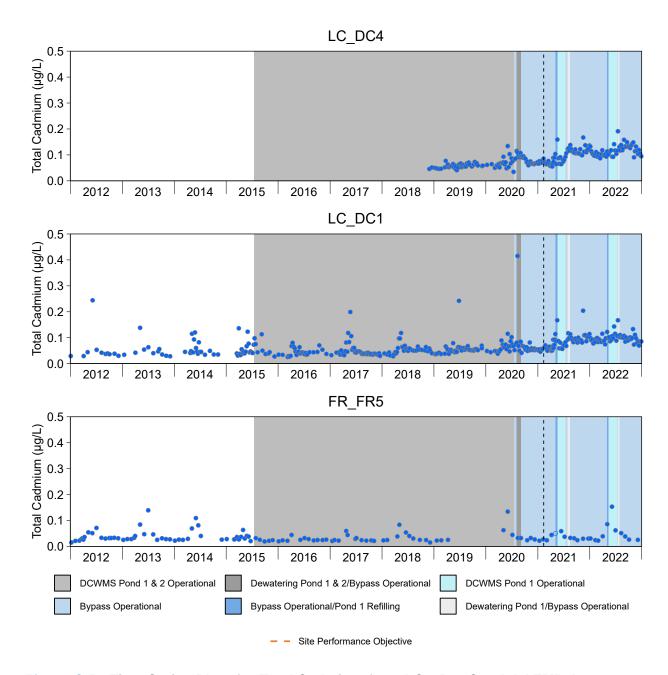


Figure C.5: Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

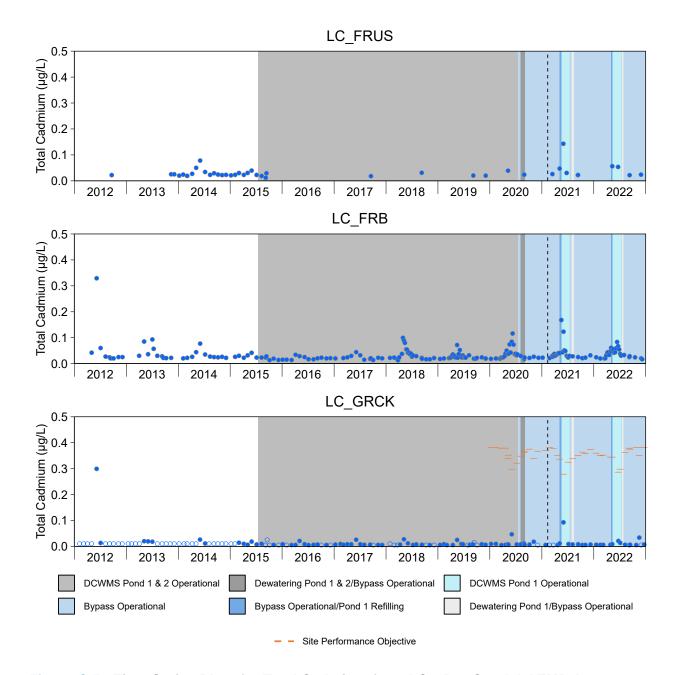


Figure C.5: Time Series Plots for Total Cadmium from LCO Dry Creek LAEMP Areas, 2012 to 2022

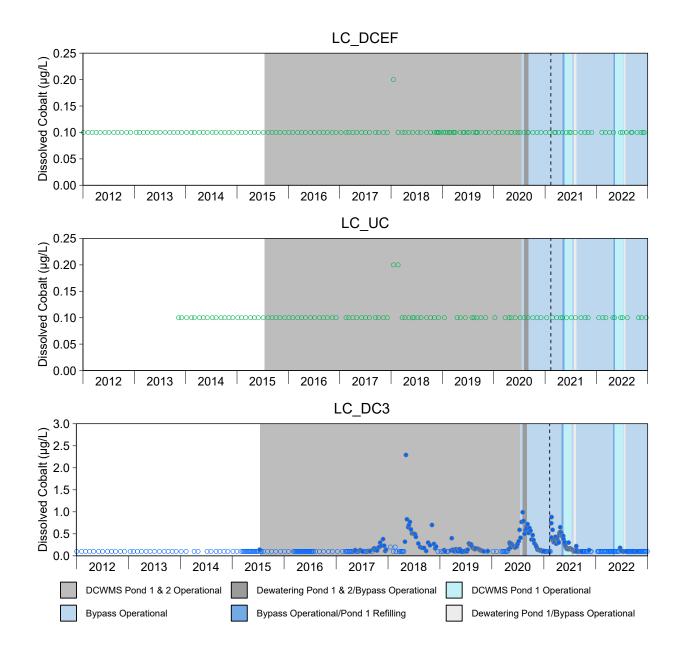


Figure C.6: Time Series Plots for Dissolved Cobalt from LCO Dry Creek LAEMP Areas, 2012 to 2022

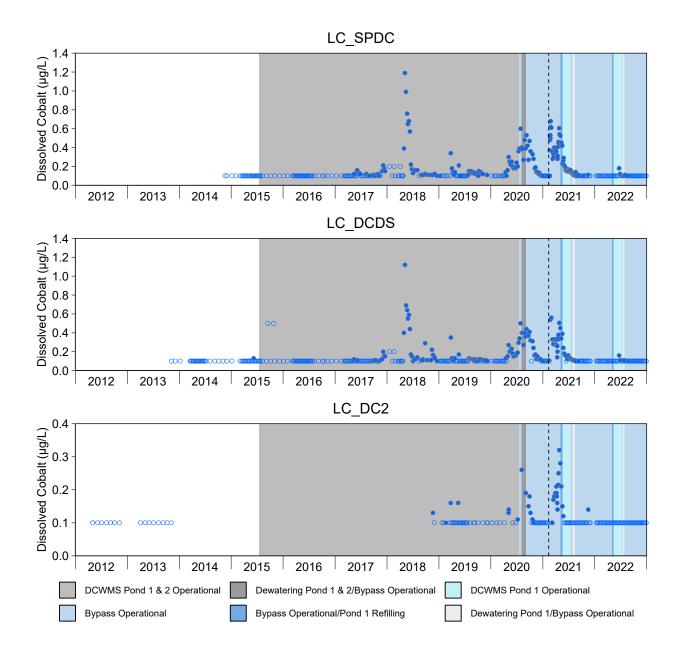


Figure C.6: Time Series Plots for Dissolved Cobalt from LCO Dry Creek LAEMP Areas, 2012 to 2022

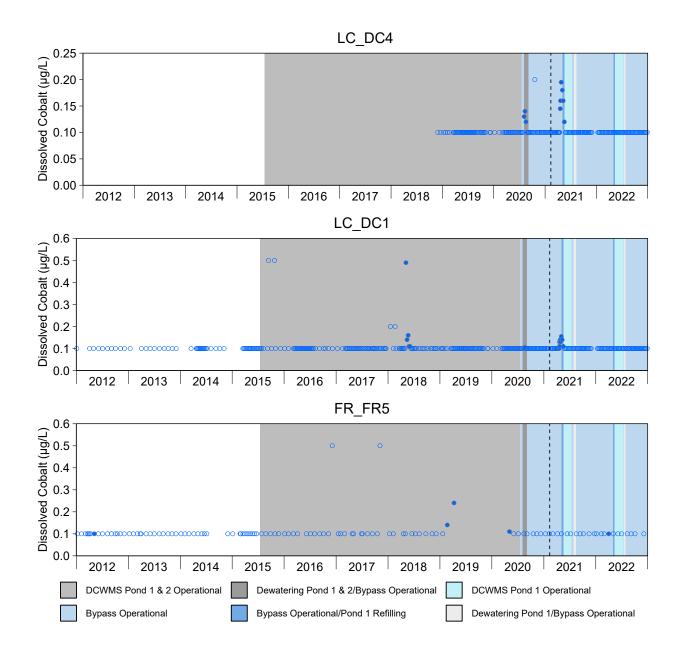


Figure C.6: Time Series Plots for Dissolved Cobalt from LCO Dry Creek LAEMP Areas, 2012 to 2022

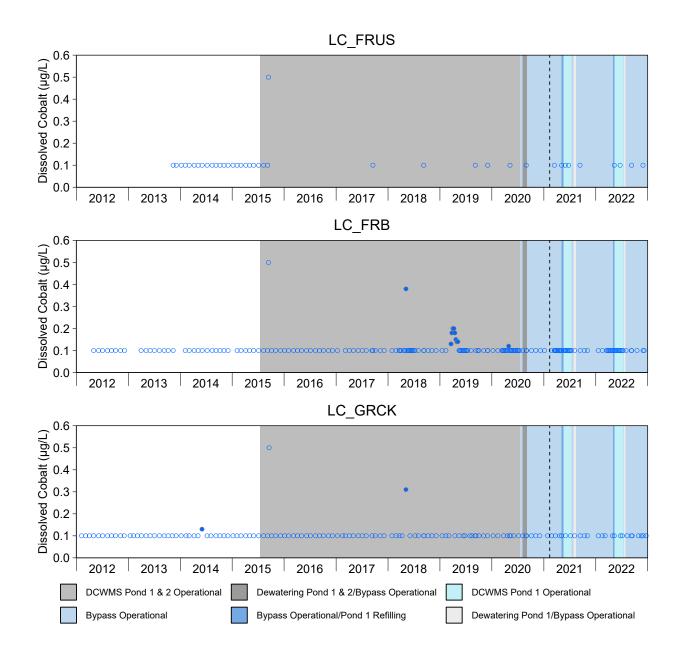


Figure C.6: Time Series Plots for Dissolved Cobalt from LCO Dry Creek LAEMP Areas, 2012 to 2022

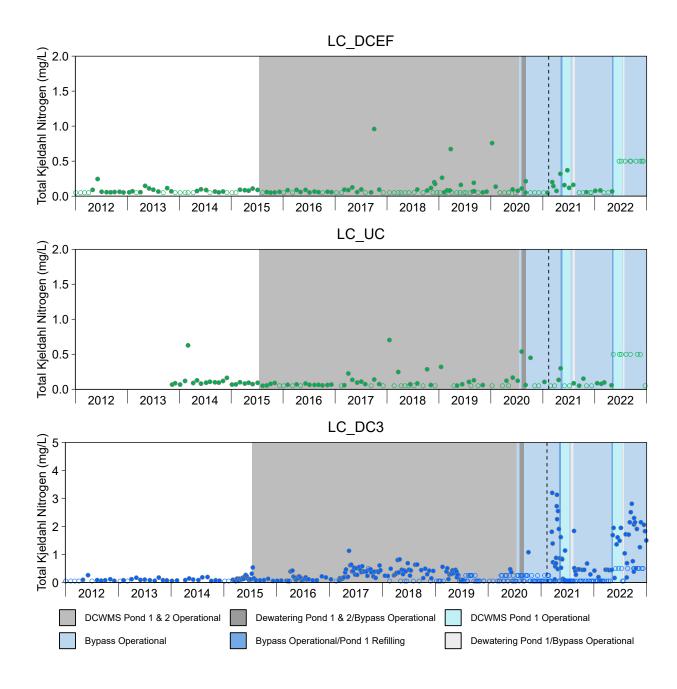


Figure C.7: Time Series Plots for Total Kjeldahl Nitrogen from LCO Dry Creek LAEMP Areas, 2012 to 2022

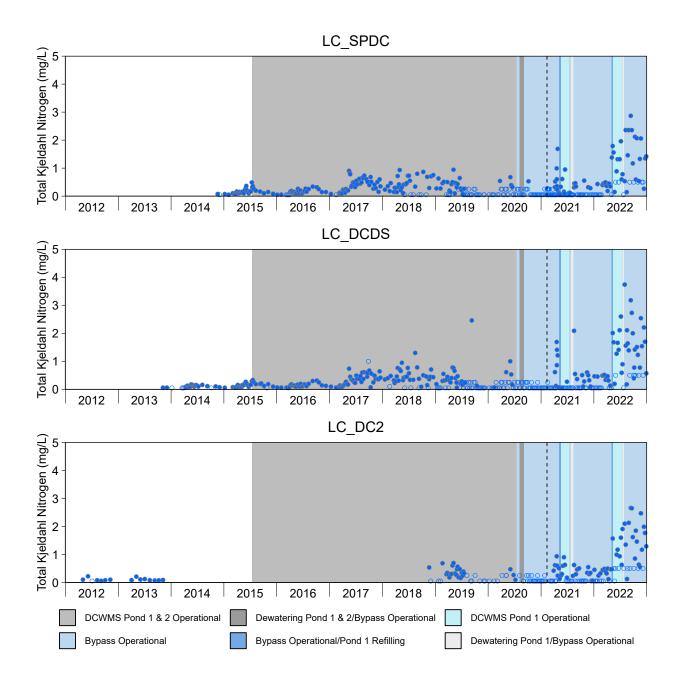


Figure C.7: Time Series Plots for Total Kjeldahl Nitrogen from LCO Dry Creek LAEMP Areas, 2012 to 2022

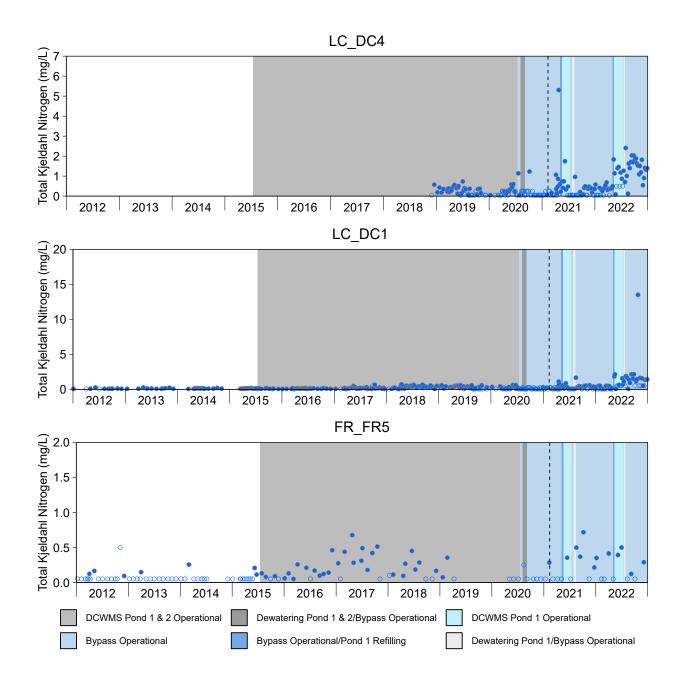


Figure C.7: Time Series Plots for Total Kjeldahl Nitrogen from LCO Dry Creek LAEMP Areas, 2012 to 2022

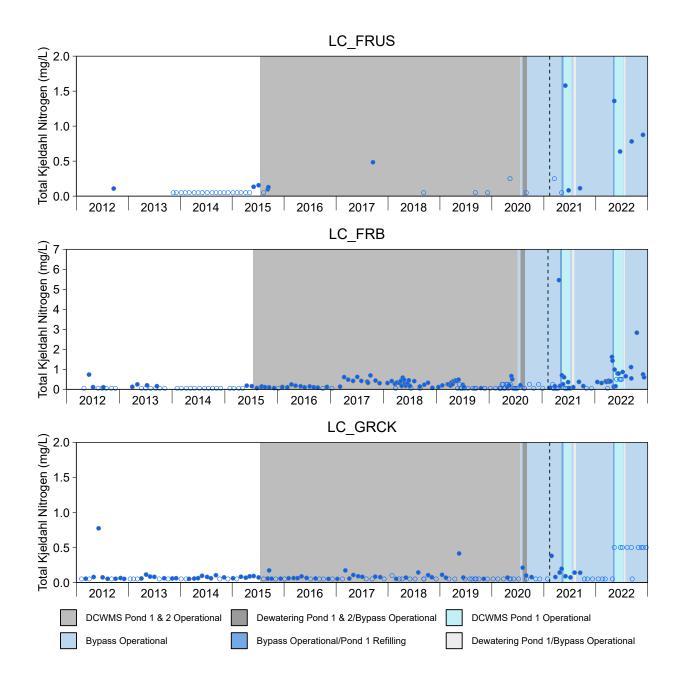


Figure C.7: Time Series Plots for Total Kjeldahl Nitrogen from LCO Dry Creek LAEMP Areas, 2012 to 2022

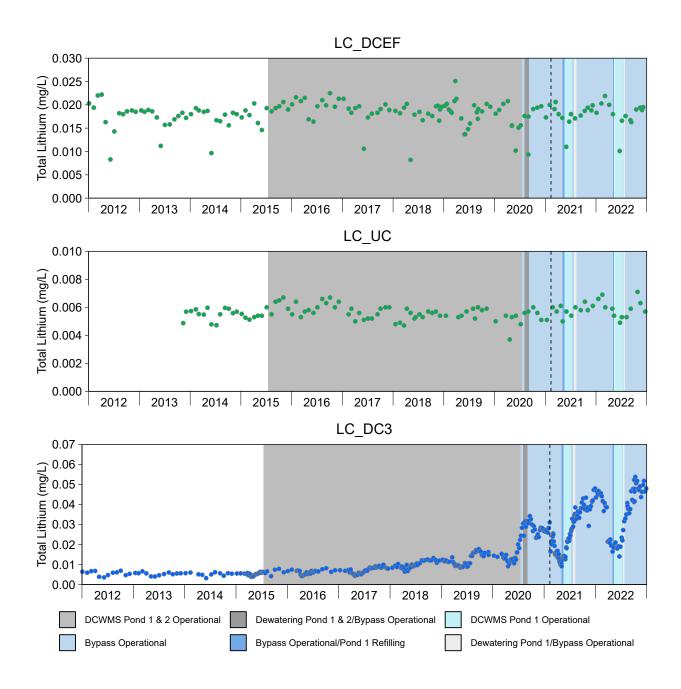


Figure C.8: Time Series Plots for Total Lithium from LCO Dry Creek LAEMP Areas, 2012 to 2022

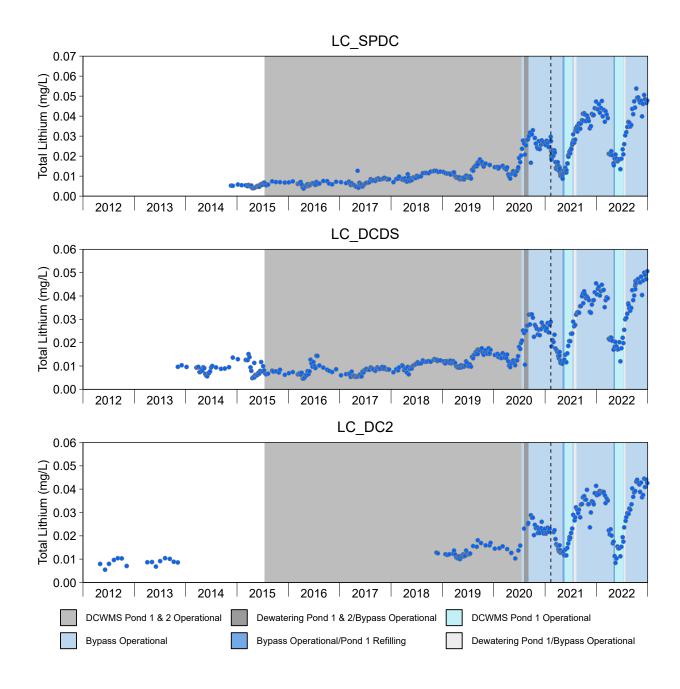


Figure C.8: Time Series Plots for Total Lithium from LCO Dry Creek LAEMP Areas, 2012 to 2022

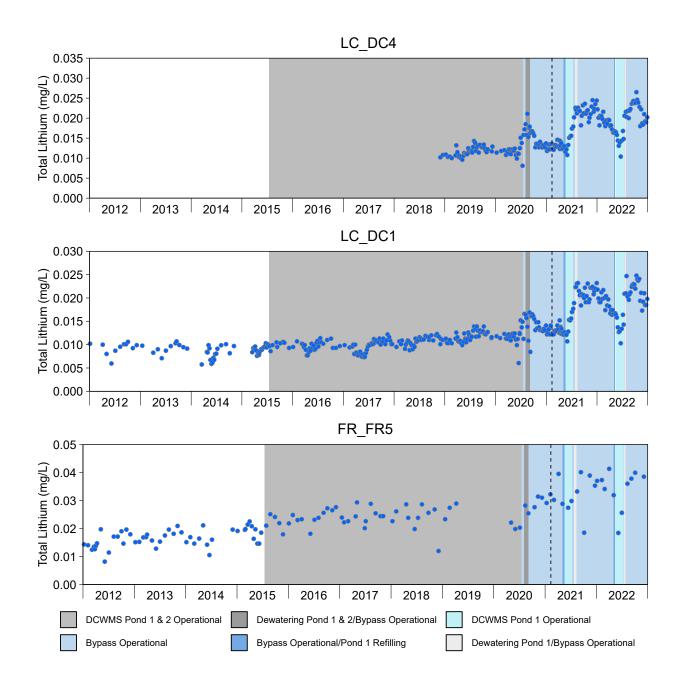


Figure C.8: Time Series Plots for Total Lithium from LCO Dry Creek LAEMP Areas, 2012 to 2022

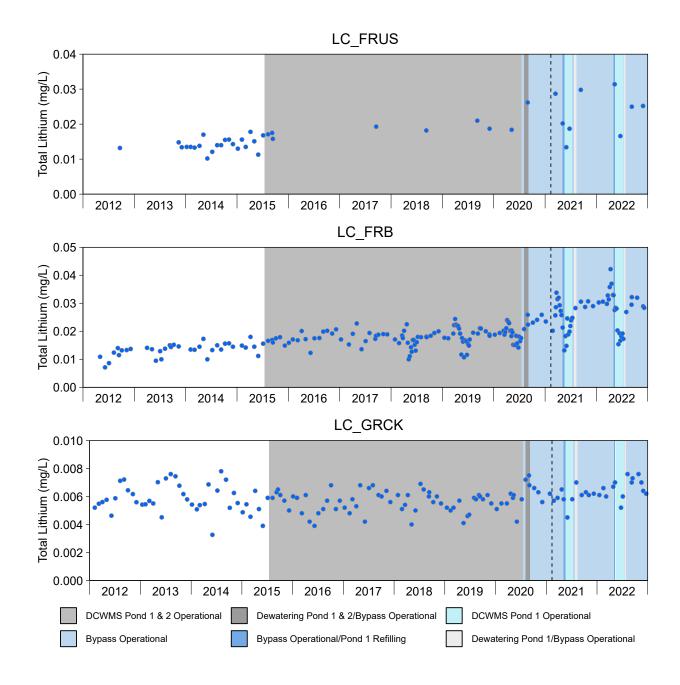


Figure C.8: Time Series Plots for Total Lithium from LCO Dry Creek LAEMP Areas, 2012 to 2022

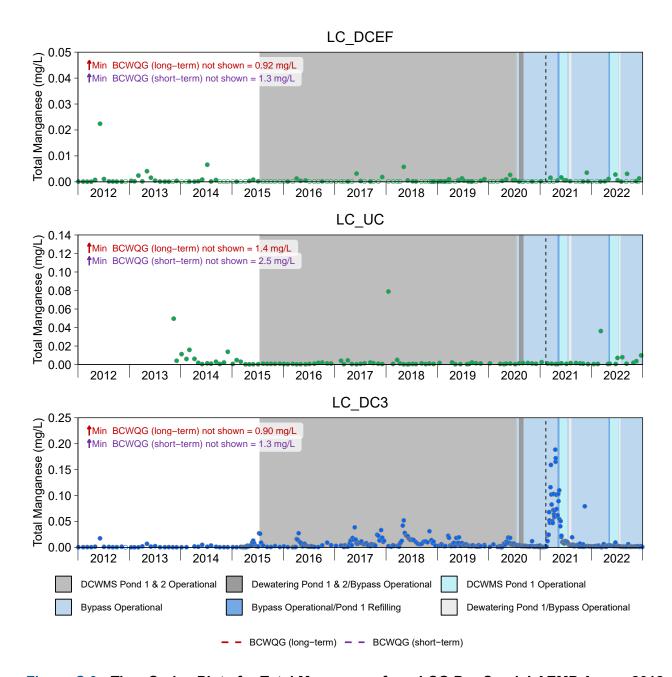


Figure C.9: Time Series Plots for Total Manganese from LCO Dry Creek LAEMP Areas, 2012 to 2022

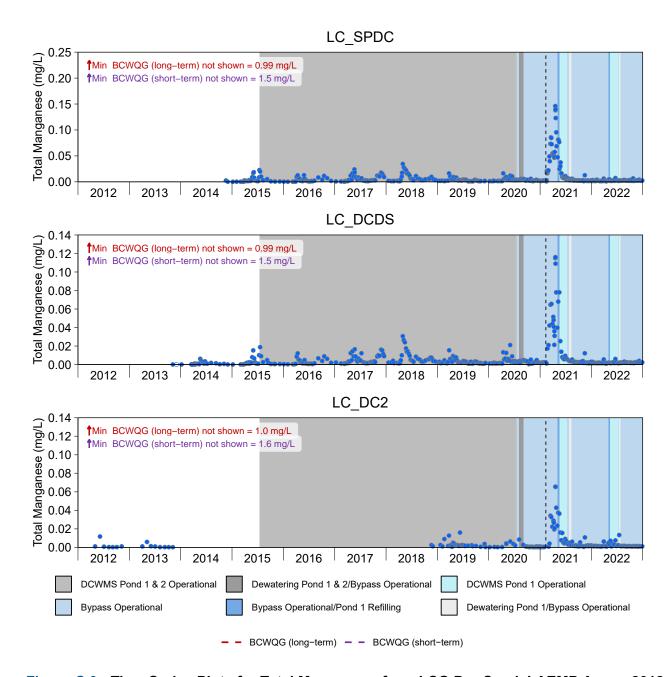


Figure C.9: Time Series Plots for Total Manganese from LCO Dry Creek LAEMP Areas, 2012 to 2022

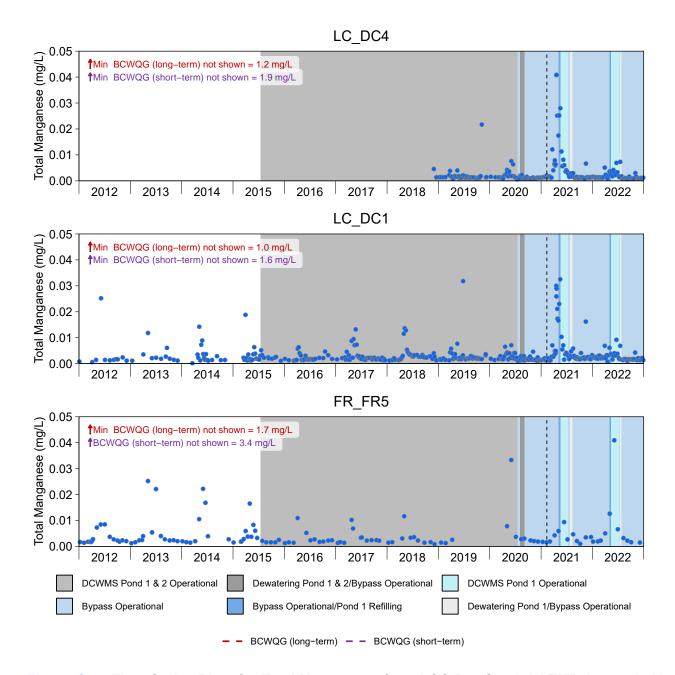


Figure C.9: Time Series Plots for Total Manganese from LCO Dry Creek LAEMP Areas, 2012 to 2022

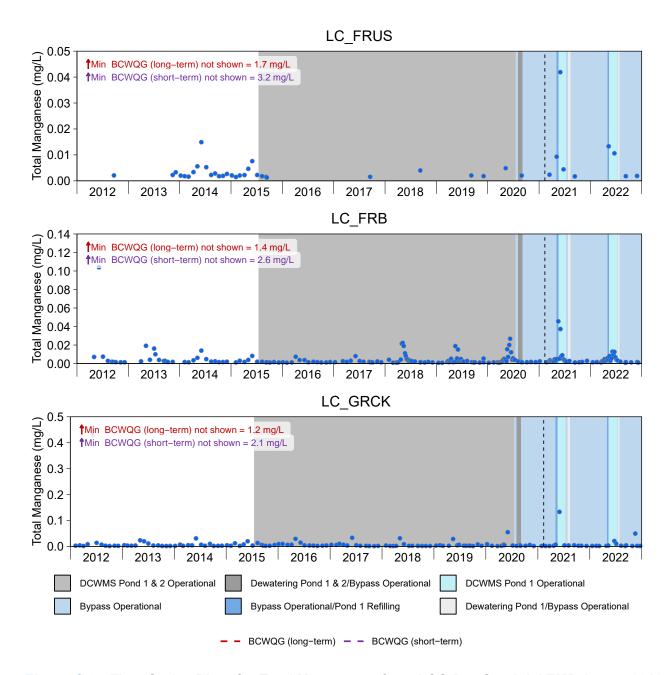


Figure C.9: Time Series Plots for Total Manganese from LCO Dry Creek LAEMP Areas, 2012 to 2022

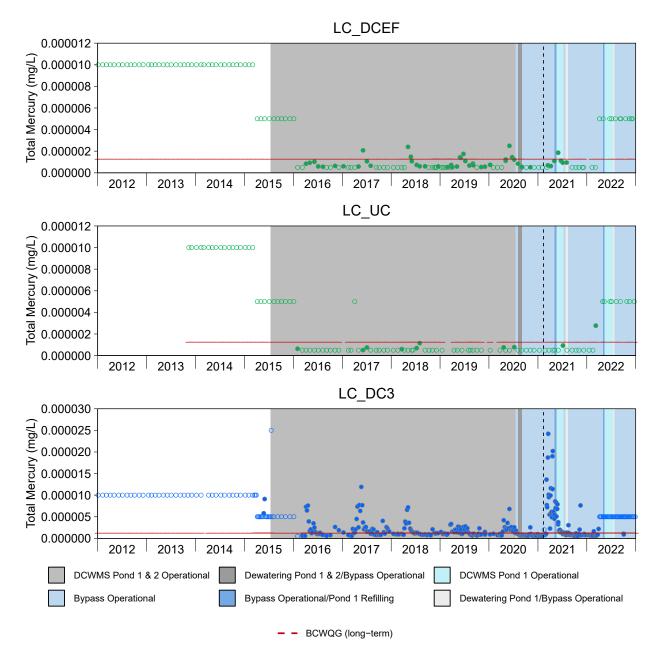


Figure C.10: Time Series Plots for Total Mercury from LCO Dry Creek LAEMP Areas, 2012 to 2022

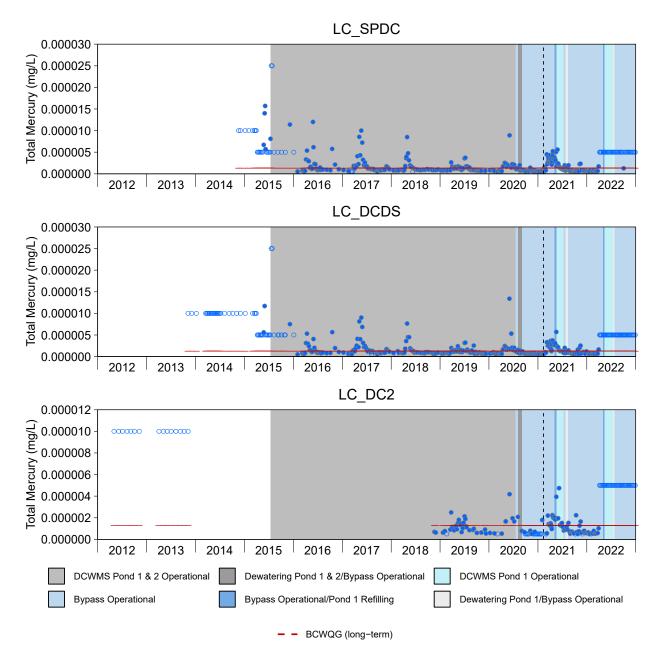


Figure C.10: Time Series Plots for Total Mercury from LCO Dry Creek LAEMP Areas, 2012 to 2022

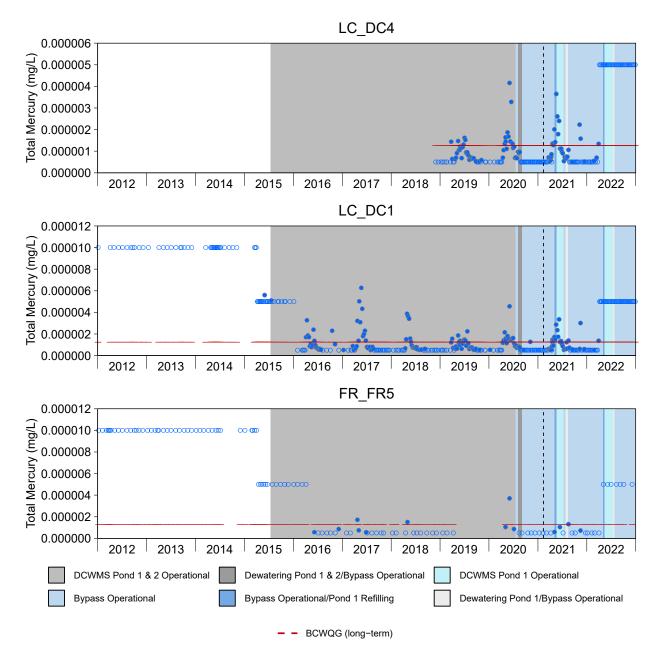


Figure C.10: Time Series Plots for Total Mercury from LCO Dry Creek LAEMP Areas, 2012 to 2022

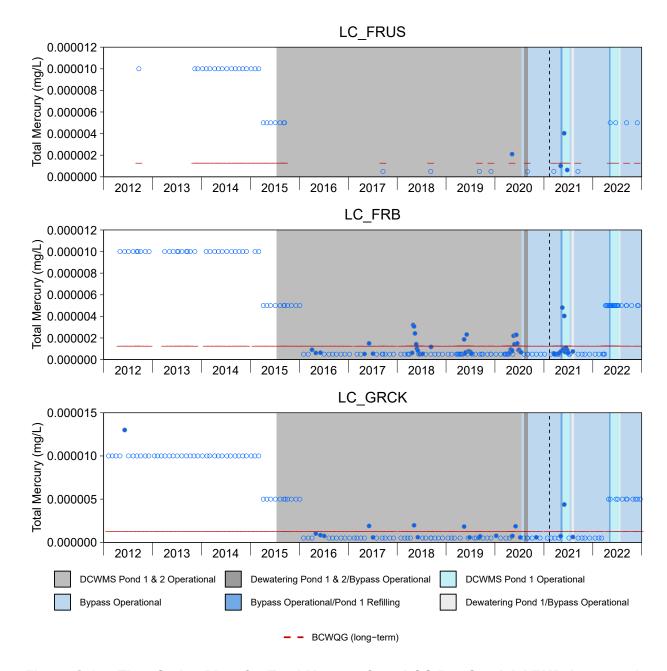


Figure C.10: Time Series Plots for Total Mercury from LCO Dry Creek LAEMP Areas, 2012 to 2022

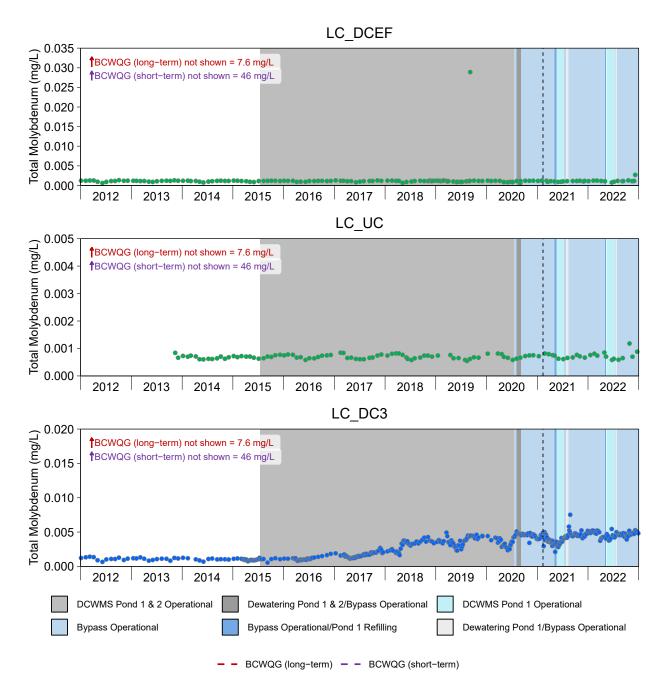


Figure C.11: Time Series Plots for Total Molybdenum from LCO Dry Creek LAEMP Areas, 2012 to 2022

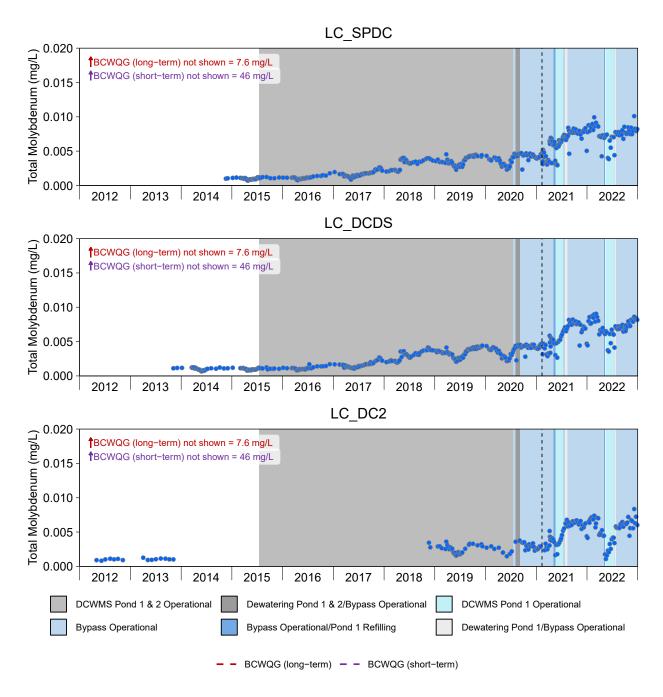


Figure C.11: Time Series Plots for Total Molybdenum from LCO Dry Creek LAEMP Areas, 2012 to 2022

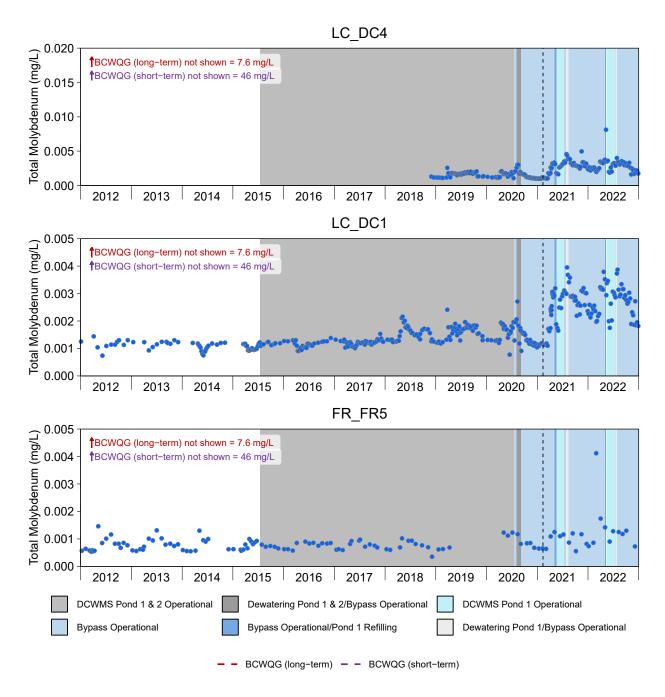


Figure C.11: Time Series Plots for Total Molybdenum from LCO Dry Creek LAEMP Areas, 2012 to 2022

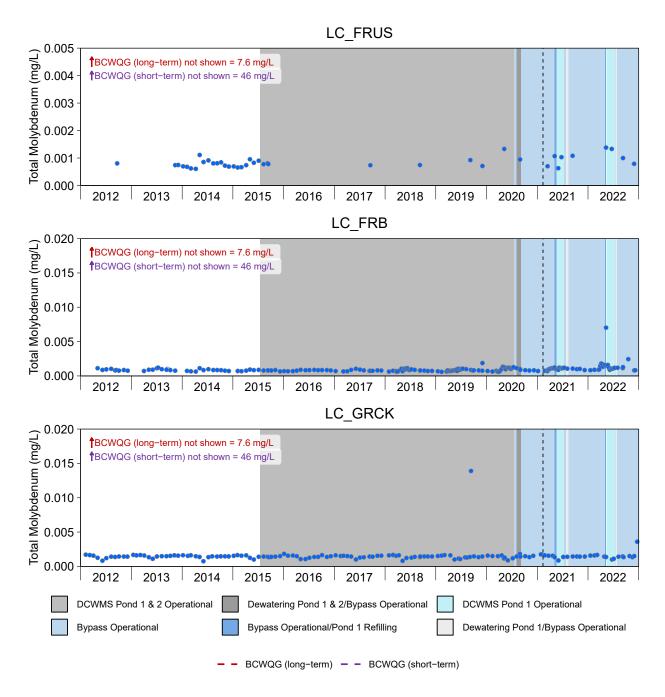


Figure C.11: Time Series Plots for Total Molybdenum from LCO Dry Creek LAEMP Areas, 2012 to 2022

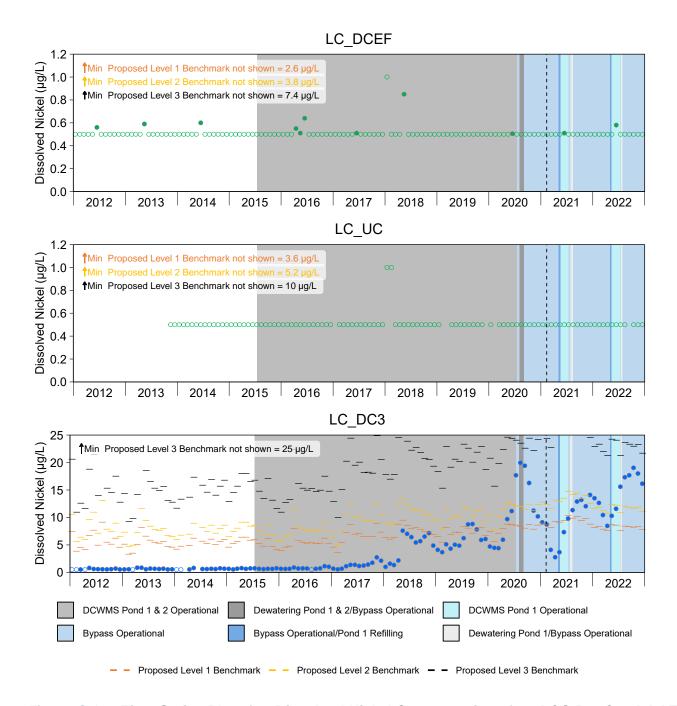


Figure C.12: Time Series Plots for Dissolved Nickel Concentrations from LCO Dry Creek LAEMP Areas, 2012 to 2022

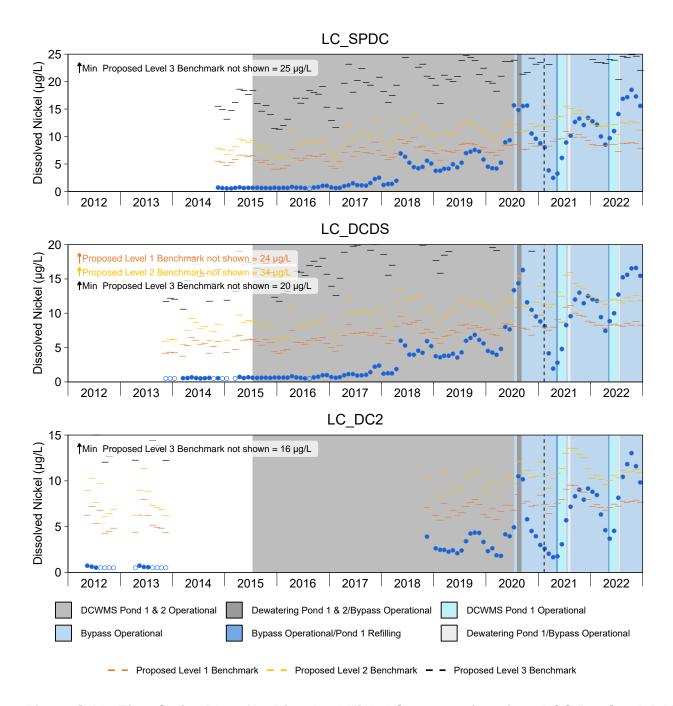


Figure C.12: Time Series Plots for Dissolved Nickel Concentrations from LCO Dry Creek LAEMP Areas, 2012 to 2022

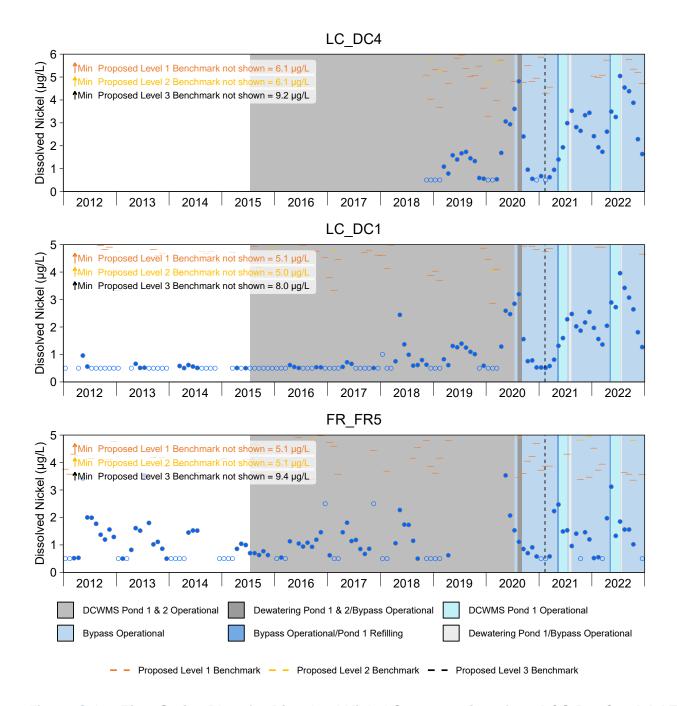


Figure C.12: Time Series Plots for Dissolved Nickel Concentrations from LCO Dry Creek LAEMP Areas, 2012 to 2022

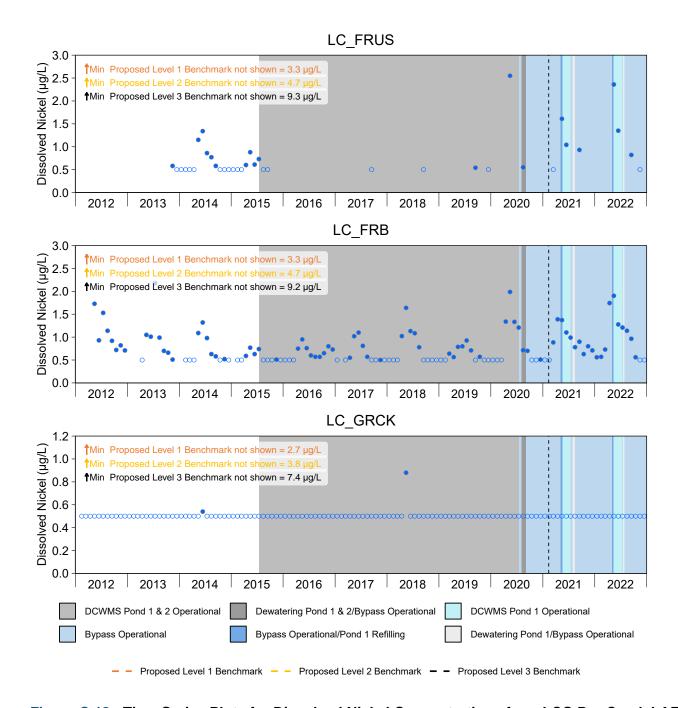


Figure C.12: Time Series Plots for Dissolved Nickel Concentrations from LCO Dry Creek LAEMP Areas, 2012 to 2022

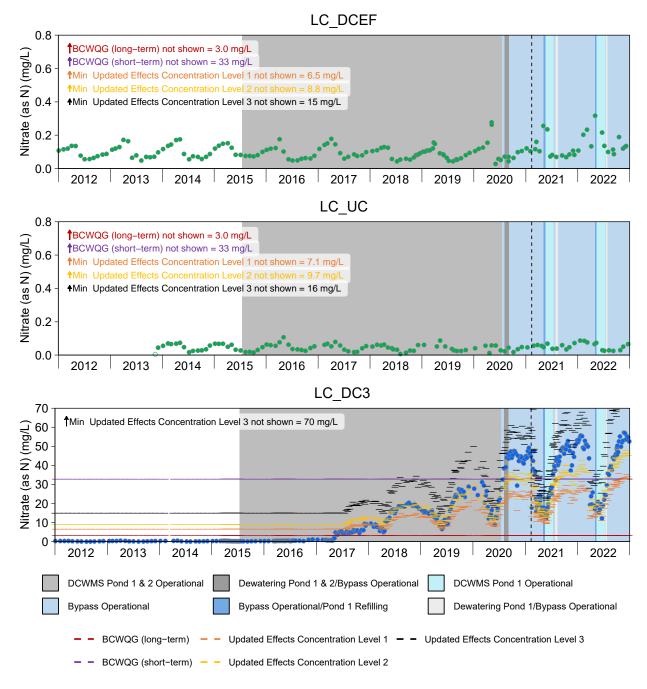


Figure C.13: Time Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022

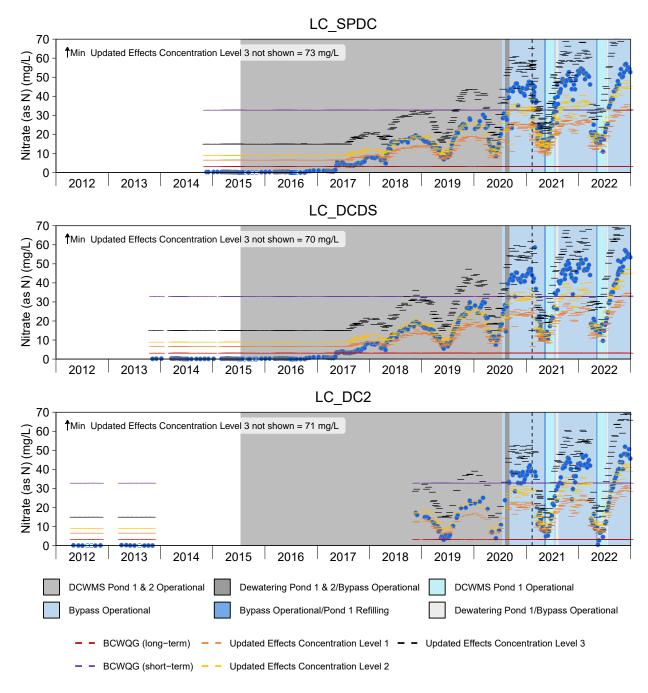


Figure C.13: Time Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022

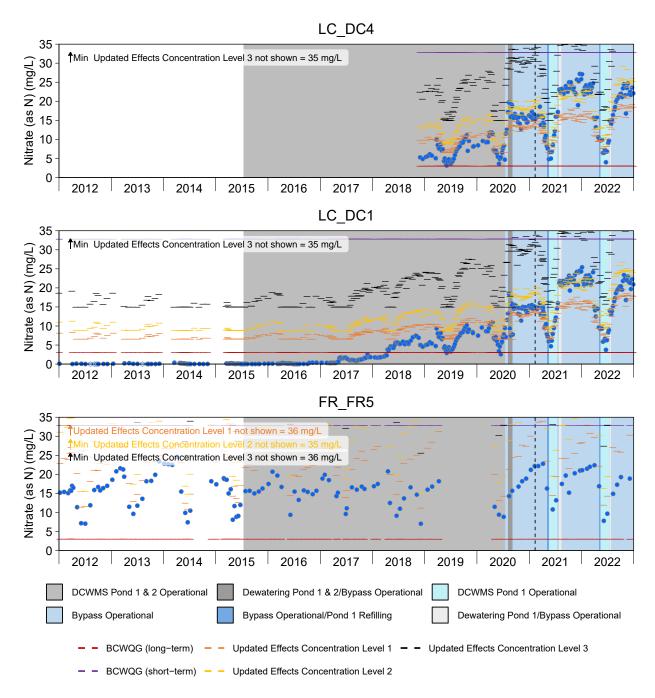


Figure C.13: Time Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022

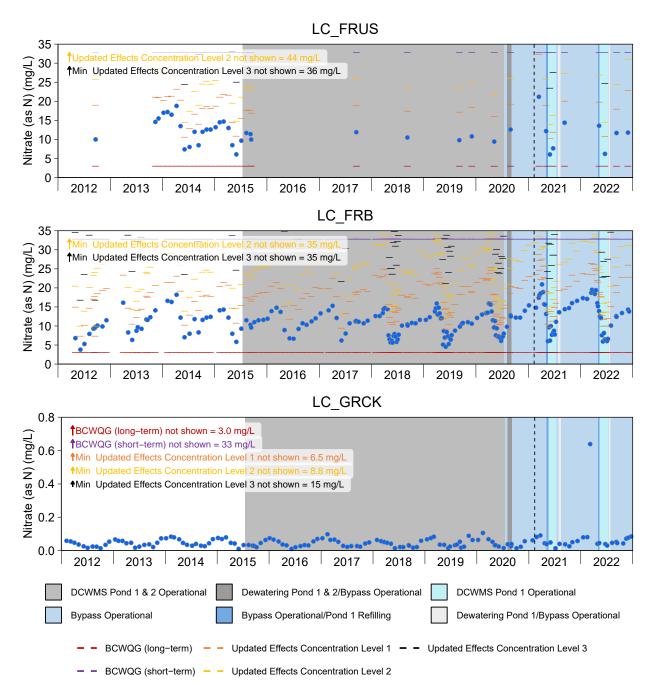


Figure C.13: Time Series Plots for Nitrate from LCO Dry Creek LAEMP Areas, 2012 to 2022

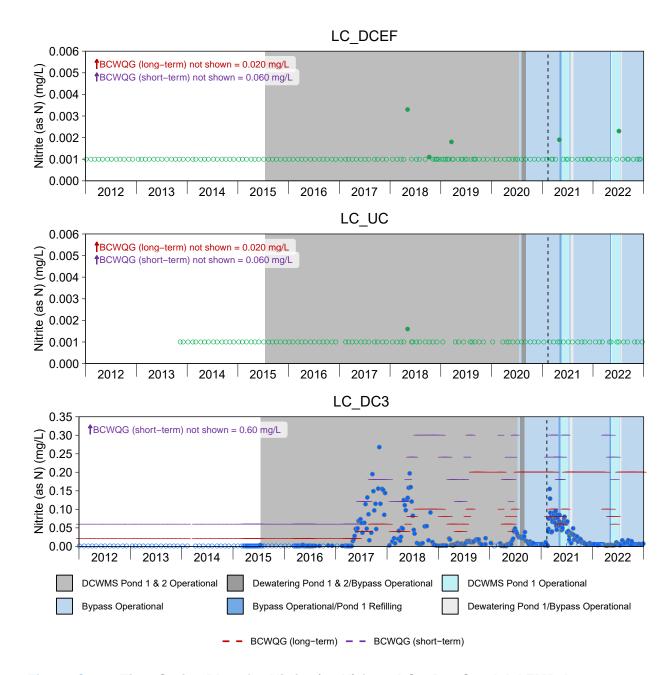


Figure C.14: Time Series Plots for Nitrite (as N) from LCO Dry Creek LAEMP Areas, 2012 to 2022

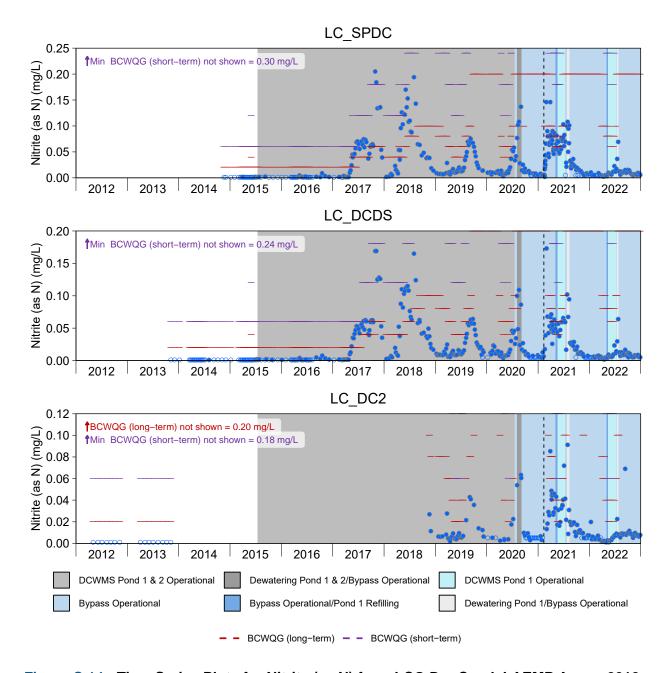


Figure C.14: Time Series Plots for Nitrite (as N) from LCO Dry Creek LAEMP Areas, 2012 to 2022

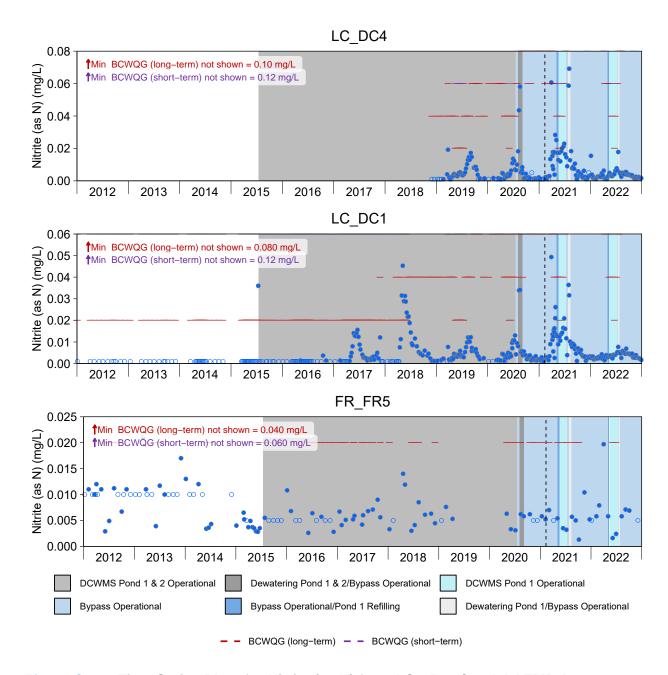


Figure C.14: Time Series Plots for Nitrite (as N) from LCO Dry Creek LAEMP Areas, 2012 to 2022

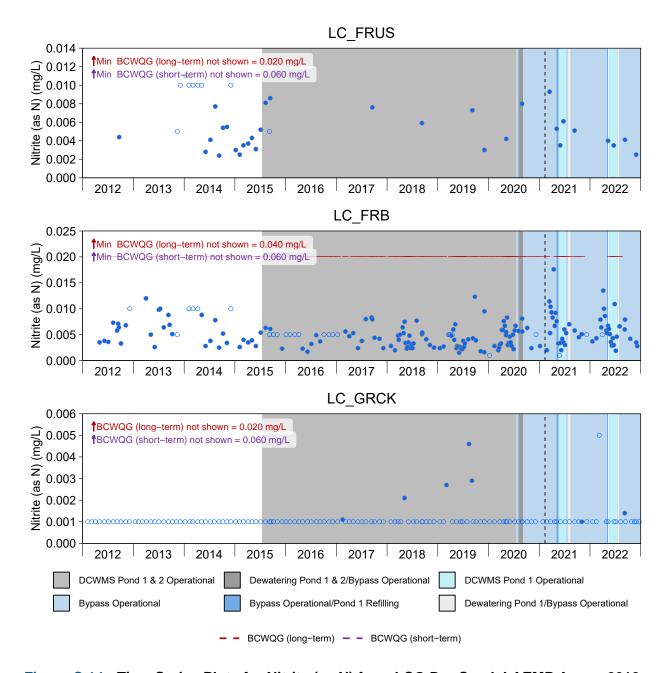


Figure C.14: Time Series Plots for Nitrite (as N) from LCO Dry Creek LAEMP Areas, 2012 to 2022

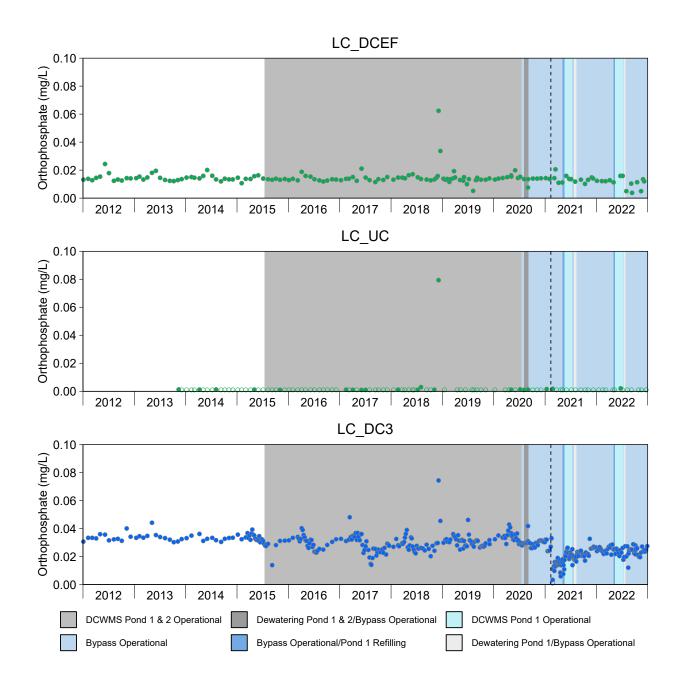


Figure C.15: Time Series Plots for Orthophosphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

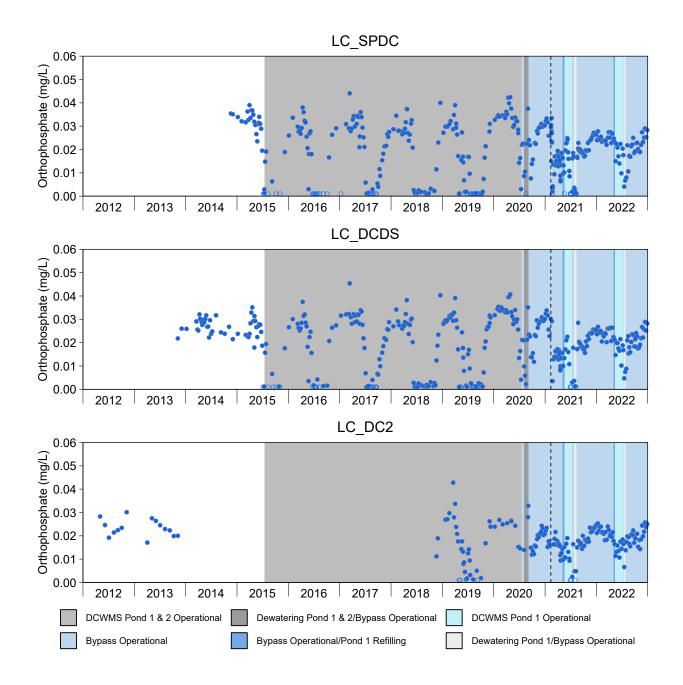


Figure C.15: Time Series Plots for Orthophosphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

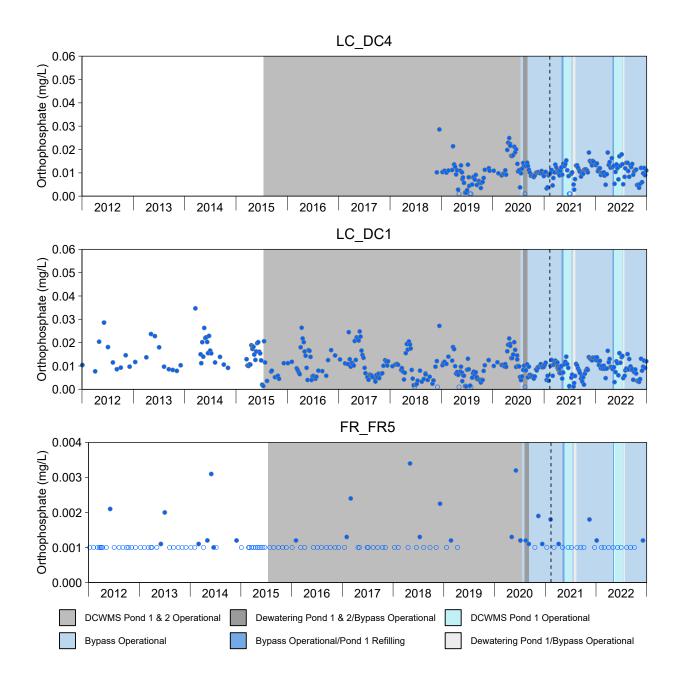


Figure C.15: Time Series Plots for Orthophosphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

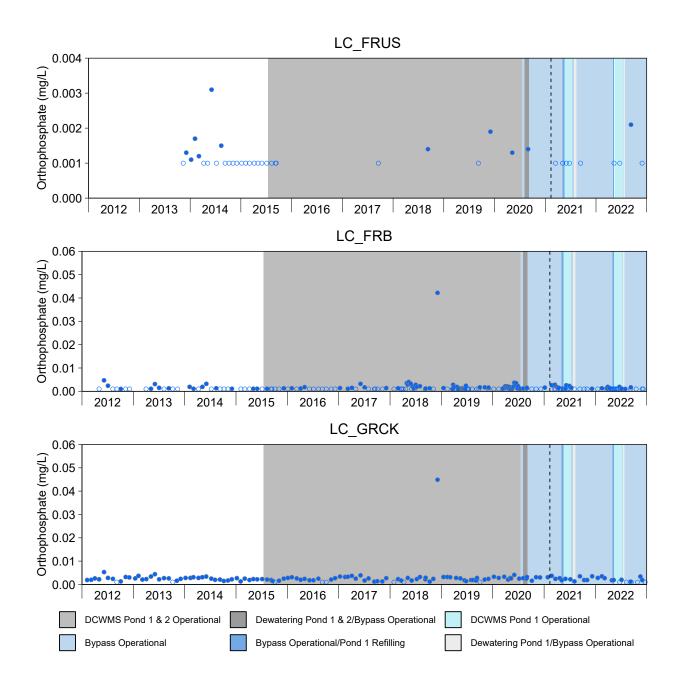


Figure C.15: Time Series Plots for Orthophosphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

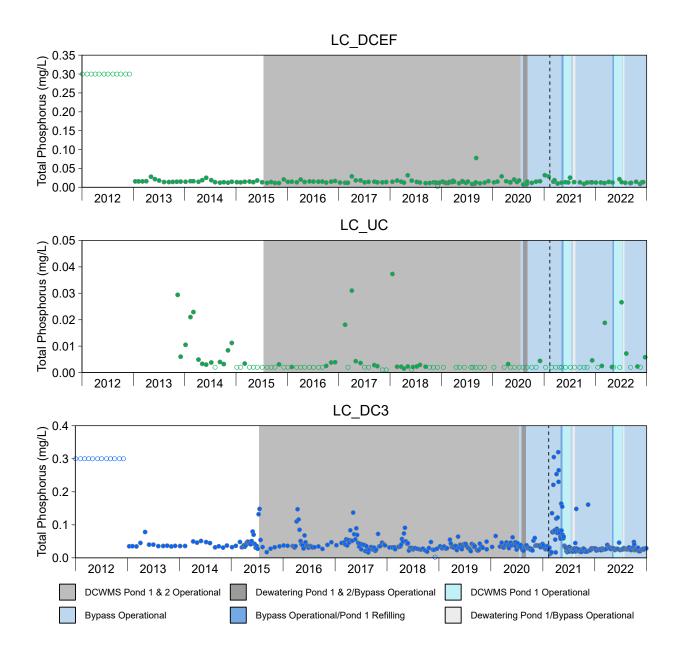


Figure C.16: Time Series Plots for Phosphorus from LCO Dry Creek LAEMP Areas, 2012 to 2022

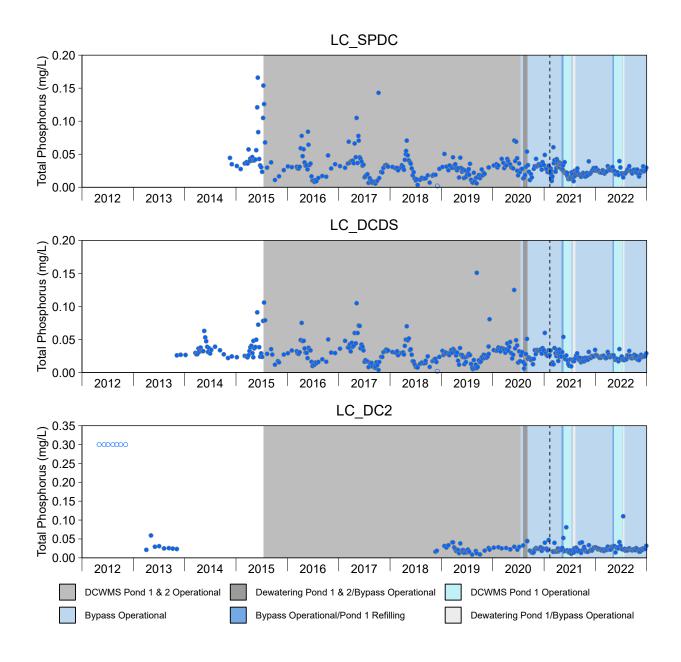


Figure C.16: Time Series Plots for Phosphorus from LCO Dry Creek LAEMP Areas, 2012 to 2022

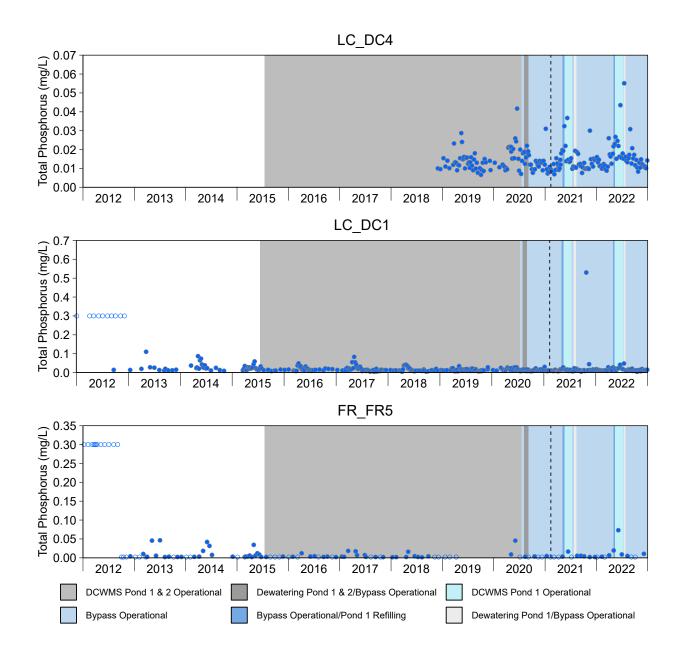


Figure C.16: Time Series Plots for Phosphorus from LCO Dry Creek LAEMP Areas, 2012 to 2022

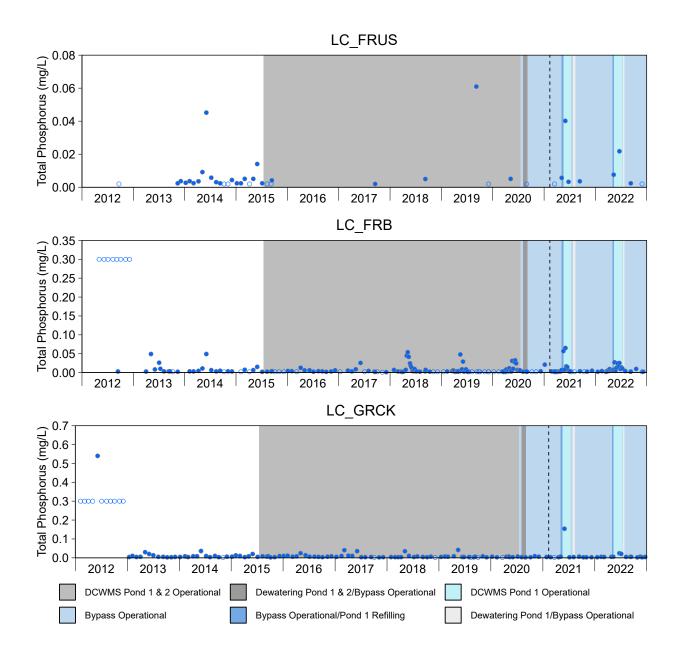


Figure C.16: Time Series Plots for Phosphorus from LCO Dry Creek LAEMP Areas, 2012 to 2022

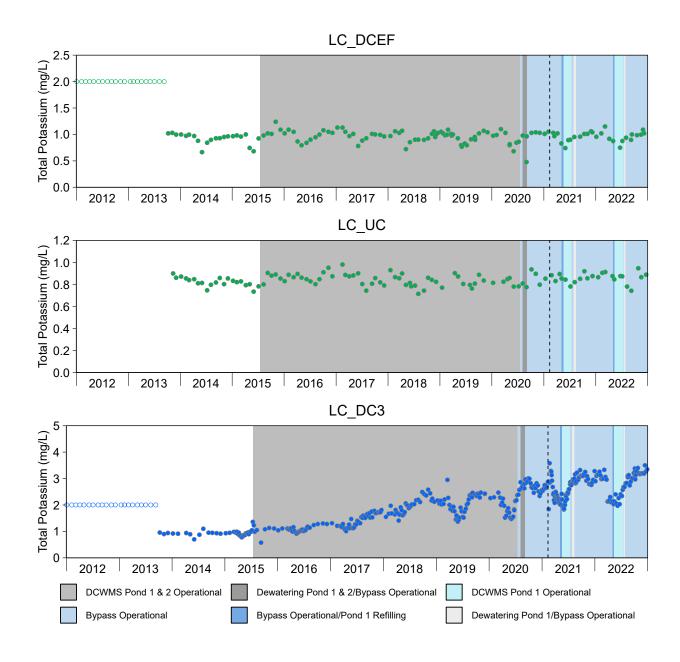


Figure C.17: Time Series Plots for Total Potassium from LCO Dry Creek LAEMP Areas, 2012 to 2022

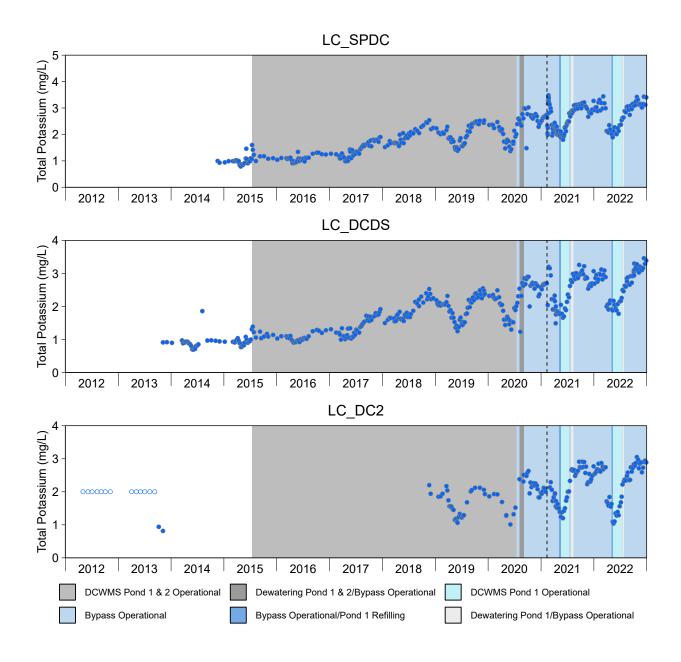


Figure C.17: Time Series Plots for Total Potassium from LCO Dry Creek LAEMP Areas, 2012 to 2022

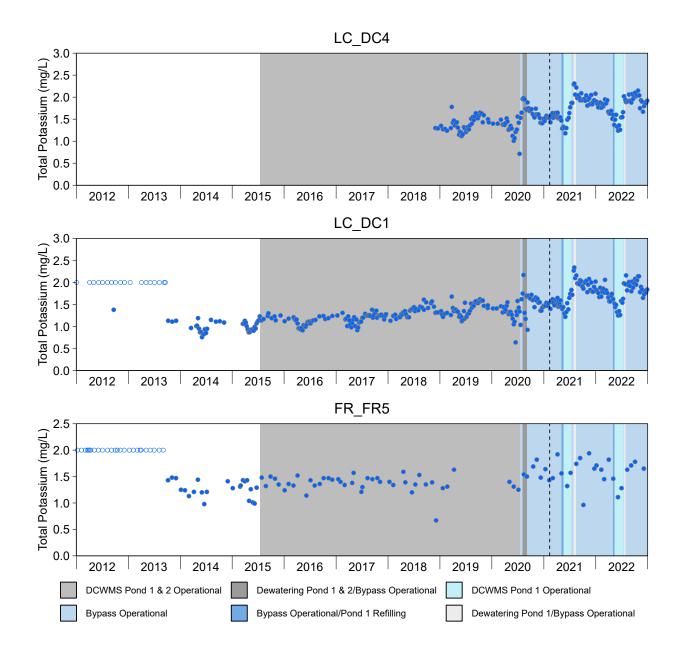


Figure C.17: Time Series Plots for Total Potassium from LCO Dry Creek LAEMP Areas, 2012 to 2022

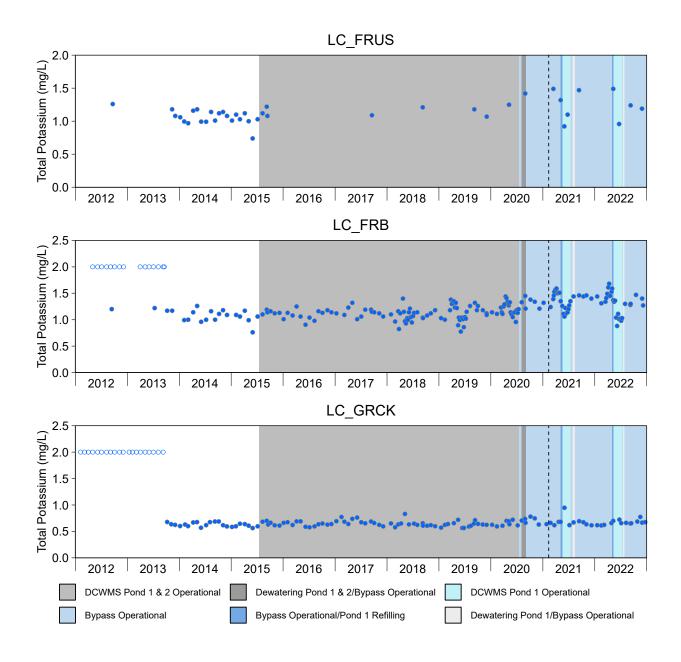


Figure C.17: Time Series Plots for Total Potassium from LCO Dry Creek LAEMP Areas, 2012 to 2022

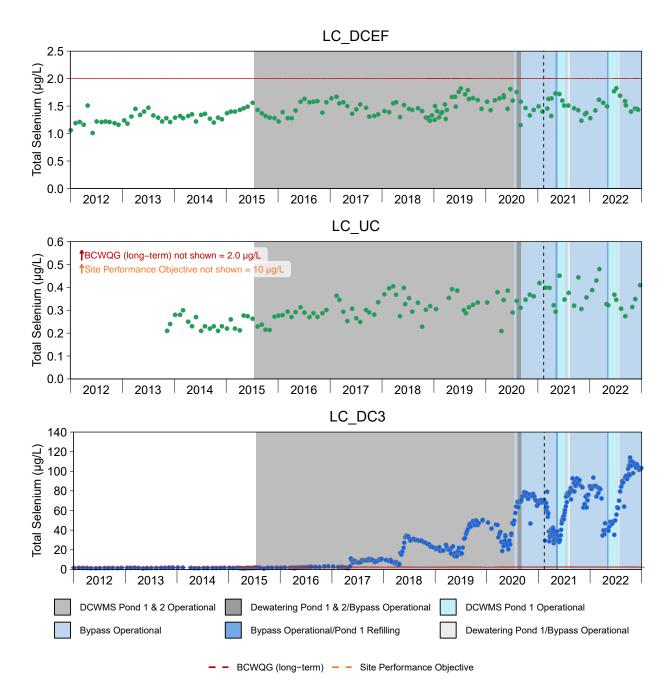


Figure C.18: Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022

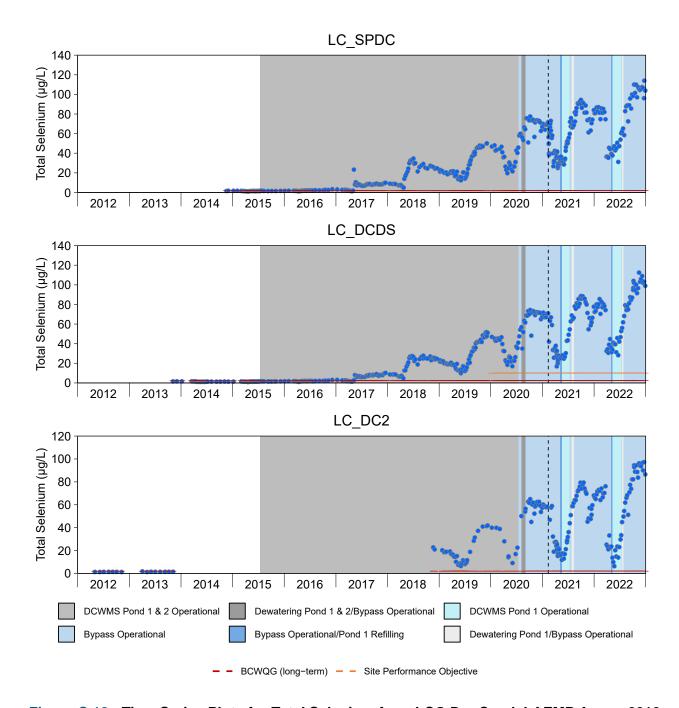


Figure C.18: Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022

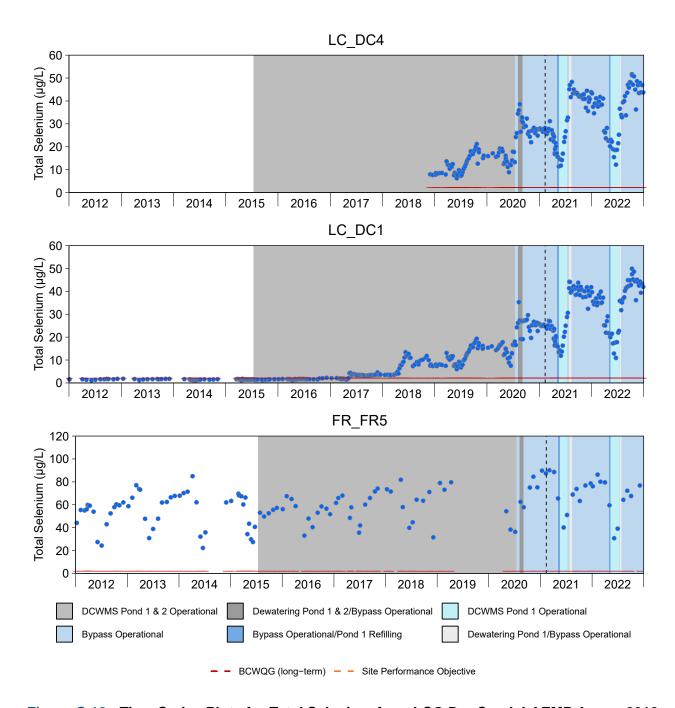


Figure C.18: Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022

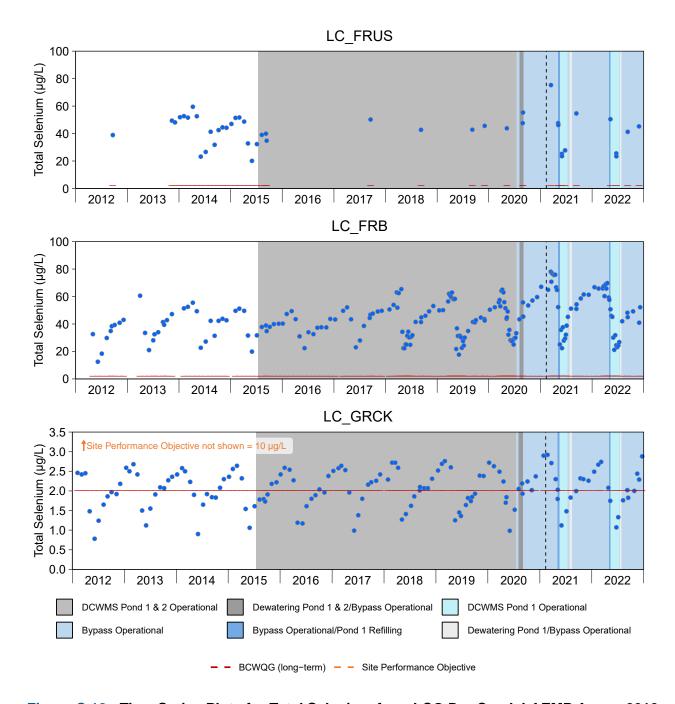


Figure C.18: Time Series Plots for Total Selenium from LCO Dry Creek LAEMP Areas, 2012 to 2022

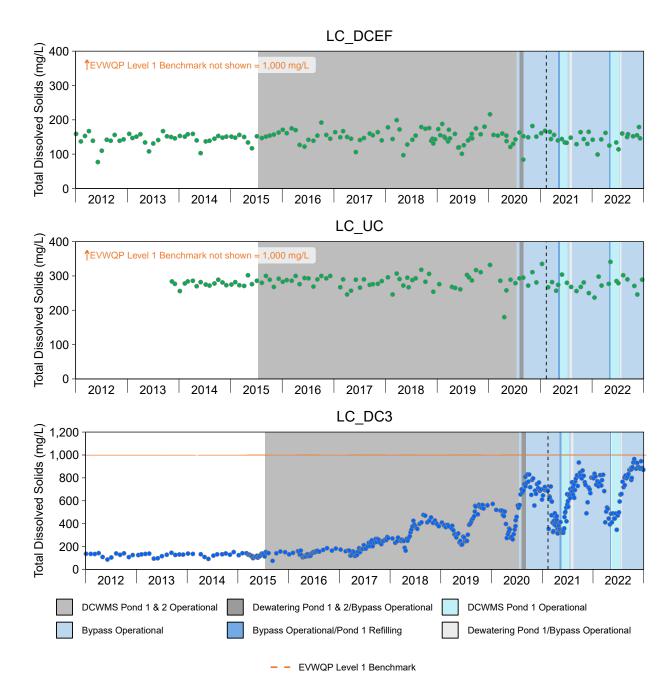


Figure C.19: Time Series Plots for Total Dissolved Solids from LCO Dry Creek LAEMP Areas, 2012 to 2022

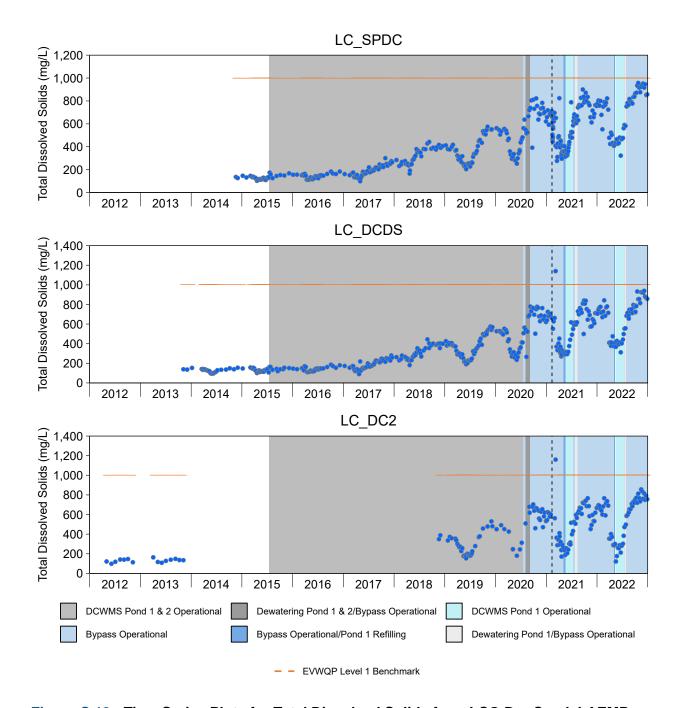


Figure C.19: Time Series Plots for Total Dissolved Solids from LCO Dry Creek LAEMP Areas, 2012 to 2022

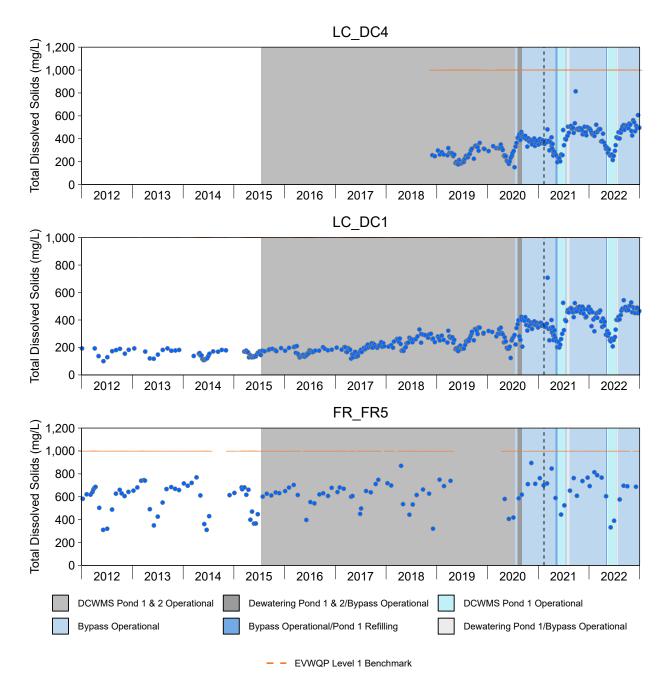


Figure C.19: Time Series Plots for Total Dissolved Solids from LCO Dry Creek LAEMP Areas, 2012 to 2022

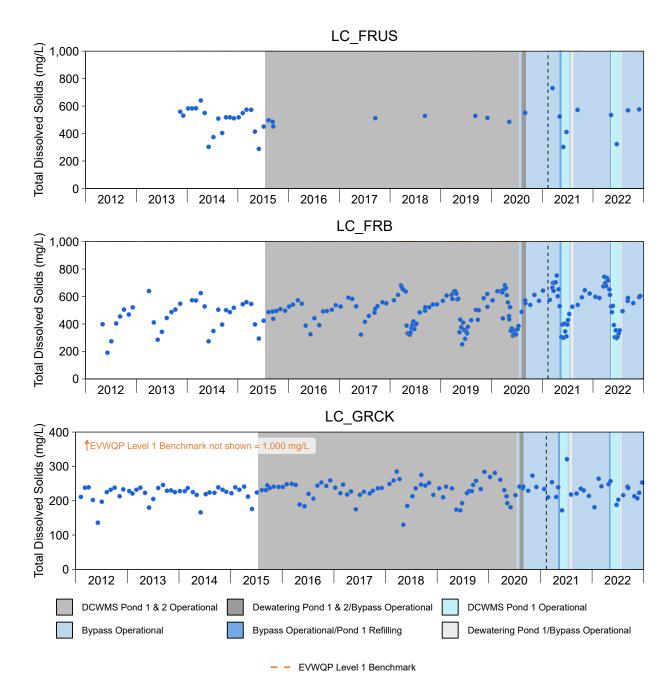


Figure C.19: Time Series Plots for Total Dissolved Solids from LCO Dry Creek LAEMP Areas, 2012 to 2022

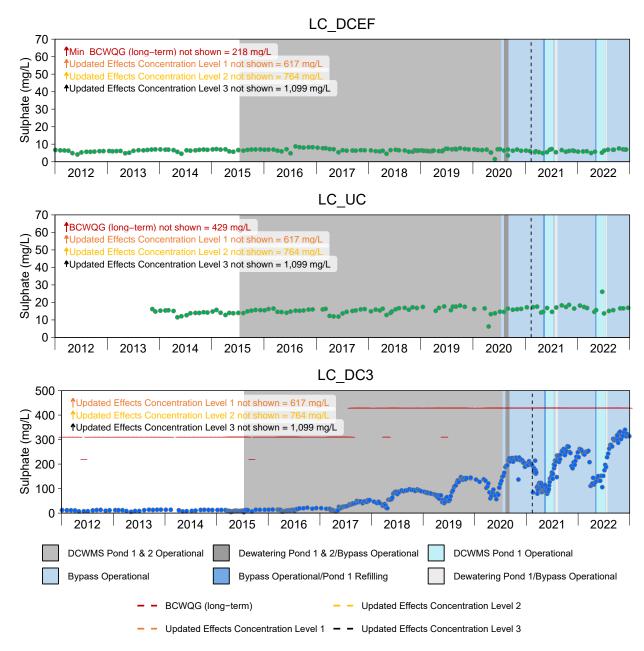


Figure C.20: Time Series Plots for Sulphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

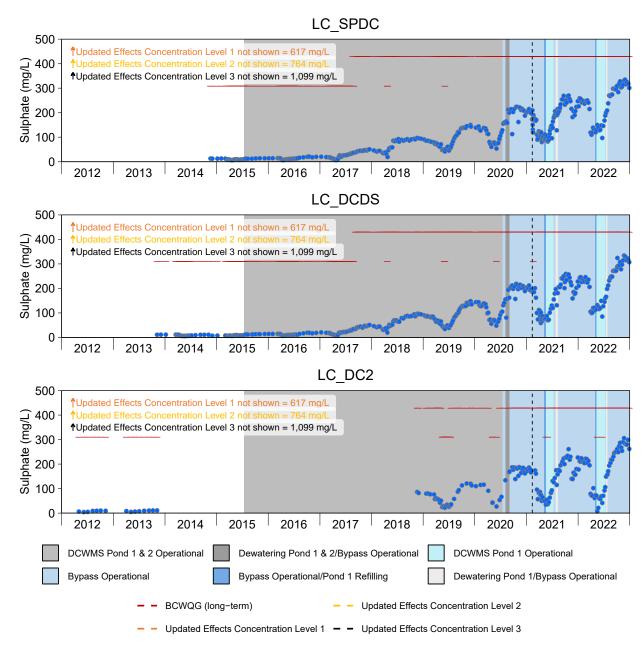


Figure C.20: Time Series Plots for Sulphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

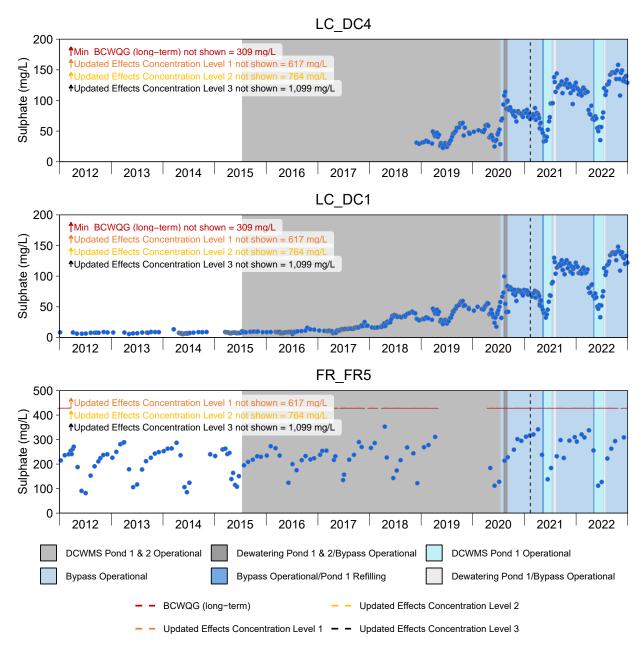


Figure C.20: Time Series Plots for Sulphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green data points are used for reference sites and blue data points are used for mine—exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine—related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Guidelines are dependent on water hardness. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal.

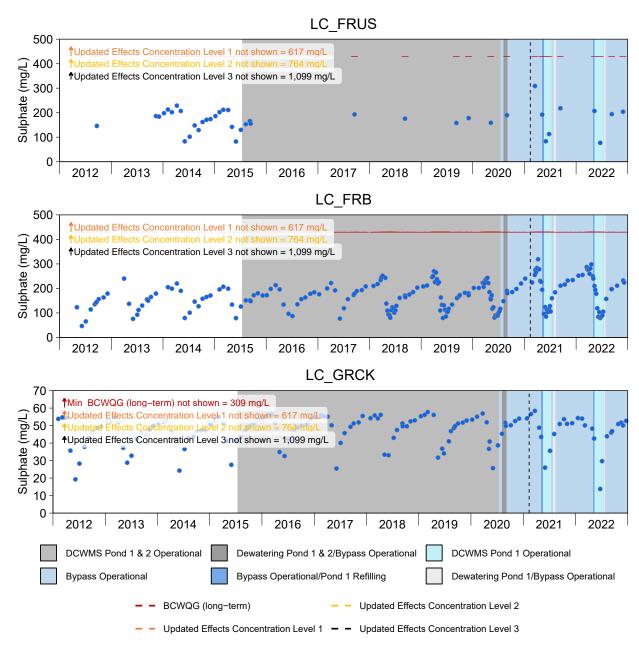


Figure C.20: Time Series Plots for Sulphate from LCO Dry Creek LAEMP Areas, 2012 to 2022

Notes: BCWQG = British Columbia Water Quality Guideline (BCMOECCS 2021a,b). Green data points are used for reference sites and blue data points are used for mine—exposed sites. Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness concentrations. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal. Constituent was plotted because it was identified as a mine—related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). When biological monitoring areas and routine water quality stations were in close proximity to each other and with no additional inputs between them, data collected at the biological monitoring area were combined with routine data and plotted together with the biological monitoring area depicted in parenthesis. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only apply to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1). Guidelines are dependent on water hardness. EVWQP Level 1 Benchmark is shown in plots where the EVWQP Level 1 Benchmark and the BCWQG are equal.

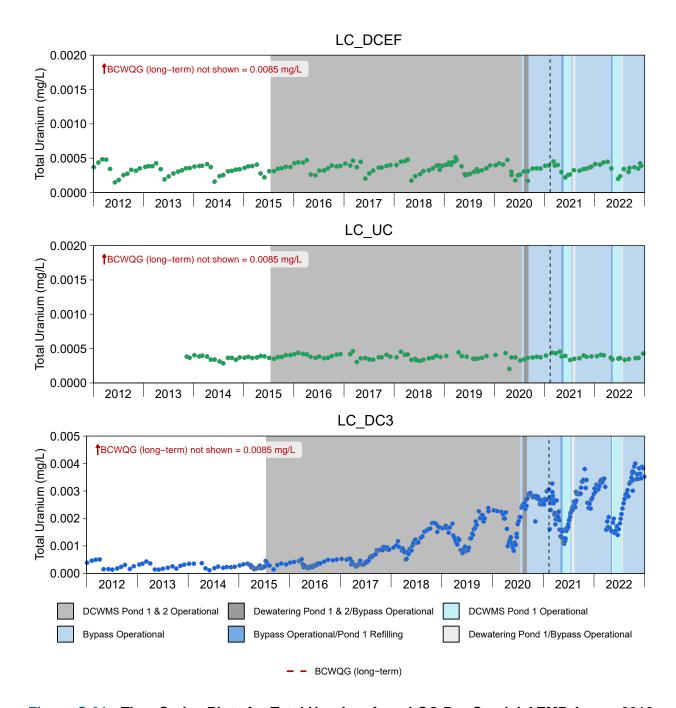


Figure C.21: Time Series Plots for Total Uranium from LCO Dry Creek LAEMP Areas, 2012 to 2022

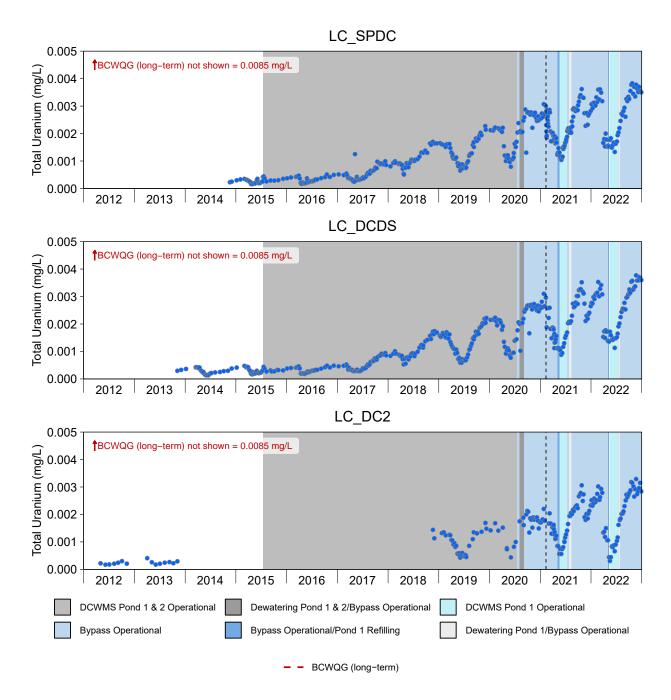


Figure C.21: Time Series Plots for Total Uranium from LCO Dry Creek LAEMP Areas, 2012 to 2022

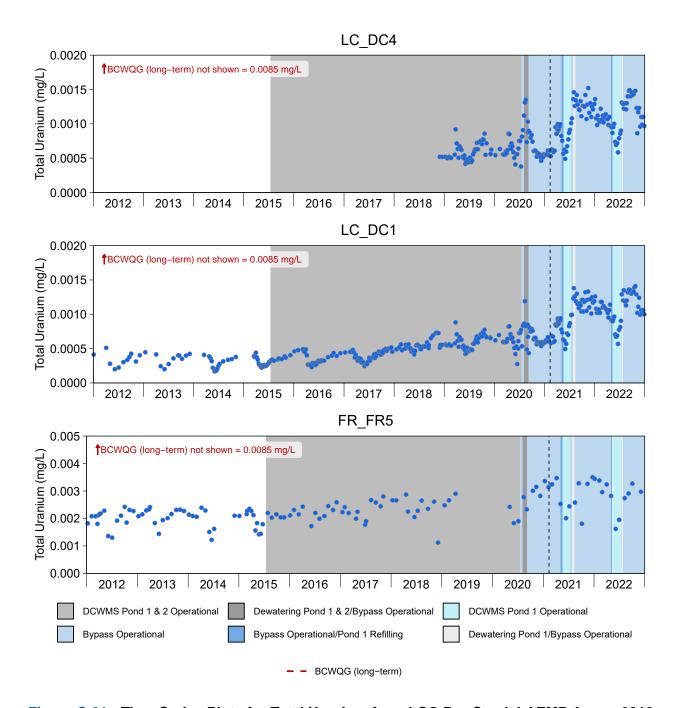


Figure C.21: Time Series Plots for Total Uranium from LCO Dry Creek LAEMP Areas, 2012 to 2022

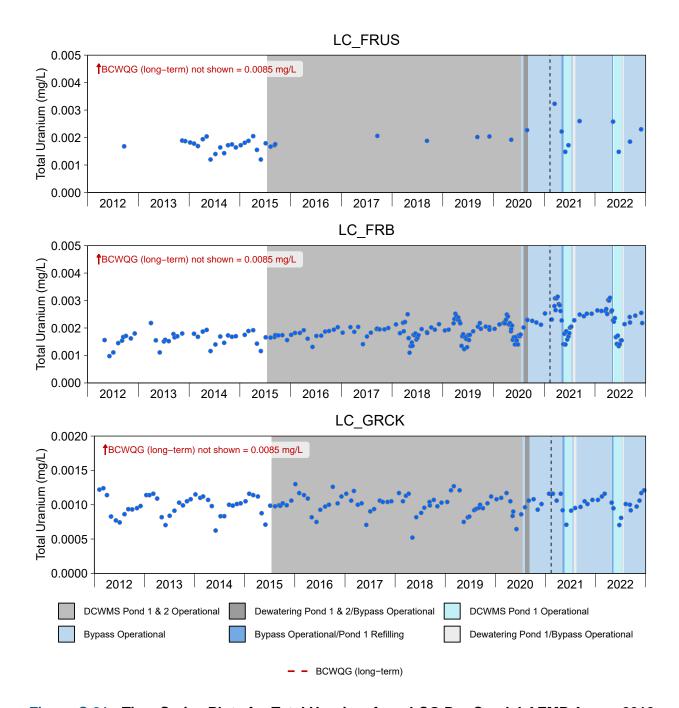


Figure C.21: Time Series Plots for Total Uranium from LCO Dry Creek LAEMP Areas, 2012 to 2022

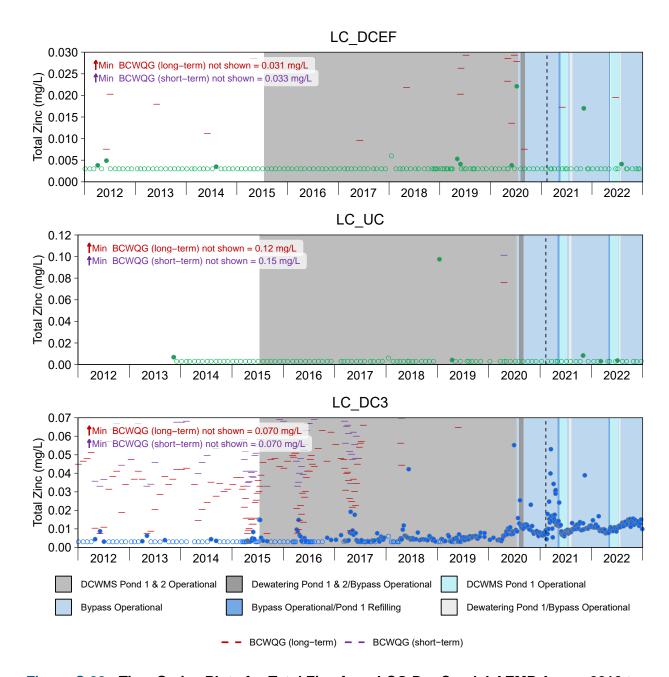


Figure C.22: Time Series Plots for Total Zinc from LCO Dry Creek LAEMP Areas, 2012 to 2022

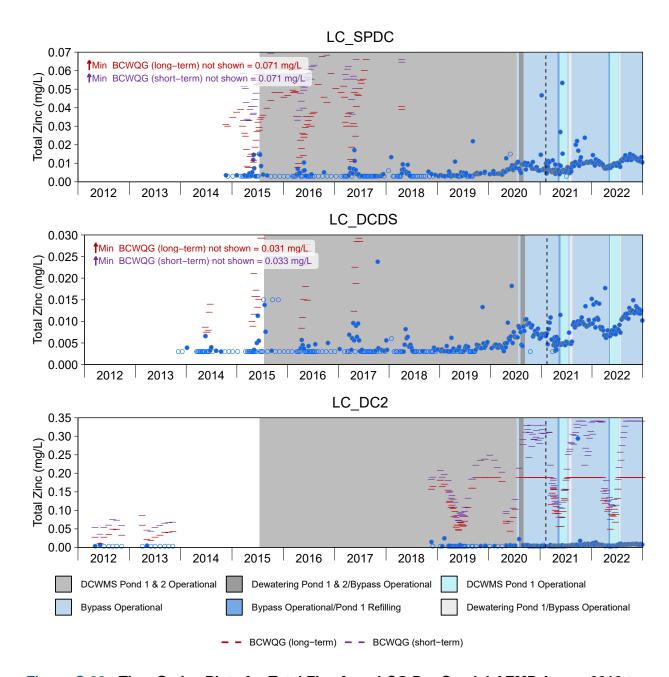


Figure C.22: Time Series Plots for Total Zinc from LCO Dry Creek LAEMP Areas, 2012 to 2022

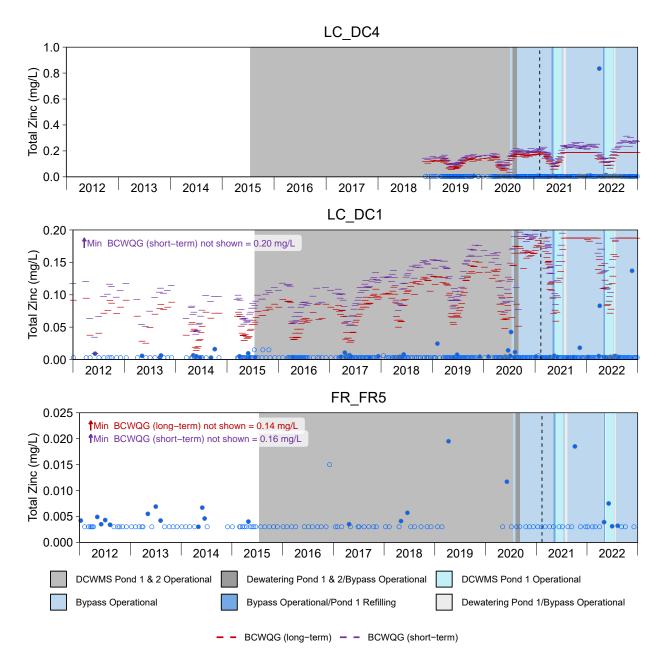


Figure C.22: Time Series Plots for Total Zinc from LCO Dry Creek LAEMP Areas, 2012 to 2022

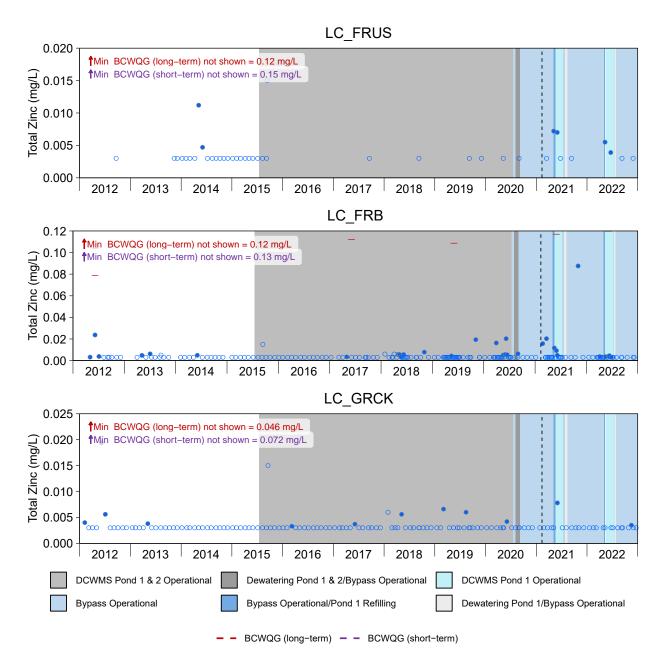


Figure C.22: Time Series Plots for Total Zinc from LCO Dry Creek LAEMP Areas, 2012 to 2022

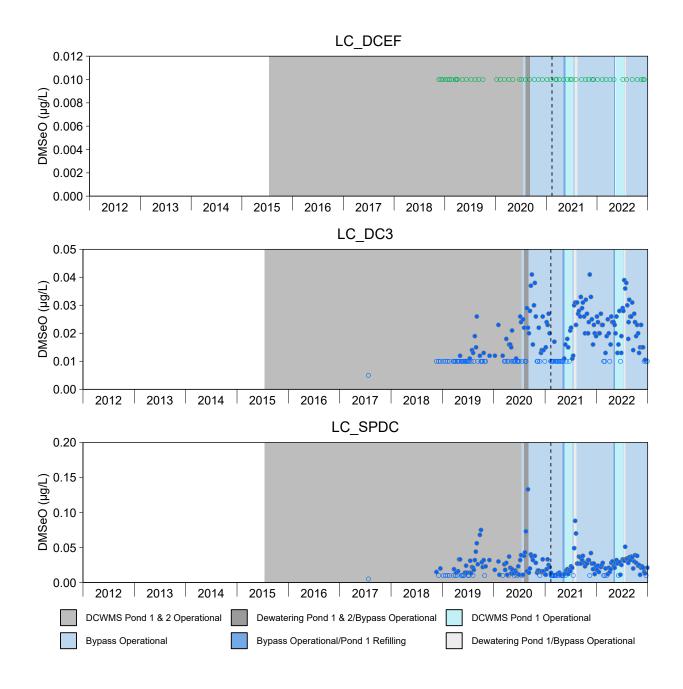


Figure C.23: Time Series Plots for Dimethylselenoxide (DMSeO) from LCO Dry Creek LAEMP Areas, 2012 to 2022

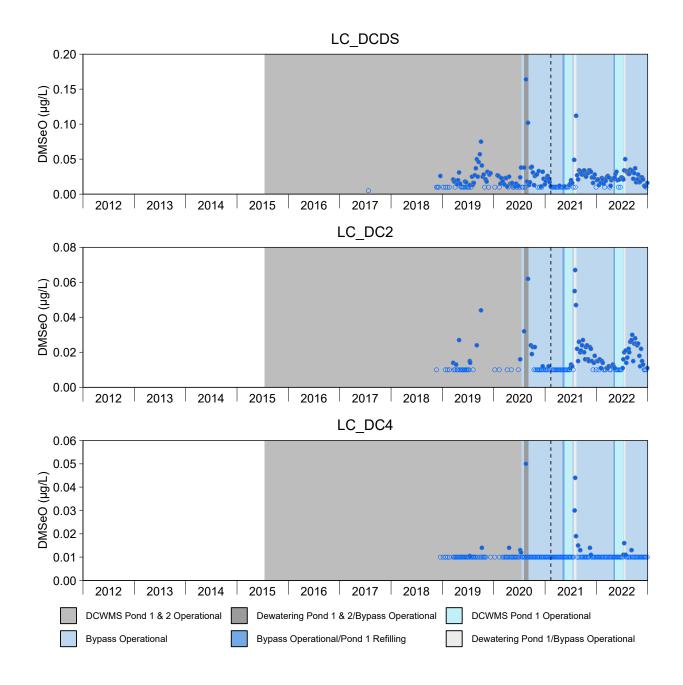


Figure C.23: Time Series Plots for Dimethylselenoxide (DMSeO) from LCO Dry Creek LAEMP Areas, 2012 to 2022

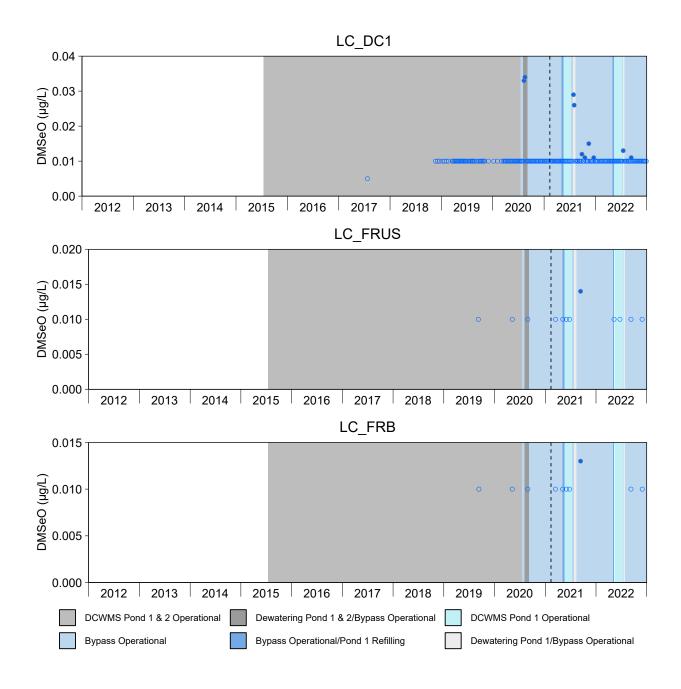


Figure C.23: Time Series Plots for Dimethylselenoxide (DMSeO) from LCO Dry Creek LAEMP Areas, 2012 to 2022

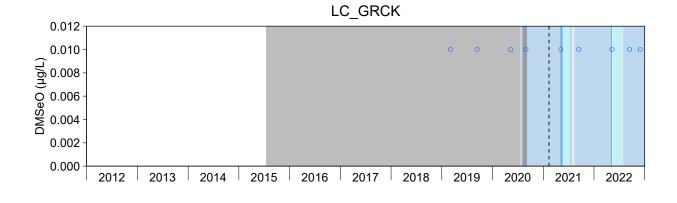




Figure C.23: Time Series Plots for Dimethylselenoxide (DMSeO) from LCO Dry Creek LAEMP Areas, 2012 to 2022

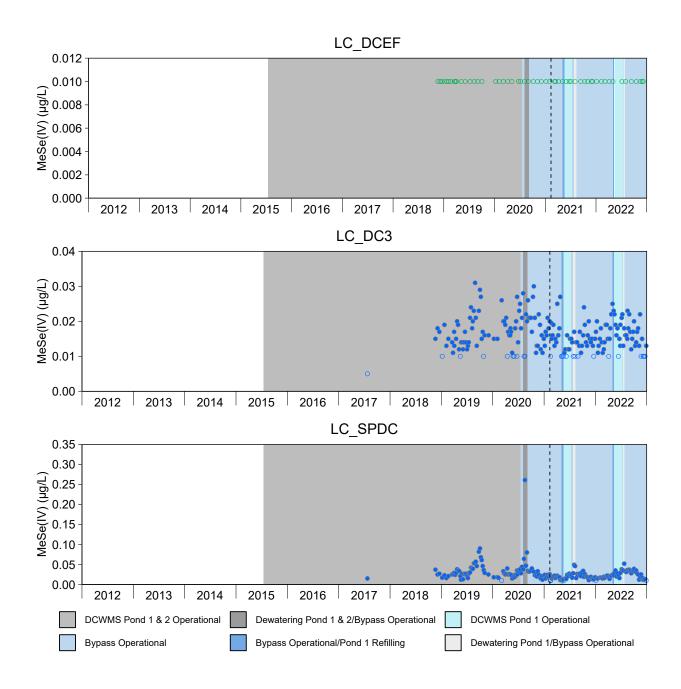


Figure C.24: Time Series Plots for Methylseleninic Acid [MeSe(IV)] from LCO Dry Creek LAEMP Areas, 2012 to 2022

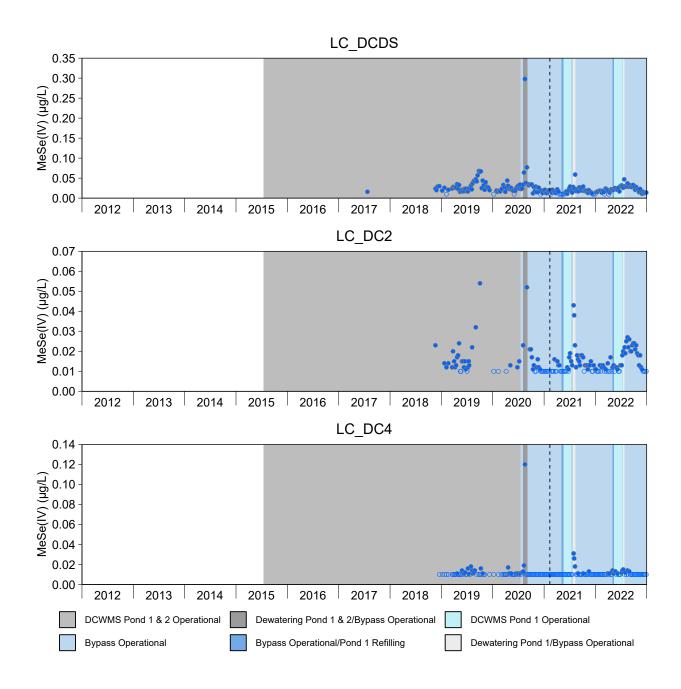


Figure C.24: Time Series Plots for Methylseleninic Acid [MeSe(IV)] from LCO Dry Creek LAEMP Areas, 2012 to 2022

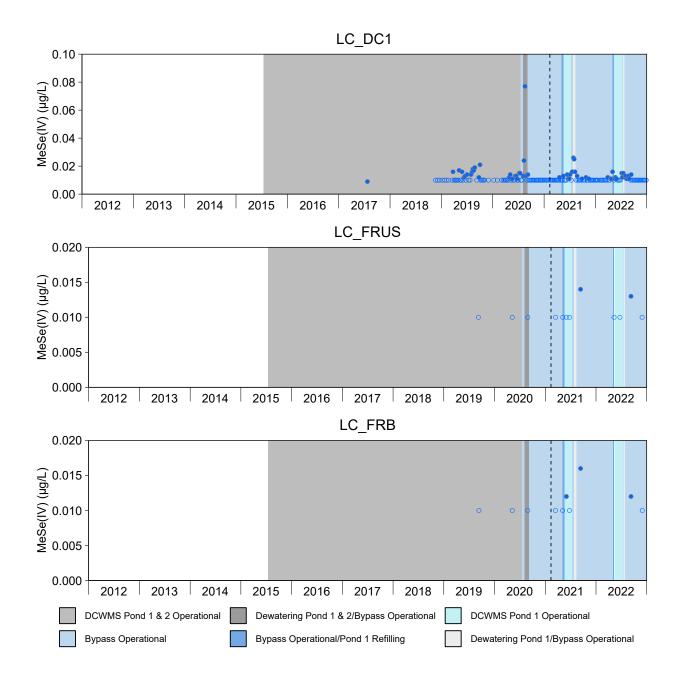
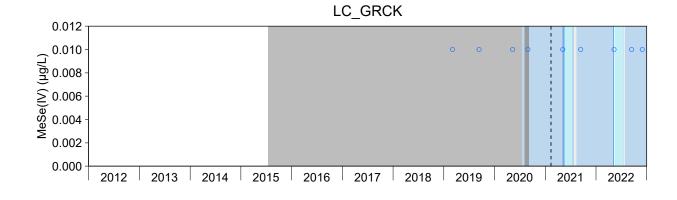


Figure C.24: Time Series Plots for Methylseleninic Acid [MeSe(IV)] from LCO Dry Creek LAEMP Areas, 2012 to 2022



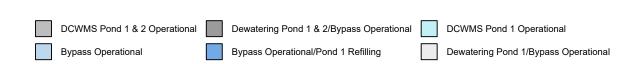


Figure C.24: Time Series Plots for Methylseleninic Acid [MeSe(IV)] from LCO Dry Creek LAEMP Areas, 2012 to 2022

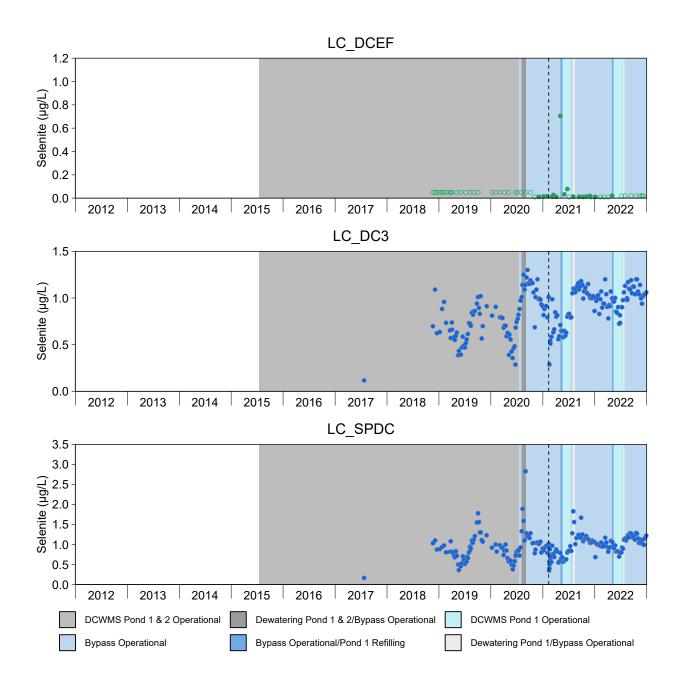


Figure C.25: Time Series Plots for Selenite from LCO Dry Creek LAEMP Areas, 2012 to 2022

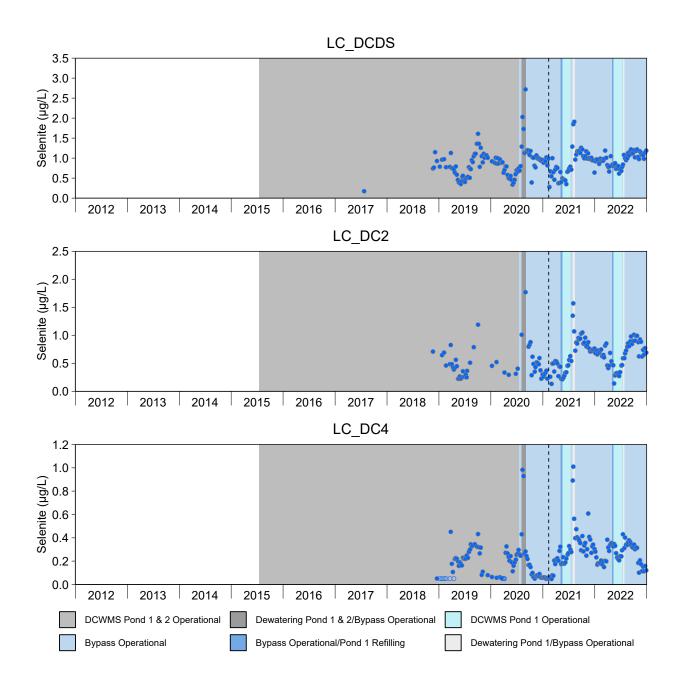


Figure C.25: Time Series Plots for Selenite from LCO Dry Creek LAEMP Areas, 2012 to 2022

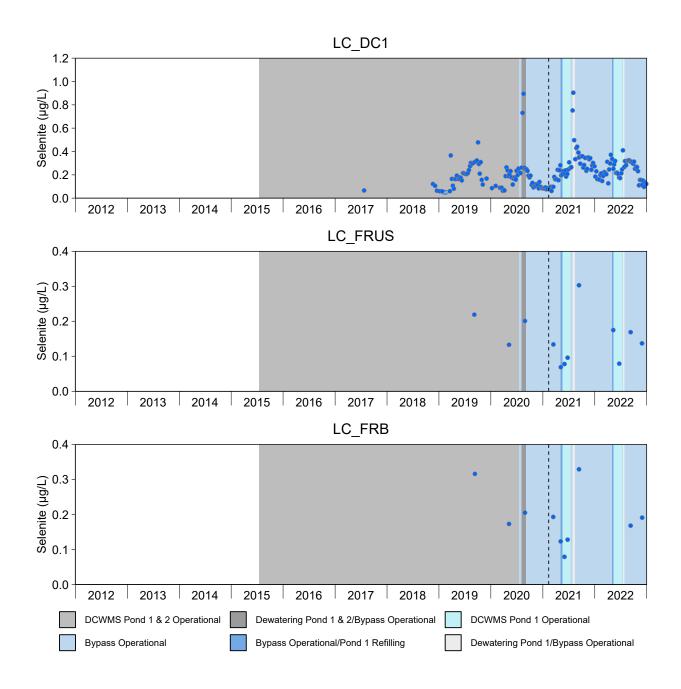
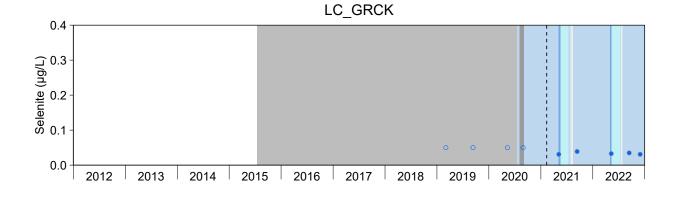


Figure C.25: Time Series Plots for Selenite from LCO Dry Creek LAEMP Areas, 2012 to 2022



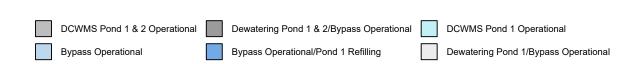


Figure C.25: Time Series Plots for Selenite from LCO Dry Creek LAEMP Areas, 2012 to 2022

Table C.1: British Columbia Water Quality Guidelines, Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Constituents Assessed in the Line Creek Dry Creek LAEMP, 2022

|                             | Constituent                    | Units    | British Columbia Water Quality Guidelines <sup>a</sup>  |   |      |          | 011. 0   | Updated Effects Concentraitonk/ Proposed   |
|-----------------------------|--------------------------------|----------|---|---|------|----------|--|--|
|                             | Constituent                    |          | Long-term Average   | Short-term Maximum  | Year | Status   | Site-Specific Benchmark <sup>b</sup>   | Benckmark  |
| Non-Metals                  | Total Alkalinity               | mg/L     | For dissolved calcium = < 4mg/L, BCWQG = <10 For dissolved calcium = 4 to 8 mg/L, BCWQG = 10 to 20 For dissolved calcium = > 8 mg/L, BCWQG = > 20 | -   | 2015 | Working  | -  | -  |
|                             | Unionized Ammonia <sup>c</sup> | mg/L     | pH and Temperature dependent (tabular)  | pH and Temperature dependent (tabular)  | 2009 | Approved | -  | -  |
|                             | Chloride                       | mg/L     | 150   | 600   | 2003 | Approved | -  | -  |
|                             | Fluoride                       | mg/L     | -   | For hardness ≤ 10 mg/L, BCWQG = 0.4 For hardness > 10 mg/L, BCWQG = [-51.73 + 92.57 × log <sub>10</sub> (hardness)]×0.01 Maximum applicable hardness = 385 mg/L | 1990 | Approved | -  | -  |
|                             | Nitrate-N                      | mg/L     | 3   | 33  | 2009 | Approved | -  | Level 1 Updated Effects Concentration =  10 <sup>((log10(9)/(-2.64))</sup> -(1.45-1.18'(log10(hardness))))  Level 2 Updated Effects Concentration =  10 <sup>((log10(4)/(-2.64))</sup> -(1.45-1.18'(log10(hardness))))  Level 3 Updated Effects Concentration =  10 <sup>((log10(1)/(-2.64))</sup> -(1.45-1.18'(log10(hardness)))) |
|                             | Nitrite-N <sup>d</sup>         | mg/L     | 0.02 to 0.20  | 0.06 to 0.60  | 2009 | Approved | -  | -  |
|                             | Dissolved oxygen <sup>e</sup>  | mg/L     | For buried embryo/alevin life stages, BCWQG (water column) = 11;<br>BCWQG (interstitial) = 8;<br>for other life stages, BCWQG (water column) = 8  | For buried embryo/alevin life stages, BCWQG (water column) = 9;<br>BCWQG (interstitial) = 6<br>For other life stages, BCWQG (water column) = 5                  | 1997 | Approved | -  | -  |
|                             | pH <sup>f</sup>                | pH units |   | 6.5 - 9.0   | 1991 | Approved | -  | -  |
|                             | Sulphate <sup>g</sup>          | mg/L     | 128 to 429<br>Maximum applicable hardness = 250 mg/L  | -   | 2013 | Approved | -  | Level 1 Updated Effects Concentration = 617<br>Level 2 Updated Effects Concentration = 764<br>Level 3 Updated Effects Concentration = 1099   |
|                             | Total Dissolved Solids         | mg/L     | -   | -   | -    | -        | Screening Level 1 Benchmark = 1,000  | -  |
| Metals and Metalloids Total | Aluminum                       | mg/L     | Biotic Ligand Model   | -   | 2023 | Approved | -  | -  |
|                             | Antimony (III)                 | mg/L     | 0.009   | -   | 2015 | Working  | -  | -  |
|                             | Arsenic                        | mg/L     | -   | 0.005   | 2002 | Approved | -  | -  |
|                             | Barium                         | mg/L     | 1   | -   | 2015 | Working  | -  | -  |
|                             | Beryllium                      | mg/L     | 0.00013   | -   | 2015 | Working  | -  | -  |
|                             | Cadmium                        | mg/L     | -   | -   | -    | -        | Site Performance Objective <sup>j</sup> = ≤0.001×10 <sup>0.83(log700-log(hardness))</sup> Maximum applicable hardness = 0.00038 mg/L | -  |
|                             | Boron                          | mg/L     | 1.2   | -   | 2003 | Approved | -  | -  |
|                             | Chromium <sup>h</sup>          | mg/L     | For Cr(VI), BCWQG = 0.001<br>For Cr(III), BCWQG = 0.0089  | -   | 2015 | Working  | -  | -  |
|                             | Cobalt                         | mg/L     | 0.004   | 0.11  | 2004 | Approved | -  | -  |
|                             | Iron                           | mg/L     | -   | 1   | 2008 | Approved | -  | -  |

Note: "-" = no data available.

<sup>&</sup>lt;sup>a</sup> British Columbia Working (BCMOECCS 2021a) or Accepted (BCMOECCS 2021b) Water Quality Guidelines (BCWQG) for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

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

 $<sup>^{\</sup>circ}$  Temperature and pH dependent; range of minimum and maximum values.

<sup>&</sup>lt;sup>d</sup> Dependent on concurrent chloride, range of values reported (BCMOECCS 2021a).

<sup>&</sup>lt;sup>e</sup> Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

f Unrestricted change permitted within this pH range

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

<sup>&</sup>lt;sup>h</sup> Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied

<sup>&</sup>lt;sup>i</sup> The most conservative guideline (0.00000125 mg/L) was applied.

<sup>&</sup>lt;sup>j</sup> As outlined in Permit 107517.

<sup>&</sup>lt;sup>k</sup> As oulined in WSP Golder. 2022. Task 1: Elk Valley Water Quality Plan Benchmark Validation Nitrate, Sulphate, Selenium

Table C.1: British Columbia Water Quality Guidelines, Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Constituents Assessed in the Line Creek Dry Creek LAEMP, 2022

|                       |           | Constituent            | Units | British Colum  | bia Water Quality Guidelines <sup>a</sup>  |      |          | Cita Cassifia Banahmanla   | Updated Effects Concentraiton <sup>k</sup> / Proposed   |
|-----------------------|-----------|------------------------|-------|--|--|------|----------|--|---|
|                       |           | Constituent            | Units | Long-term Average  | Short-term Maximum   | Year | Status   | Site-Specific Benchmark <sup>b</sup>   | Benckmark   |
|                       | 1         | Lead <sup>g</sup>      | mg/L  | For hardness ≤ 8 mg/L, none proposed. For hardness 8 to 360 mg/L, BCWQG = 0.001×{3.31+ exp[1.273 × ln(hardness) - 4.704]} No more than 20% of samples in a 30-d period should be >1.5x the guideline. Maximum applicable hardness = 360 mg/L | For hardness ≤ 8 mg/L, BCWQG ≤ 0.003<br>For hardness 8 to 360 mg/L,<br>BCWQG = 0.001×{exp[1.273 × ln(hardness) - 1.460]}<br>Maximum applicable hardness = 360 mg/L | 1987 | Approved | -  | -   |
|                       |           | Manganese <sup>g</sup> | mg/L  | For hardness 37 to 450 mg/L,<br>BCWQG ≤ 0.004 × hardness + 0.605<br>Maximum applicable hardness = 450 mg/L   | For hardness 25 to 259 mg/L,<br>BCWQG ≤ 0.01102 × hardness + 0.54<br>Maximum applicable hardness = 259 mg/L  | 2001 | Approved | -  | -   |
|                       | Total     | Mercury <sup>i</sup>   | mg/L  | MeHg ≤ 0.5% of THg, BCWQG = 0.00002<br>Else, BCWQG = [0.0001/(MeHg/THg)] OR<br>When MeHg = 0.5% of THg, BCWQG= 0.00002<br>When MeHg = 1.0% of THg, BCWQG = 0.00001<br>When MeHg = 8.0% of THg, BCWQG= 0.00000125                             | -  | 2001 | Approved | -  | -   |
|                       | -         | Molybdenum             | mg/L  | 7.6  | 46   | 2021 | Approved | -  | -   |
|                       | ;         | Selenium               | μg/L  | 2  | -  | 2014 | Approved | -  | -   |
| Metals and Metalloids | :         | Silver <sup>f</sup>    | mg/L  | For hardness ≤ 100 mg/L, BCWQG = 0.00005<br>For hardness > 100 mg/L, BCWQG = 0.0015  | For hardness ≤ 100 mg/L, BCWQG = 0.0001<br>For hardness > 100 mg/L, BCWQG = 0.003  | 1996 | Approved | -  | -   |
| d Me                  |           | Thallium               | mg/L  | 0.0008   | -  | 1997 | Working  | -  | -   |
| als an                |           | Uranium                | mg/L  | 0.0085   | -  | 2011 | Working  | -  | -   |
| Meta                  |           | Zinc <sup>g</sup>      | mg/L  | For hardness ≤ 90 mg/L, BCWQG = 0.0075<br>For hardness 90 to 330 mg/L,<br>BCWQG = [7.5 + 0.75 (hardness - 90)]×0.001;<br>Maximum applicable hardness = 330 mg/L  | For hardness ≤ 90 mg/L, BCWQG = 0.033<br>For hardness 90 to 500 mg/L,<br>BCWQG = [33 + 0.75 (hardness - 90)]×0.001;<br>Maximum applicable hardness = 500 mg/L      | 1999 | Approved |  | -   |
|                       |           | Cadmium <sup>g</sup>   | μg/L  | For hardness = 3.4 to 285 mg/L, BCWQG = {exp[0.736×In(hardness) - 4.943]} Maximum applicable hardness = 285 mg/L   | For hardness = 7 to 455 mg/L,<br>BCWQG = {exp[1.03×ln(hardness)-5.274]}<br>Maximum applicable hardness = 455 mg/L  | 2015 | Approved | Level 1 EVWQP Benchmark = 10 <sup>0.83(log(hardness))</sup> - 2.53  Maximum applicable hardness = 285 mg/L | -   |
|                       |           | Copper                 | mg/L  | Biotic Ligand Model  | Biotic Ligand Model  | 2019 | Approved | -  | -   |
|                       | Dissolved | Nickel                 | μg/L  | -  | -  | -    | Proposed |  | Level 1 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate)) + 0.856 Level 2 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate))) + 1.011 Level 3 Benchmark = log(Benchmark) = 0.547 x (log(DOC)) + 0.411 x (log(Hardness)) - 0.520 x (log(Bicarbonate)) + 1.304 |
|                       |           | Iron                   | mg/L  | -  | BCWQG = 0.35 mg/L  | 2008 | Approved | -  | -   |

Note: "-" = no data available.

<sup>&</sup>lt;sup>a</sup> British Columbia Working (BCMOECCS 2021a) or Accepted (BCMOECCS 2021b) Water Quality Guidelines (BCWQG) for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

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

<sup>&</sup>lt;sup>c</sup> Temperature and pH dependent; range of minimum and maximum values.

<sup>&</sup>lt;sup>d</sup> Dependent on concurrent chloride, range of values reported (BCMOECCS 2021a).

<sup>&</sup>lt;sup>e</sup> Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

f Unrestricted change permitted within this pH range.

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

<sup>&</sup>lt;sup>h</sup> Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

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

<sup>&</sup>lt;sup>j</sup> As outlined in Permit 107517.

<sup>&</sup>lt;sup>k</sup> As oulined in WSP Golder. 2022. Task 1: Elk Valley Water Quality Plan Benchmark Validation Nitrate, Sulphate, Selenium

Table C.2: Seasonal Kendall Trend Analysis For Water Quality Constituents Collected at Routine Monitoring Stations, Dry Creek LAEMP, 2012 to 2022

| Constituent                      | Units | Refe    | rence |        |         |         |        | Mine-e | exposed |        |         |        |         |
|----------------------------------|-------|---------|-------|--------|---------|---------|--------|--------|---------|--------|---------|--------|---------|
| Constituent                      | Omis  | LC_DCEF | LC_UC | LC_DC3 | LC_SPDC | LC_DCDS | LC_DC2 | LC_DC4 | LC_DC1  | FR_FR5 | LC_FRUS | LC_FRB | LC_GRCK |
| Nitrate (as N)                   | mg/L  | NS      | NS    | 77     | 42      | 53      | 22     | 38     | 90      | 1.2    | NS      | 1.8    | 1.9     |
| Nitrite (as N)                   | mg/L  | NS      | NS    | 37     | 12      | 17      | 12     | 6.3    | 24      | NS     | NS      | NS     | NS      |
| Total Kjeldahl Nitrogen          | mg/L  | NS      | NS    | 17     | NS      | 16      | 30     | 50     | 20      | 58     | 147     | 26     | NS      |
| Phosphorus (P)-Total             | mg/L  | -1.6    | -11   | -2.6   | -3.5    | NS      | NS     | 4.6    | -2.8    | NS     | NS      | NS     | -4.7    |
| Orthophosphate                   | mg/L  | -0.96   | NS    | -2.9   | NS      | NS      | -3.1   | NS     | -4.6    | NS     | NS      | NS     | NS      |
| Sulphate                         | mg/L  | NS      | 1.9   | 68     | 40      | 51      | 25     | 36     | 51      | 2.8    | NS      | 3.1    | 0.75    |
| Total Dissolved Solids           | mg/L  | 0.63    | NS    | 32     | 26      | 27      | 14     | 17     | 13      | 1.4    | 2.1     | 1.8    | NS      |
| Antimony (Sb)-Total              | mg/L  | -1.5    | NS    | 17     | 15      | 16      | 9.3    | 13     | 6.8     | NS     | NS      | NS     | -       |
| Barium (Ba)-Total                | mg/L  | 0.81    | NS    | 9.4    | 9.2     | 6.4     | 3.3    | 6.8    | 6.9     | -2.3   | -1.7    | -0.88  | 0.44    |
| Boron (B)-Total                  | mg/L  | -2.3    | -3.8  | 0.50   | 0.83    | NS      | NS     | 0.54   | 0       | -1.4   | NS      | -2.0   | -2.6    |
| Cadmium (Cd)-Total               | mg/L  | NS      | NS    | 20     | 28      | 26      | 16     | 27     | 8.5     | NS     | NS      | NS     | NS      |
| Iron (Fe)-Total                  | mg/L  | NS      | -14   | NS     | -9.9    | -8.8    | NS     | NS     | NS      | NS     | NS      | NS     | -8.1    |
| Lithium (Li)-Total               | mg/L  | NS      | NS    | 23     | 29      | 21      | 17     | 18     | 6.9     | 8.5    | 7.5     | 7.8    | 0.69    |
| Manganese (Mn)-Total             | mg/L  | NS      | NS    | 13     | 8.1     | 10      | 9.4    | NS     | 4.3     | NS     | NS      | NS     | -2.8    |
| Mercury (Hg)-Total               | mg/L  | NS      | NS    | NS     | NS      | NS      | NS     | NS     | NS      | NS     | NS      | NS     | NS      |
| Molybdenum (Mo)-Total            | mg/L  | NS      | NS    | 23     | 24      | 26      | 12     | 26     | 7.9     | 1.7    | NS      | 2.0    | NS      |
| Nickel (Ni)-Total                | mg/L  | NS      | NS    | 64     | 38      | 38      | 20     | 34     | 25      | NS     | NS      | NS     | NS      |
| Potassium (K)-Total              | mg/L  | NS      | NS    | 15     | 15      | 14      | 4.9    | 8.8    | 6.7     | 2.6    | NS      | 2.9    | NS      |
| Selenium (Se)-Total              | mg/L  | 2.2     | 5.9   | 96     | 52      | 53      | 29     | 42     | 81      | 3.0    | NS      | 3.3    | 0.80    |
| Uranium (U)-Total                | mg/L  | 0.90    | NS    | 50     | 34      | 35      | 15     | 22     | 13      | 4.1    | 3.7     | 4.1    | NS      |
| Zinc (Zn)-Total                  | mg/L  | NS      | NS    | 20     | 23      | 19      | 11     | 6.1    | 0.87    | NS     | NS      | NS     | NS      |
| Cadmium (Cd)-Dissolved           | mg/L  | NS      | NS    | 28     | 46      | 41      | 22     | 27     | 9.7     | NS     | NS      | NS     | NS      |
| Cobalt (Co)-Dissolved            | mg/L  | NS      | NS    | 6.5    | 4.2     | 3.4     | NS     | LRL    | NS      | NS     | NS      | NS     | NS      |
| Iron (Fe)-Dissolved              | mg/L  | NS      | NS    | NS     | -5.8    | NS      | NS     | NS     | NS      | NS     | LRL     | NS     | NS      |
| Selenium (Se)-Dissolved          | mg/L  | 1.9     | 6.2   | 87     | 50      | 53      | 28     | 42     | 77      | 4.0    | NS      | 3.5    | NS      |
| Ammonia, Total (as N)            | mg/L  | 15      | NS    | 13     | NS      | 8.8     | NS     | -35    | 8.3     | NS     | 13      | 11     | 14      |
| Total Organic Carbon             | mg/L  | -1.5    | NS    | 2.0    | NS      | NS      | NS     | NS     | -2.1    | -2.7   | NS      | NS     | -3.5    |
| Dissolved Organic Carbon         | mg/L  | NS      | NS    | 2.2    | NS      | 3.3     | NS     | NS     | NS      | NS     | NS      | NS     | NS      |
| DMSeO - Dimethylselenoxide       | mg/L  | NS      | -     | 20     | NS      | NS      | 5.4    | NS     | 5.0     | -      | LRL     | LRL    | LRL     |
| MeSe(IV) - Methylseleninic Acid  | mg/L  | NS      | -     | NS     | -11     | NS      | NS     | NS     | NS      | -      | LRL     | -      | LRL     |
| Se(IV) - Selenite                | mg/L  | NS      | -     | 9.6    | 4.1     | 3.2     | NS     | 12     | 13      | -      | -       | -      | -       |
| Selenium Unknown                 | mg/L  | NS      | -     | NS     | NS      | NS      | NS     | NS     | NS      | -      | LRL     | LRL    | LRL     |
| MeSe(VI) - Methaneselenonic Acid | mg/L  | NS      | -     | NS     | NS      | NS      | NS     | NS     | NS      | -      | LRL     | LRL    | LRL     |
| Se(VI) - Selenate                | mg/L  | NS      | -     | 33     | 32      | 34      | 36     | 42     | 41      | -      | -       | -      | -       |

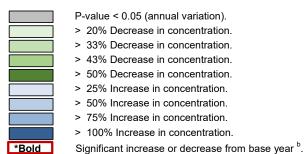
Significant decreasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Significant increasing temporal trend (Seasonal Kendall test for monotonic trend at α = 0.05). Value reported is the Sen's slope reported as a percentage of the median concentration or value.

Notes: ""NS" = no significant temporal trend (Seasonal Kendall test for monotonic trend at  $\alpha = 0.05$ ). "-" = no data or insufficient data (n < 5) to test for trend. LRL = >75% censored data.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

| Parameter       | Area Type   | Area    |    | nnual<br>ation <sup>a</sup> | Q1: Is | there a |       |       | (b) of | monito | ring?   |        | s since |        | se year | Q2: Is | the 202 | 2 annua | al mean | greate | r or less | than a | ll annua<br>(2022 |      | ical me | ans (20 | 112 to 2022) a | nd the pre   | vious year |
|-----------------|-------------|---------|----|-----------------------------|--------|---------|-------|-------|--------|--------|---------|--------|---------|--------|---------|--------|---------|---------|---------|--------|-----------|--------|-------------------|------|---------|---------|----------------|--------------|------------|
| i arameter      | Alea Type   | Alea    | DF | P-Value                     | 2012   | 2013    | 2014  | 2015  | 2016   |        | 2018    | 2019   | 2020    | 2021   | 2022    | 2012   | 2013    | 2014    | 2015    | 2016   | 2017      | 2018   | 2019              | 2020 | 2021    | 2022    | 2022 vs.       | 2022 v       | s. 2021    |
|                 |             |         |    |                             |        |         |       |       |        |        |         |        |         |        |         |        |         |         |         |        |           |        |                   |      |         |         | 2012-2021      | Trend        | MOD        |
|                 | Reference   | LC_DCEF | 10 | 0.001                       | b      | 4.39    | 8.15  | 13.4  | -9.98  | 15.1   |         | -9.97  | 1.72    | 19.2   | 73.3    | ВС     | ВС      | ВС      | BC      | С      | ВС        | С      | С                 | ВС   | В       | Α       | <b>↑</b>       | 1            | 45.5       |
|                 | reference   | LC_UC   | 8  | 0.002                       | -      | -       | b     | -13.6 | 15.8   | -1.63  | -20.8   | 5.93   | -16.5   | 17.9   | 11.4    | -      | -       | AB      | AB      | Α      | AB        | В      | AB                | AB   | Α       | AB      | No             | No           | -5.58      |
|                 |             | LC_DC3  | 10 | 0.001                       | b      | 46.2    | 30.9  | 99.5  | 246    | 2,122  | 9,309   | 11,462 | 19,403  | 22,622 | 24,780  | F      | EF      | EF      | E       | D      | С         | В      | В                 | Α    | Α       | Α       | No             | No           | 9.50       |
|                 |             | LC_SPDC | 7  | 0.001                       | -      | -       | -     | b     | 12.5   |        |         |        | 21,659  |        |         | -      | -       | -       | Е       | Е      | D         | С      | BC                | AB   | Α       | Α       | No             | No           | 8.68       |
|                 |             | LC_DCDS | 8  | 0.001                       | -      | -       | b     | -52.8 | -22.6  | 1,459  | 6,841   | 8,496  | 14,243  | 16,664 | 18,948  | -      | -       | D       | E       | DE     | С         | В      | В                 | Α    | Α       | Α       | No             | No           | 13.6       |
| Nitrate (as N)  |             | LC_DC2  | 5  | 0.001                       | b      | 118     | -     | -     | -      | -      | -       | 39,427 | 74,438  | 85,760 | 83,295  | С      | С       | -       | -       | -      | -         | -      | В                 | Α    | Α       | Α       | No             | No           | -2.87      |
| Milato (ao M)   | Mine-       | LC_DC4  | 3  | 0.001                       | -      | -       | -     | -     | -      | -      | -       | b      | 64.9    | 136    | 140     | -      | -       | -       | -       | -      | -         | -      | С                 | В    | Α       | Α       | No             | No           | 1.73       |
|                 | Exposed     | LC_DC1  | 10 | 0.001                       | b      | 102     | 288   | 200   | 370    |        |         | 31,284 | 48,141  | -, -   |         | G      | FG      | EF      | EF      | E      | D         | С      | BC                | В    | Α       | Α       | No             | No           | 6.39       |
|                 |             | FR_FR5  | 9  | 0.001                       | b      | 24.6    | 28.6  | 7.28  | 14.6   | 15.9   | 3.07    | -      | 12.9    | 35.4   | 25.7    | С      | AB      | AB      | BC      | ABC    | ABC       | ВС     | -                 | ABC  | Α       | AB      | No             | No           | -7.19      |
|                 |             | LC_FRUS | 1  | 0.023                       | -      | -       | b     | -11.1 | -      | -      | -       | -      | -       | -      | -       | -      | -       | Α       | В       | -      | -         | -      | -                 | -    | -       | -       | $\downarrow$   | $\downarrow$ | -          |
|                 |             | LC_FRB  | 10 | 0.001                       | b      | 34.1    | 35.2  | 20.8  | 19.4   | 27.5   | 11.7    | 15.3   | 28.1    | 51.6   | 46.6    | E      | ABCD    | ABC     | CDE     | CDE    | BCD       | DE     | CDE               | С    | Α       | AB      | No             | No           | -3.26      |
|                 |             | LC_GRCK | 10 | 0.001                       | b      | 20.3    | 43.0  | 18.2  | 11.1   | 27.5   | -0.0779 | 27.5   | 10.4    | 32.7   | 93.3    | В      | В       | AB      | В       | В      | В         | В      | В                 | В    | В       | Α       | No             | <b>↑</b>     | 45.6       |
|                 | Reference   | LC_DCEF | -  | -                           | -      | -       | -     | -     | -      | -      | -       | -      | -       | -      | -       | -      | -       | -       | -       | -      | -         | -      | -                 | -    | -       | -       | No             | No           | -          |
|                 | 1101010100  | LC_UC   | -  | -                           | -      | -       | -     | -     | -      | -      | -       | -      | -       | -      | -       | -      | -       | -       | -       | -      | -         | -      | -                 | -    | -       | -       | No             | No           | -          |
|                 |             | LC_DC3  | 6  | 0.001                       | -      | -       | -     | -     | b      | 4,869  | 6,780   | 1,566  |         |        | 621     | -      | -       | -       | -       | D      | Α         | Α      | В                 | В    | Α       | С       | No             | <b>↓</b>     | -89.1      |
|                 |             | LC_SPDC | 6  | 0.001                       | -      | -       | -     | -     | b      | 2,660  | 5,460   | 2,126  |         |        | 832     | -      | -       | -       | -       | E      | BC        | Α      | С                 | С    | AB      | D       | No             | <b>↓</b>     | -77.2      |
|                 |             | LC_DCDS | 6  | 0.001                       | -      | -       | -     | -     | b      | 2,190  | 4,465   | 1,931  |         |        | 692     | -      | -       | -       | -       | Е      | BC        | Α      | BC                | С    | AB      | D       | No             | $\downarrow$ | -74.2      |
| Nitrite (as N)  |             | LC_DC2  | 3  | 0.001                       | -      | -       | -     | -     | -      | -      | -       | b      | -33.3   | 106    | -32.2   | -      | -       | -       | -       | -      | -         | -      | В                 | В    | Α       | В       | No             | <b></b>      | -67.0      |
| Titalio (do 11) | Mine-       | LC_DC4  | 3  | 0.001                       | -      | -       | -     | -     | -      | -      | -       | b      | -15.0   | 103    | 10.4    | -      | -       | -       | -       | -      | -         | -      | В                 | В    | Α       | В       | No             | <b>↓</b>     | -45.8      |
|                 | Exposed     | LC_DC1  | 5  | 0.001                       | -      | -       | -     | -     | -      | b      | 105     | 38.4   | 33.6    | 210    | 64.3    | -      | -       | -       | -       | -      | С         | AB     | BC                | BC   | Α       | В       | No             | $\downarrow$ | -47.1      |
|                 |             | FR_FR5  | 9  | 0.001                       | b      | 19.1    | -8.36 | -48.5 | -38.1  | -20.7  | -20.7   | -      | -32.0   | -36.0  | -27.5   | AB     | Α       | ABC     | С       | BC     | ABC       | ABC    | -                 | ABC  | BC      | ABC     | No             | No           | 13.4       |
|                 |             | LC_FRUS | 1  | 0.833                       | nc     | nc      | nc    | nc    | nc     | nc     | nc      | nc     | nc      | nc     | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc     | nc                | nc   | nc      | nc      | No             | No           | nc         |
|                 |             | LC_FRB  | 10 | 0.001                       | b      | 26.8    | -7.56 | -21.3 | -43.7  | -1.93  | -15.8   | -25.9  | -11.0   | 9.61   | 13.4    | AB     | Α       | AB      | AB      | В      | AB        | AB     | В                 | AB   | Α       | Α       | No             | No           | 3.48       |
|                 |             | LC_GRCK | -  | -                           | -      | -       | -     | -     | -      | -      | -       | -      | -       | -      | -       | -      | -       | -       | -       | -      | -         | -      | -                 | -    | -       | -       | No             | No           | -          |
|                 | Reference   | LC_DCEF | 9  | 0.683                       | nc     | nc      | nc    | nc    | nc     | nc     | nc      | nc     | nc      | nc     | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc     | nc                | nc   | nc      | nc      | No             | No           | nc         |
|                 | 11010101100 | LC_UC   | 8  | 0.282                       | nc     | nc      | nc    | nc    | nc     | nc     | nc      | nc     | nc      | nc     | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc     | nc                | nc   | nc      | nc      | No             | No           | nc         |
|                 |             | LC_DC3  | 9  | 0.001                       | b      | 69.6    | 119   | 107   | 138    | 471    | 345     | 18.1   | -       | 76.8   | 594     | CD     | BCD     | ABCD    | BCD     | BCD    | AB        | ABC    | D                 | -    | D       | Α       | No             | 1            | 293        |
|                 |             | LC_SPDC | 6  | 0.001                       | -      | -       | -     | b     | -22.0  | 105    | 67.2    | -37.8  | -       | -73.9  | 183     | -      | -       | -       | BCD     | CD     | AB        | ABC    | D                 | -    | Е       | Α       | No             | <u> </u>     | 986        |
|                 |             | LC_DCDS | 7  | 0.001                       | -      | -       | b     | 78.4  | 78.3   | 286    | 340     | 29.4   | -       | -24.4  | 616     | -      | -       | CD      | BC      | BC     | AB        | Α      | CD                | -    | D       | Α       | No             | 1            | 847        |
| Total Kjeldahl  |             | LC_DC2  | 4  | 0.001                       | b      | 27.7    | -     | -     | -      | -      | -       | 154    | -       | 10.3   | 650     | В      | В       | -       | -       | -      | -         | -      | В                 | -    | В       | Α       | 1              | <u> </u>     | 580        |
| Nitrogen        | Mine-       | LC_DC4  | 3  | 0.001                       | -      | -       | -     | -     | -      | -      | -       | b      | -73.4   | -31.0  | 344     | -      | -       | -       | -       | -      | -         | -      | В                 | С    | В       | Α       | <b>↑</b>       | 1            | 544        |
|                 | Exposed     | LC_DC1  | 10 | 0.001                       | b      | 54.8    | 42.2  | 31.3  | 31.2   | 93.3   | 279     | 179    | -23.1   | 77.0   | 469     | CD     | BCD     | BCD     | CD      | CD     | BC        | AB     | BC                | D    | С       | Α       | No             | 1            | 222        |
|                 |             | FR_FR5  | 5  | 0.001                       | -      | -       | -     | b     | 302    | 777    | 266     | -      | -       | 230    | 209     | -      | -       | -       | В       | Α      | Α         | AB     | -                 | -    | AB      | AB      | No             | No           | -6.46      |
|                 |             | LC_FRUS | -  | -                           | -      | -       | -     | -     | -      | -      | -       | -      | -       | -      | -       | -      | -       | -       | -       | -      | -         | -      | -                 | -    | -       | -       | No             | No           | -          |
|                 |             | LC_FRB  | 8  | 0.001                       | b      | -0.364  | -     | 52.4  | 135    | 697    | 334     | 106    | -       | 70.2   | 824     | CD     | D       | -       | CD      | BCD    | AB        | ABC    | CD                | -    | CD      | Α       | No             | <b>↑</b>     | 443        |
|                 |             | LC_GRCK | 9  | 0.124                       | nc     | nc      | nc    | nc    | nc     | nc     | nc      | nc     | nc      | nc     | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc     | nc                | nc   | nc      | nc      | No             | No           | nc         |



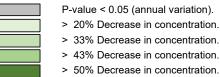
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha = 0.05$ ) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>°</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                 |   |         |      | nual<br>ation <sup>a</sup> | Q1: Is | there a | •       |         | (b) of   | monito | ring?                |        |          |       | se year | Q2: Is | the 202 | 2 annua | al mean | greate | r or less | s than a | II annua | _   | rical me | ans (20 | 12 to 2022) a         | nd the prev  | vious year     |
|-----------------|---|---------|------|----------------------------|--------|---------|---------|---------|----------|--------|----------------------|--------|----------|-------|---------|--------|---------|---------|---------|--------|-----------|----------|----------|---|----------|---------|-----------------------|--------------|----------------|
| Parameter       | Area Type                                   | Area    | vari | ation                      |        | ı       | Magnitu | de of D | ifferenc | e (MOE | )) <sup>b</sup> from | Base Y | 'ear (b) | С     |         |        |         |         |         |        |           |          | (2022    | <u>.)                                    </u> |          |         |                       |              |                |
|                 | 7,1   |         | DF   | P-Value                    | 2012   | 2013    | 2014    | 2015    | 2016     | 2017   | 2018                 | 2019   | 2020     | 2021  | 2022    | 2012   | 2013    | 2014    | 2015    | 2016   | 2017      | 2018     | 2019     | 2020  | 2021     | 2022    | 2022 vs.<br>2012-2021 | 2022 v       | s. 2021<br>MOD |
|                 | - ·   | LC DCEF | 10   | 0.001                      | b      | -1.81   | -0.132  | -5.77   | -5.55    | -4.26  | 15.2                 | -11.0  | -3.91    | -8.63 | -29.3   | AB     | AB      | AB      | AB      | AB     | AB        | Α        | ВС       | AB  | AB       | С       | No                    | 1            | -22.6          |
|                 | Reference                                   | LC UC   | 2    | 0.379                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 |   | LC DC3  | 10   | 0.001                      | b      | 0.900   | -1.84   | -6.83   | -11.5    | -18.1  | -13.1                | -8.64  | -6.14    | -47.1 | -28.8   | Α      | Α       | Α       | Α       | Α      | AB        | Α        | Α        | Α   | С        | В       | No                    | <b>↑</b>     | 34.7           |
|                 |   | LC_SPDC | 7    | 0.001                      | -      | -       | -       | b       | -47.2    | -23.1  | -40.7                | -57.7  | 78.3     | -23.0 | 46.8    | -      | -       | -       | ABC     | CD     | BCD       | CD       | D        | Α   | С        | AB      | No                    | <u> </u>     | 90.5           |
|                 |   | LC_DCDS | 8    | 0.001                      | -      | -       | b       | -56.9   | -65.3    | -52.9  | -68.5                | -72.1  | -1.53    | -47.3 | -15.2   | -      | -       | AB      | CD      | CD     | CD        | CD       | D        | Α   | BC       | AB      | No                    | No           | 60.8           |
| Orthophosphate  |   | LC_DC2  | 5    | 0.001                      | b      | -10.7   | -       | -       | -        | -      | -                    | -70.3  | -36.3    | -56.0 | -39.2   | Α      | Α       | -       | -       | -      | -         | -        | С        | AB  | BC       | AB      | No                    | No           | 38.1           |
| Orthophosphate  | Mine-                                       | LC_DC4  | 3    | 0.001                      | -      | -       | -       | -       | -        | -      | -                    | b      | 75.0     | 41.2  | 57.9    | -      | -       | -       | -       | -      | -         | -        | В        | Α   | Α        | Α       | No                    | No           | 11.9           |
|                 | Exposed                                     | LC_DC1  | 10   | 0.001                      | b      | -2.24   | 25.0    | -22.9   | -28.2    | -24.4  | -52.4                | -54.1  | -27.9    | -46.0 | -34.5   | AB     | AB      | Α       | ABC     | BCD    | BC        | DE       | Е        | ВС  | CDE      | BCDE    | No                    | No           | 21.4           |
|                 |   | FR_FR5  | 3    | 0.185                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 |   | LC_FRUS | ı    | -                          | -      | -       | -       | ı       | -        | -      | -                    | -      | -        | -     | -       | ı      | -       | ı       | -       | ı      | -         | -        | -        | -   | -        | -       | No                    | No           | -              |
|                 |   | LC_FRB  | 10   | 0.009                      | b      | 2.60    | -3.89   | -39.4   | -41.2    | -4.24  | 45.2                 | -14.3  | 8.77     | -18.4 | -37.2   | AB     | AB      | AB      | AB      | AB     | AB        | Α        | AB       | AB  | AB       | В       | No                    | No           | -23.1          |
|                 |   | LC_GRCK | 10   | 0.042                      | b      | 2.84    | 5.51    | -17.8   | -15.7    | 3.55   | 5.84                 | -7.22  | 19.9     | 5.16  | -32.3   | AB     | AB      | AB      | AB      | AB     | AB        | AB       | AB       | Α   | AB       | В       | No                    | No           | -35.6          |
|                 | Reference                                   | LC_DCEF | 9    | 0.531                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 | Reference                                   | LC_UC   | 4    | 0.011                      | -      | -       | b       | -       | -81.0    | -55.1  | -64.5                | -      | -        | -     | -52.8   | -      | -       | Α       | -       | В      | AB        | AB       | -        | -   | -        | AB      | No                    | No           | 0              |
|                 |   | LC_DC3  | 9    | 0.001                      | -      | b       | 3.53    | -3.93   | -3.18    | -0.847 |                      |        |          | -1.72 | -30.3   | 1      | ABC     | ABC     | ABC     | AB     | AB        | BC       | ABC      | AB  | Α        | С       | No                    | $\downarrow$ | -29.1          |
|                 |   | LC_SPDC | 7    | 0.001                      | -      | -       | -       | b       | -39.8    | -36.1  |                      | -47.6  |          | -46.4 | -42.1   | -      | -       | -       | Α       | BC     | BC        | С        | С        | AB  | С        | BC      | No                    | No           | 7.94           |
|                 |   | LC_DCDS | 8    | 0.001                      | -      | -       | b       | 4.45    | -18.1    | -14.6  | -34.7                |        | -4.74    | -26.7 | -22.0   | -      | -       | ABC     | Α       | ABCD   | ABCD      | D        | BCD      | AB  | CD       | ABCD    | No                    | No           | 6.32           |
| Phosphorus (P)- |   | LC_DC2  | 4    | 0.007                      | -      | b       | -       | -       | -        | -      | -                    | -34.4  | -17.6    | -25.2 | -19.6   | -      | Α       | -       | -       | -      | -         | -        | В        | AB  | AB       | AB      | No                    | No           | 7.59           |
| Total           | Mine-                                       | LC_DC4  | 3    | 0.005                      | -      | -       | -       | -       | -        | -      | -                    | b      | 12.3     | 3.76  | 22.3    | -      | -       | -       | -       | -      | -         | -        | В        | AB  | В        | Α       | No                    | <b>↑</b>     | 17.9           |
|                 | Exposed                                     | LC_DC1  | 9    | 0.001                      | -      | b       | 24.2    | -9.43   | -22.0    | -26.8  | -36.2                | -35.7  | -28.6    | -34.0 | -27.0   | -      | AB      | Α       | AB      | В      | В         | В        | В        | В   | В        | В       | No                    | No           | 10.6           |
|                 |   | FR_FR5  | 8    | 0.555                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 |   | LC_FRUS | 1    | 0.008                      | -      | -       | b       | -34.8   | -        | -      | -                    | -      | -        | -     | -       | -      | -       | Α       | В       | -      | -         | -        | -        | -   | -        | -       | $\downarrow$          | $\downarrow$ | -              |
|                 |   | LC_FRB  | 9    | 0.004                      | -      | b       | -5.20   | -51.4   | -22.9    | -50.1  | -20.9                | -62.6  | -47.5    | -42.2 | -19.2   | -      | Α       | AB      | AB      | AB     | AB        | AB       | В        | AB  | AB       | Α       | No                    | No           | 39.8           |
|                 |   | LC_GRCK | 9    | 0.081                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 | Reference                                   | LC_DCEF | 10   | 0.002                      | b      | 7.18    | 11.8    | 16.6    | 23.8     | 18.1   | 5.65                 |        | 0.549    | 4.72  | 9.12    | В      | AB      | AB      | AB      | A      | AB        | AB       | AB       | В   | AB       | AB      | No                    | No           | 4.20           |
|                 |   | LC_UC   | 8    | 0.001                      | Ŀ      | -       | b       | 4.17    | 9.87     | 3.68   | 12.2                 |        | 2.01     | 19.2  | 19.9    | -      | -       | В       | В       | AB     | В         | AB       | Α        | В   | Α        | Α       | No                    | No           | 0.550          |
|                 |   | LC_DC3  | 10   | 0.001                      | b      | 3.84    | 4.48    | 6.73    | 45.1     | 159    | 552                  | 751    | 1,258    | 1,540 | 2,015   | Н      | Н       | Н       | Н       | G      | F         | Е        | D        | С   | В        | Α       | <u> </u>              | 1            | 29.0           |
|                 | ]   | LC_SPDC | 7    | 0.001                      | -      | -       | -       | b       | 27.0     | 125    | 476                  | 641    |          | 1,327 | 1,749   | -      | -       | -       | Н       | G      | F         | E        | D        | С   | В        | Α       | <u> </u>              | 1            | 29.6           |
|                 |   | LC_DCDS | 8    | 0.001                      | -      | -       | b       | 4.94    | 37.5     | 146    | 524                  | 699    |          | 1,400 |         | -      | -       | Н       | Н       | G      | F         | E        | D        | С   | В        | Α       | <b>1</b>              | 1            | 33.0           |
| Sulphate        | <u>                                    </u> | LC_DC2  | 5    | 0.001                      | b      | 18.8    | -       | -       | -        | -      | -                    |        | 1,232    | _     |         | D      | D       | -       | -       | -      | -         | -        | С        | В   | AB       | Α       | No                    | No           | 17.7           |
|                 | _Mine-                                      | LC_DC4  | 3    | 0.001                      | -      | -       | -       | -       | -        | -      | -                    | b      | 52.0     | 116   | 159     | -      | -       | -       | -       | -      | -         | -        | D        | С   | В        | Α       | <u> </u>              | 1            | 20.1           |
|                 | Exposed                                     | LC_DC1  | 10   | 0.001                      | b      | 2.37    | 15.5    | 24.4    | 38.6     | 84.3   | 297                  | 435    | 650      | 1,041 | 1,292   | Н      | Н       | GH      | GH      | G      | F         | E        | D        | С   | В        | A       | <u> </u>              | <b>1</b>     | 22.0           |
|                 |   | FR_FR5  | 9    | 0.001                      | b      | 9.11    | 10.9    | 5.23    | 12.5     | 19.1   | 20.9                 | -      | 19.7     | 37.7  | 31.8    | С      | BC      | ABC     | С       | ABC    | ABC       | ABC      | -        | ABC   | Α        | AB      | No                    | No           | -4.31          |
|                 |   | LC_FRUS | 1    | 0.919                      | nc     | nc      | nc      | nc      | nc       | nc     | nc                   | nc     | nc       | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc       | nc  | nc       | nc      | No                    | No           | nc             |
|                 |   | LC_FRB  | 10   | 0.001                      | b      | 19.5    | 19.4    | 20.3    | 18.0     | 30.9   | 25.2                 | 1      | 30.4     | 48.3  | 48.1    | С      | BC      | BC      | BC      | BC     | AB        | В        | AB       | AB  | A        | A       | No                    | No           | -0.188         |
|                 |   | LC GRCK | 10   | 0.001                      | b      | 6.41    | 4.95    | 11.8    | 13.8     | 15.9   | 15.1                 | 17.3   | 13.1     | 12.8  | 3.00    | С      | ABC     | ABC     | ABC     | AB     | Α         | AB       | Α        | AB  | ABC      | BC      | No                    | No           | -8.66          |



P-value < 0.05 (annual variation).

> 20% Decrease in concentration.

> 33% Decrease in concentration.

> 50% Decrease in concentration.

> 25% Increase in concentration.

> 50% Increase in concentration.

> 75% Increase in concentration.

> 100% Increase in concentration.

\*Bold Significant increase or decrease from base year b.

<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>&</sup>lt;sup>c</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

| Parameter         | Area Type | Area               |        | nnual<br>ation <sup>a</sup> | Q1: Is  | there a    | positive<br>Magnitu |             | (b) of      | monito     | oring?       |              |              |              | se year       | Q2: Is    | the 202 | 2 annua | al mean  | greate    | r or less | s than a | II annua<br>(2022 |          | rical me  | eans (20 | 112 to 2022) a | nd the pre     | vious year            |
|-------------------|-----------|--------------------|--------|-----------------------------|---------|------------|---------------------|-------------|-------------|------------|--------------|--------------|--------------|--------------|---------------|-----------|---------|---------|----------|-----------|-----------|----------|-------------------|----------|-----------|----------|----------------|----------------|-----------------------|
| Parameter         | Area Type | Area               |        |                             | 2042    |            |                     |             |             | •          |              |              |              |              |               | 2010      | 22.42   |         | 2245     | 2242      | 2045      | 2242     | 22.42             |          | 2224      |          | 2022 vs.       | 2022 v         | s. 2021               |
|                   |           |                    | DF     | P-Value                     | 2012    | 2013       | 2014                | 2015        | 2016        | 2017       | 2018         | 2019         | 2020         | 2021         | 2022          | 2012      | 2013    | 2014    | 2015     | 2016      | 2017      | 2018     | 2019              | 2020     | 2021      | 2022     | 2012-2021      | Trend          | MOD                   |
|                   | Reference | LC_DCEF            | 10     | 0.293                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   | Reference | LC_UC              | 8      | 0.645                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   |           | LC_DC3             | 10     | 0.001                       | b       | 0.984      | 2.37                | 14.4        | 30.4        | 60.7       | 182          | 212          | 341          | 374          | 461           | F         | F       | F       | EF       | Е         | D         | С        | С                 | В        | В         | Α        | <b>↑</b>       | <b>↑</b>       | 18.4                  |
|                   |           | LC_SPDC            | 7      | 0.001                       | -       | -          | -                   | b           | 7.75        | 29.3       | 125          | 145          |              | 291          | 352           | -         | -       | -       | F        | F         | Е         | D        | D                 | С        | В         | Α        | <b>1</b>       | 1              | 15.8                  |
|                   | -         | LC_DCDS            | 8      | 0.001                       | -       | -          | b                   | 3.11        | 9.63        | 30.1       | 122          | 147          | 241          | 274          | 335           | -         | -       | E       | Е        | Е         | D         | С        | С                 | В        | В         | Α        | 1              | <b>↑</b>       | 16.5                  |
| Total Dissolved   | -         | LC_DC2             | 5      | 0.001                       | b       | 10.7       | -                   | -           | -           | -          | -            | 143          | 234          | 261          | 299           | D         | D       | -       | -        | -         | -         | -        | С                 | В        | AB        | Α        | No             | No             | 10.5                  |
| Solids            | Mine-     | LC_DC4             | 3      | 0.001                       | -       | -          | -                   | -           | -           | -          | -            | b            | 23.1         | 46.8         | 58.9          | -         | -       | -       | -        | -         | -         | -        | D                 | С        | В         | Α        | <u> </u>       | <b>↑</b>       | 8.28                  |
|                   | Exposed   | LC_DC1             | 10     | 0.001                       | b       | 2.17       | -1.99               | 7.50        | 11.6        | 17.1       | 57.6         | 61.7         | 89.8         | 137          | 150           | Е         | DE      | E       | DE       | DE        | D         | С        | С                 | В        | Α         | Α        | No             | No             | 5.64                  |
|                   |           | FR_FR5             | 9      | 0.005                       | b       | 9.52       | 10.3                | 2.83        | 8.79        | 13.9       | 9.69         | -            | 17.4         | 22.0         | 14.7          | В         | AB      | AB      | В        | AB        | AB        | AB       | -                 | AB       | Α         | AB       | No             | No             | -5.98                 |
|                   | -         | LC_FRUS            | 1      | 0.309                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   | -         | LC_FRB             | 10     | 0.001                       | b       | 14.7       | 14.2                | 12.9        | 13.5        | 21.0       | 18.8         | +            | 22.7         | 30.2         | 30.4          | С         | ABC     | ABC     | BC       | BC        | AB        | AB       | AB                | AB       | Α         | Α        | No             | No             | 0.114                 |
|                   |           | LC_GRCK            | 10     | 0.347                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   | Reference | LC_DCEF            | 10     | 0.001                       | b       | 11.5       | 6.10                | 6.74        | 2.35        | 1.16       | -0.167       | 0.0183       | -5.48        | -0.797       | 1.77          | BC        | Α       | AB      | AB       | ABC       | ABC       | BC       | ВС                | С        | BC        | ABC      | No             | No             | 2.59                  |
|                   |           | LC_UC              | -      | -                           | -       | -          | -                   | -           | -           | -          | -            | -            | -            | -            | -             | -         | -       | -       |          | -         | -         | -        | -                 | -        | -         | -        | No             | No             | -                     |
|                   | -         | LC_DC3             | 10     | 0.001                       | b       | 6.09       | 1.30                | 5.14        | 14.8        | 53.8       | 146          | 161          | 152          | 284          | 246           | E         | E       | E       | E        | E         | D         | С        | С                 | С        | Α         | В        | No             | <u></u>        | -10.0                 |
|                   | -         | LC_SPDC            | 7      | 0.001                       | -       | -          | -                   | b           | -2.91       | 24.9       | 107          | 116          | 107          | 215          | 194           | -         | -       | -       | D        | D         | С         | В        | В                 | В        | Α         | Α        | No             | No             | -6.53                 |
| A () (OL)         | -         | LC_DCDS            | 8      | 0.001                       | -       | -          | b                   | 15.4        | 16.5        | 55.7       | 150          | 160          | 153          | 256          | 245           | -         | -       | E       | D        | D         | С         | В        | В                 | В        | Α         | Α        | No             | No             | -3.17                 |
| Antimony (Sb)-    |           | LC_DC2             | 5      | 0.001                       | b       | 0.226      | -                   | -           | -           | -          | -            | 117          | 104          | 200          | 181           | С         | С       | -       | -        | -         | -         | -        | В                 | В        | Α         | Α        | No             | No             | -6.16                 |
| Total             | Mine-     | LC_DC4             | 3      | 0.001                       | -       | -          |                     | -           | -           | -          | -            | b            | -8.77        | 34.7         | 36.6          | -         | -       | -       | -        | -         | -         | -        | В                 | В        | Α         | Α        | No             | No             | 1.42                  |
|                   | Exposed   | LC_DC1             | 10     | 0.001                       | b       | 3.59       | 10.7                | 4.30        | 10.5        | 16.3       | 39.9         | 1            | 27.8         | 84.1         | 91.2          | D         | D       | CD      | D        | D         | CD        | В        | В                 | BC       | Α         | Α        | No             | No             | 3.87                  |
|                   | -         | FR_FR5             | 9      | 0.637                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   | -         | LC_FRUS            | 1      | 0.176                       | nc      | nc         | nc                  | nc          | nc          | nc         | nc           | nc           | nc           | nc           | nc            | nc        | nc      | nc      | nc       | nc        | nc        | nc       | nc                | nc       | nc        | nc       | No             | No             | nc                    |
|                   | -         | LC_FRB             | 10     | 0.001                       | b       | -4.63      | -7.59               | -11.9       | -24.0       | -24.3      | -8.63        | -21.9        | -10.3        | -6.52        | -3.55         | AB        | AB      | AB      | AB       | AB        | AB        | AB       | В                 | AB       | AB        | Α        | No             | No             | 3.18                  |
|                   |           | LC_GRCK            | -      | - 0.040                     |         | - 4.40     | -                   | -           | -           | - 0.45     | -            | -            |              | -            | - 7.50        | -         | -       | -       | -        | -         | -         | -        | -                 | -        | -         | -        | No             | No             | - 4.00                |
|                   | Reference | LC_DCEF            | 10     | 0.040                       | b       | 4.42       | -0.202              | 4.31        | 3.10        | 8.15       | 6.87         | 9.62         | 5.17         | 8.84         | 7.53          | Α         | Α       | A       | A        | A         | A         | A        | A                 | A        | A         | A        | No             | No             | -1.20                 |
|                   |           | LC_UC              | 8      | 0.005                       | -       | -          | b                   | -0.777      | -1.26       | 1.99       | -2.20        |              |              | 1.35         | 2.56          | -         | -       | AB      | AB       | AB        | A         | AB       | AB                | В        | A         | A        | No             | No             | 1.20                  |
|                   | -         | LC_DC3             | 10     | 0.001                       | b       | 2.01       | 0.194               | 10.00       | 22.4        | 48.9       | 93.7<br>68.1 | 87.2<br>59.2 |              | 122          | 70.9          | F         | F       | F       | EF       | E         | D         | В        | BC                | В        | A         | С        | No             | <b>—</b>       | -23.1                 |
|                   | -         | LC_SPDC<br>LC DCDS | 7      | 0.001                       | -       | -          | -<br>b              | b           | 2.72        | 25.7       |              |              | 65.9         | 87.8<br>39.8 | 53.1          | -         | -       | -       | D        | D         | С         | В        | В                 | В        | A         | В        | No             | <b>—</b>       | -18.5                 |
|                   | -         | _                  | 8      | 0.001                       | -<br>b  | - 0 11     | b                   | -12.1       | -11.7       | -3.13      |              | 47.0         | 31.6<br>90.1 | 39.8<br>62.2 | 19.6<br>52.8  | -<br>D    | -<br>D  | С       | С        | С         | С         | AB       | AB                | AB       | A         | B        | No<br>No       | N <sub>1</sub> | <b>-14.4</b><br>-5.83 |
| Barium (Ba)-Total | Mine-     | LC_DC2<br>LC_DC4   | 5<br>3 | 0.001                       | b<br>-  | 8.11       | -                   | -           | -           | -          | -            | <b>47.0</b>  | 11.6         | 19.1         | 52.8<br>19.1  | -<br>-    | D -     | -       | -        | -         | -         | -        | C                 | A<br>B   | B<br>A    | BC<br>A  | No<br>No       | No<br>No       | -5.83<br>-0.0185      |
|                   | Exposed   | LC_DC4             | 10     | 0.001                       | b<br>b  | 3.12       | -1.26               | 2.17        | 3.31        | 14.6       | 30.6         |              | 47.7         | 70.1         | 67.8          | E         | DE      | E       | E        | E         | -<br>D    | C        | BC                | В        | A         | A        | No             | No             | -1.33                 |
|                   | LAPUSEU   | FR FR5             | 9      | 0.001                       | b       | 9.67       | 9.34                | -3.03       | -2.02       | -0.937     | -10.8        |              | -8.42        | -15.0        | -15.6         | ABC       | A       | AB      | ABCD     | ABCD      | ABC       | CD       | - BC              | BCD      | D         | D        | No             | No             | -0.683                |
|                   | -         | LC FRUS            | 1      | 0.436                       |         |            |                     |             |             |            |              |              |              |              |               |           |         |         |          |           |           |          |                   |          |           |          | No             | No             |                       |
|                   |           | LC_FRUS            | 10     | 0.436                       | nc<br>b | nc<br>5.25 | nc<br>3.36          | nc<br>0.941 | nc<br>-5.49 | nc<br>3.40 | nc<br>-10.6  | nc<br>-6.47  | nc<br>-8.41  | nc<br>-3.84  | nc<br>-8.96   | nc<br>ABC | nc<br>A | nc<br>A | nc<br>AB | nc<br>ABC | nc<br>A   | nc<br>C  | nc<br>ABC         | nc<br>BC | nc<br>ABC | nc<br>BC | No             | No             | nc<br>-5.32           |
|                   |           | LC_FRB             | 10     | 0.001                       | nc      | 0.20<br>nc | nc                  | nc          | -5.49<br>nc |            |              |              |              | -3.04<br>nc  | -0.90<br>nc   | nc        | nc      | nc      |          | nc        | nc        | nc       |                   | nc       | nc        | nc       | No             | No             | -5.32<br>nc           |
|                   |           | LC_GRCK            | 9      | 0.052                       | b       | -7.26      | -2.29               | -13.3       | -23.7       | nc         | nc<br>-23.8  | nc<br>-21.4  | nc<br>-22.5  | -18.9        | - <b>20.6</b> |           | AB      | _       | nc<br>BC | D         | HC        | D        | nc<br>CD          | CD       | CD        | CD       | No             | No             | -2.09                 |
| Boron (B)-Total   | Reference | _                  |        |                             | D       |            |                     |             |             | 20.4       |              |              |              |              |               | Α         |         | Α       |          |           | -<br>DE   |          |                   | E        | CD        | CDE      |                |                | -2.09<br>-4.98        |
| ·                 |           | LC_UC              | 8      | 0.001                       | -       | -          | b                   | -14.0       | -22.1       | -29.4      | -30.2        | -25.8        | -31.7        | -24.4        | -28.2         | -         | -       | Α       | В        | С         | DE        | DE       | CDE               | E        | CD        | UDE      | No             | No             | -4.98                 |



P-value < 0.05 (annual variation).

- > 20% Decrease in concentration.
- > 33% Decrease in concentration.
- > 43% Decrease in concentration.
- > 50% Decrease in concentration.
- > 25% Increase in concentration.
- > 50% Increase in concentration.
- 75% Increase in concentration.100% Increase in concentration.

\*Bold Significant increase or decrease from base year b.

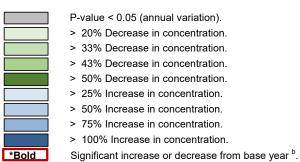
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha = 0.05$ ) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

 $<sup>^{\</sup>rm c}$  Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                   |   |           |    | nnual<br>ation <sup>a</sup> | Q1: Is | there a | -               |                  | (b) of | monito | oring? |       |       |                    | se year | Q2: Is  | the 202 | 2 annua | al mean | greater | r or less | s than a | II annua<br>(2022 |      | rical me | eans (20 | 12 to 2022) a         | and the pre | vious year      |
|-------------------|---|-----------|----|-----------------------------|--------|---------|-----------------|------------------|--------|--------|--------|-------|-------|--------------------|---------|---------|---------|---------|---------|---------|-----------|----------|-------------------|------|----------|----------|-----------------------|-------------|-----------------|
| Parameter         | Area Type                               | Area      | DF | P-Value                     | 2012   | 2013    | Magnitu<br>2014 | ude of D<br>2015 | 2016   | 2017   | 2018   | 2019  | 2020  | 2021               | 2022    | 2012    | 2013    | 2014    | 2015    | 2016    | 2017      | 2018     | 2019              | 2020 | 2021     | 2022     | 2022 vs.<br>2012-2021 | 2022 v      | rs. 2021<br>MOD |
|                   |   | LC DC3    | 5  | 0.001                       | b      | -       | -2.05           | -8.44            |        |        | _      |       | -8.89 | 3.79               | 1.49    | AB      |         | AB      | В       | _       | _         |          |                   | В    | ۸        | ۸        | No                    | No          | -2.22           |
|                   |   | LC_DC3    | 3  | 0.001                       | -      | -       | -2.05           | -0.44<br>b       | -      | -      | -      | -     | -6.64 | 5.80               | 2.94    | AD<br>- | -       | AD      | AB      | _       | -         | -        | -                 | В    | A        | A        | No                    | No          | -2.22<br>-2.70  |
|                   |   | LC_SFDC   | 4  | 0.001                       |        | -       | b               | <b>-9.61</b>     | -      |        | -      | -     | -14.7 | -4.91              | -4.60   |         |         | A       | BC      | -       | -         | -        | -                 | С    | AB       | AB       | No                    | No          | 0.318           |
|                   | -                                       | LC_DCD3   | 3  | 0.047                       | b      | -1.65   | -               | -9.01            | -      | -      | -      |       | -14.7 | - <del>9</del> .31 | -8.00   | A       | A       | -       | -       | -       |           |          |                   | -    | A        | A        | No                    | No          | 1.29            |
|                   | Mine-                                   | LC_DC2    | -  | 0.047                       | -      | -1.00   | _               | _                | _      |        | -      | _     |       | -3.17              | -0.00   | -       | -       | -       | _       | _       |           |          |                   |      | -        | -        | No                    | No          | 1.20            |
| Boron (B)-Total   | Exposed                                 | LC DC1    | 4  | 0.002                       | b      | -0.537  | 3.08            | -10.5            | _      | _      | _      | _     |       | _                  | -19.2   | AB      | AB      | Α       | AB      | -       | _         |          |                   | _    | _        | В        | No                    | No          | 0               |
|                   | _,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | FR FR5    | 8  | 0.001                       | b      | -5.84   | -3.49           | -10.3            | -28.6  | -      | -25.2  | -     | -21.1 | -16.4              | -12.8   | A       | AB      | AB      | ABC     | D       | -         | CD       | _                 | BCD  | BCD      | ABCD     | No                    | No          | 4.32            |
|                   |   | LC FRUS   | 1  | 0.267                       | nc     | nc      | nc              | nc               | nc     | nc     | nc     | nc    | nc    | nc                 | nc      | nc      | nc      | nc      | nc      | nc      | nc        | nc       | nc                | nc   | nc       | nc       | No                    | No          | nc              |
|                   |   | LC FRB    | 4  | 0.044                       | b      | 0.0951  | 3.72            | -4.59            | -      | -      | -      | -     | -     | -12.0              | -       | AB      | AB      | A       | AB      | -       | -         | -        | -                 | -    | В        | -        | No                    | No          | -               |
|                   | ļ.                                      | LC GRCK   | 10 | 0.001                       | b      | 1.90    | 4.41            | -12.1            | -18.5  | -18.1  | -18.2  | -18.7 | -13.5 | -12.3              | -11.7   | Α       | Α       | Α       | В       | В       | В         | В        | В                 | В    | В        | В        | No                    | No          | 0.636           |
|                   |   | LC DCEF   | 10 | 0.097                       | nc     | nc      | nc              | nc               | nc     | nc     | nc     | nc    | nc    | nc                 | nc      | nc      | nc      | nc      | nc      | nc      | nc        | nc       | nc                | nc   | nc       | nc       | No                    | No          | nc              |
|                   | Reference                               | LC UC     | 8  | 0.001                       | -      | -       | b               | -56.4            | -63.0  | -55.6  |        | -54.5 |       | -54.9              | -31.7   | _       | -       | Α       | ВС      | С       | ВС        | ВС       | ВС                | ВС   | ВС       | AB       | No                    | No          | 51.5            |
|                   |   | LC DC3    | 10 | 0.001                       | b      | -6.96   | -2.94           | 33.6             | 39.8   | 78.3   | 110    | 98.3  | 198   | 440                | 393     | Е       | Е       | Е       | DE      | DE      | CD        | С        | С                 | В    | Α        | Α        | No                    | No          | -8.66           |
|                   | ļ.                                      | LC SPDC   | 7  | 0.001                       | -      | -       | -               | b                | -32.0  | -15.8  | 2.98   | -2.45 |       | 136                | 220     | -       | -       | -       | D       | Е       | DE        | D        | D                 | С    | В        | Α        | <b>↑</b>              | <b>↑</b>    | 35.6            |
|                   | F                                       | LC DCDS   | 8  | 0.001                       | -      | -       | b               | 30.7             | 2.60   | 35.4   | 59.0   | 62.0  | 182   | 266                | 408     | -       | -       | Е       | DE      | Е       | D         | D        | D                 | С    | В        | Α        | <u> </u>              | <u> </u>    | 38.7            |
| Cadmium (Cd)-     | ļ-                                      | LC DC2    | 5  | 0.001                       | b      | -5.00   | -               | -                | -      | -      | -      | 59.8  | 122   | 182                | 261     | Е       | Е       | -       | -       | -       | -         | -        | D                 | С    | В        | Α        | <u> </u>              | <u> </u>    | 28.1            |
| Total             | Mine-                                   | LC DC4    | 3  | 0.001                       | -      | -       | -               | -                | -      | -      | -      | b     | 25.8  | 60.4               | 101     | -       | -       | -       | -       | -       | -         | -        | D                 | С    | В        | Α        | <u> </u>              | <u> </u>    | 25.4            |
|                   | Exposed                                 | LC DC1    | 10 | 0.001                       | b      | 5.18    | 12.5            | 14.3             | -1.33  | 5.21   | 21.9   | 24.7  | 45.6  | 86.4               | 159     | CD      | CD      | CD      | CD      | D       | D         | CD       | CD                | ВС   | В        | Α        | <u> </u>              | <u> </u>    | 39.2            |
|                   | ·                                       | FR FR5    | 9  | 0.001                       | b      | 18.9    | 8.34            | -18.5            | -17.2  | -18.1  | -7.00  | -     | 15.7  | -2.20              | 25.2    | AB      | Α       | AB      | В       | В       | В         | AB       | -                 | AB   | AB       | Α        | No                    | No          | 28.0            |
|                   | ļ.                                      | LC FRUS   | 1  | 0.022                       | -      | -       | b               | -20.4            | _      | -      | -      | -     | -     | _                  | -       | _       | -       | Α       | В       | _       | -         | -        | _                 | _    | -        | -        | 1                     |             | _               |
|                   | ļ.                                      | LC FRB    | 10 | 0.001                       | b      | -7.69   | -21.6           | -35.5            | -44.9  | -39.0  | -26.5  | -39.5 | -24.3 | -18.0              | -17.6   | Α       | AB      | ABC     | ABC     | С       | ВС        | ABC      | С                 | ABC  | AB       | AB       | No                    | No          | 0.490           |
|                   | F                                       | LC GRCK   | 8  | 0.495                       | nc     | nc      | nc              | nc               | nc     | nc     | nc     | nc    | nc    | nc                 | nc      | nc      | nc      | nc      | nc      | nc      | nc        | nc       | nc                | nc   | nc       | nc       | No                    | No          | nc              |
|                   |   | LC DCEF   | -  | -                           | -      | -       | -               | -                | -      | -      | -      | -     | -     | -                  | -       | -       | -       | -       | -       | -       | -         | -        | -                 | -    | -        | -        | No                    | No          | _               |
|                   | Reference                               | LC_UC     | -  | -                           | -      | -       | -               | -                | -      | -      | -      | -     | -     | -                  | -       | -       | -       | -       | -       | -       | -         | -        | -                 | -    | -        | -        | No                    | No          | _               |
|                   |   | LC DC3    | 7  | 0.001                       | -      | -       | -               | b                | 7.65   | 142    | 351    | 207   | 385   | 341                | 41.0    | _       | -       | -       | С       | С       | В         | Α        | AB                | Α    | Α        | С        | No                    |             | -68.1           |
|                   | F                                       | LC SPDC   | 7  | 0.001                       | -      | -       | -               | b                | -23.8  | 54.1   | 150    | 67.7  | 148   | 144                | -19.9   | -       | -       | -       | CD      | D       | ВС        | AB       | ABC               | Α    | Α        | D        | No                    | .l.         | -67.2           |
|                   | ļ.                                      | LC DCDS   | 6  | 0.001                       | -      | -       | _               | b                | -      | 64.0   | 192    | 80.9  | 163   | 136                | -15.1   | _       | -       | -       | CD      | _       | ВС        | Α        | В                 | Α    | AB       | D        | No                    | Ī           | -64.0           |
|                   | ļ.                                      | LC DC2    | 2  | 0.068                       | nc     | nc      | nc              | nc               | nc     | nc     | nc     | nc    | nc    | nc                 | nc      | nc      | nc      | nc      | nc      | nc      | nc        | nc       | nc                | nc   | nc       | nc       | No                    | No          | nc              |
| Cobalt (Co)-Total | Mine-                                   | LC DC4    | -  | -                           | -      | -       | -               | -                | -      | -      | -      | -     | -     | -                  | -       | -       | -       | -       | -       | -       | -         | -        | -                 | -    | -        | -        | No                    | No          | -               |
|                   | Exposed                                 | LC DC1    | -  | _                           | _      | _       | _               | _                | _      | _      | _      | _     | _     | _                  | _       | _       | _       | _       | _       | _       | _         | _        | _                 | _    | _        | _        | No                    | No          | _               |
|                   | '                                       | FR FR5    | 3  | 0.037                       | -      | _       | b               | _                | _      | _      | _      | _     | 31.6  | -31.3              | 22.6    | _       | _       | AB      | _       | _       | _         | _        | _                 | Α    | В        | Α        | No                    | 1.10        | 78.5            |
|                   | <u> </u>                                | LC FRUS   | -  | -                           | ١      | _       | -               | _                | _      | _      | _      | _     | -     | -                  | -       | _       | _       |         | _       | _       | _         | _        | _                 | -    | -        | -        | No                    | No          | -               |
|                   | <u> </u>                                | LC FRB    | 2  | 0.166                       | nc     | nc      | nc              | nc               | nc     | nc     | nc     | nc    | nc    | nc                 | nc      | nc      | nc      | nc      | nc      | nc      | nc        | nc       | nc                | nc   | nc       | nc       | No                    | No          | nc              |
|                   | <br>                                    | LC GRCK   | -  | -                           | -      | -       | -               | -                | -      | -      | -      | -     | -     | -                  | -       | -       | -       | -       | -       | -       | -         | -        | -                 | -    | -        | -        | No                    | No          | -               |
|                   |   | _0_011011 | _  | _                           |        | _       | _               | _                | _      | _      |        | _     |       | _                  |         |         | _       |         |         |         | _         | _        |                   |      | _        | _        | . 10                  | 140         | _               |



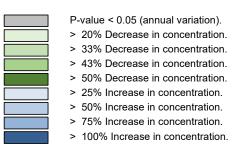
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>&</sup>lt;sup>c</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                    |           |                   | An      | nual               | Q1: Is | there a | positive | or neg      |              | nange ir<br>monito |              | ntration     | ns since   | the ba     | se year      | Q2: Is  | the 202 | 2 annua | al mean  | greate        | r or less | than al   | II annua  | al histor        | ical me  | ans (20 | )12 to 2022) a        | nd the pre   | vious year          |
|--------------------|-----------|-------------------|---------|--------------------|--------|---------|----------|-------------|--------------|--------------------|--------------|--------------|------------|------------|--------------|---------|---------|---------|----------|---------------|-----------|-----------|-----------|------------------|----------|---------|-----------------------|--------------|---------------------|
|                    |           | _                 | Varia   | ation <sup>a</sup> |        | -       | Magnitu  | de of D     | • •          |                    |              | Rasa V       | ear (b)    | С          |              |         |         |         |          |               |           |           | (2022     | ?)? <sup>c</sup> |          |         |                       |              |                     |
| Parameter          | Area Type | Area              | DF      | P-Value            | 2012   | 2013    | 2014     | 2015        |              | 2017               | 2018         | 2019         | 2020       | 2021       | 2022         | 2012    | 2013    | 2014    | 2015     | 2016          | 2017      | 2018      | 2019      | 2020             | 2021     | 2022    | 2022 vs.<br>2012-2021 |              | rs. 2021            |
|                    |           | LO DOFF           | 40      | 0.044              | -      | 0.00    | 0.04     | F 00        | 44.0         | 2.04               | 0.004        | 0.00         | 0.00       | 2.07       | 4.04         | 4 D     | -       | 1       | A D      | ^             | 4 D       | Б         | 4 D       | Б                | 4 D      | 4 D     |                       | Trend        | MOD                 |
|                    | Reference | LC_DCEF<br>LC UC  | 10      | 0.011              | b      | -2.96   | -2.91    | 5.36        | 14.9<br>8.44 | 3.94               | -0.801       |              | -2.33      | 3.07       | 1.84<br>6.58 | AB      | В       | B       | AB<br>AB | A             | AB<br>ABC | В         | AB<br>ABC | В                | AB<br>AB | AB      | No                    | No           | -1.19               |
| -                  |           | _                 | 8       | 0.001              | -      | - 2.61  | b        | 3.38        | 30.2         | -0.632             |              | 1.49         | -6.01      | 3.66       |              | -       | -       | ABC     |          | A<br>F        | F         | BC<br>E   |           | С                |          | A       | No                    | No           | 2.82<br><b>36.5</b> |
|                    | :         | LC_DC3<br>LC SPDC | 10<br>7 | 0.001              | b<br>- | -3.61   | -7.39    | 15.7        | 10.0         | <b>31.7</b> 13.2   | 92.3<br>65.9 | 131<br>94.8  | 267<br>193 | 357<br>274 | 523<br>418   | GH<br>- | GH      | Н       | FG<br>F  | F F           | F         | E         | D<br>D    | С                | В        | A       |                       |              | 38.5                |
|                    |           | _                 | 8       |                    |        | -       |          | b           |              | -22.1              |              |              | 88.8       | 152        | 234          | -       | -       | EF      | F        | <u>г</u><br>F |           | E         | D         | C                | B<br>B   | A       | <u> </u>              | <u> </u>     | 32.5                |
|                    | -         | LC_DCDS<br>LC DC2 | 5       | 0.001              | b      | 13.0    | b<br>-   | -7.68       | -8.24        | -22.1              | 10.8         | 78.3         | 115        | 185        | 244          | E       | E       | ⊏□      | Г        | Г             | G         |           | D         | С                | В        | A       | <u> </u>              |              | 20.6                |
| Lithium (Li)-Total | Mine-     | LC_DC2            | 3       | 0.001              | -      | 13.0    | -        | -           | -            | -                  | -            | 7 <b>6.3</b> | 11.8       | 42.0       | 64.0         |         | -       | -       | -        | -             | -         | -         | D         | С                | В        |         | <u> </u>              |              | 15.4                |
|                    | Exposed   | LC_DC4            | 10      | 0.001              | -<br>b | 0.289   | -7.18    | 7.08        | 12.6         | 6.36               | 20.8         |              | 41.9       | 82.0       | 110          | -<br>FG | FG      | G       | -<br>F   | EF            | -<br>F    | DE        | CD        | С                | В        | A       | 1                     | <u> </u>     | 15.4                |
|                    | LAPUSEU   | FR FR5            | 9       | 0.001              | b      | 15.1    | 16.1     | <b>36.0</b> | <b>63.1</b>  | <b>65.8</b>        | 57.5         | 32.U<br>-    | 71.6       | 113        | 132          | E       | DE      | DE      | CD       | В             | В         | BC        | -         | В                | А        | A       | No                    | No           | 8.54                |
|                    |           | LC FRUS           | 1       | 0.001              | -      | -       | b        | 12.7        | -            | -                  | 37.3         |              | 7 1.0      | 113        | 102          | -       | DL<br>- | В       | A        |               | _         | <u>БС</u> |           | -                | -        | -       | 110                   | 1 <b>N</b> O | 0.54                |
|                    |           | LC_FR03           | 10      | 0.001              | b      | 16.4    | 22.9     | 35.0        | -<br>55.1    | 54.8               | 49.9         | 61.6         | 78.5       | 122        | 144          | F       | EF      | E       | DE       | BCD           | BCD       | CD        | BC        | В                | A        | A       | No                    | No           | 9.96                |
|                    |           | LC GRCK           | 10      | 0.001              | b      | 5.09    | -2.59    | -7.58       | -9.74        | -1.79              | -3.78        |              |            | 2.23       | 11.2         | ABCD    | AB      | BCD     | CD       | D             | BCD       | BCD       | CD        | ABCD             | ABC      | A       | No                    | No           | 8.82                |
|                    |           | LC_ORER           | 10      | 0.016              | b      | 49.6    | -46.8    | -79.1       | -55.6        | -52.8              | -66.4        | -24.2        |            | 0.994      | 14.2         | AB      | A       | AB      | B        | AB            | AB        | AB        | AB        | AB               | AB       | AB      | No                    | No           | 13.1                |
|                    | Reference | LC UC             | 8       | 0.001              | -      | -       | b        | -73.6       | <b>-74.3</b> |                    | -61.4        | -62.5        |            | -65.1      | -23.3        | -       | -       | A       | С        | C             | ABC       | ABC       | ABC       | BC               | ABC      | AB      | No                    | No           | 120                 |
| -                  |           | LC_DC3            | 10      | 0.001              | b      | -27.9   | 36.1     | 133         | 189          |                    | 1,178        |              | 355        |            | 189          | FG      | G       | EFG     | DEF      | DE            | AB        | A         | BC        | CD               | A        | DE      | No                    | 110          | -82.8               |
|                    |           | LC SPDC           | 7       | 0.001              | -      | -21.9   | -        | b           | -6.43        | 117                | 187          | 42.7         | 93.7       | 471        | 44.0         | -       | -       |         | D        | D             | BC        | В         | CD        | BC               | A        | CD      | No                    | <del>\</del> | -74.8               |
|                    | :         | LC DCDS           | 8       | 0.001              | -      | -       | b        | 127         | 161          | 597                | 826          | 361          | 453        | 1,380      | 314          | _       | _       | F       | E        | DE            | BC        | AB        | CD        | BC               | A        | CD      | No                    | <del>\</del> | -72.0               |
| Manganese (Mn)-    | :         | LC DC2            | 5       | 0.001              | b      | -29.6   | -        | -           | -            | -                  | -            | 123          | 54.7       | 484        | 131          | ВС      | С       |         | -        | -             | -         | -         | В         | BC               | A        | В       | No                    | <del>↓</del> | -60.4               |
| Total              | Mine-     | LC DC4            | 3       | 0.001              | -      | -       | _        | -           | -            | -                  | _            | b            | -5.27      | 93.7       | 4.89         | -       | -       | -       | _        | _             | _         | _         | В         | В                | A        | В       | No                    | <del>\</del> | -45.8               |
| . 5 ta.:           | Exposed   | LC DC1            | 10      | 0.001              | b      | 47.8    | 2.54     | 14.8        | 4.79         | 35.5               | 59.2         | 35.1         | 21.7       | 111        | 35.4         | В       | AB      | В       | В        | В             | В         | AB        | В         | В                | A        | В       | No                    | <del>↓</del> | -35.8               |
|                    |           | FR FR5            | 9       | 0.060              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    | :         | LC FRUS           | 1       | 0.001              | -      | -       | b        | -29.4       | -            | -                  | -            | -            | -          | -          | -            | -       | -       | A       | В        | -             | -         | -         | -         | -                | -        | -       | 110                   | 1            | -                   |
|                    | -         | LC FRB            | 10      | 0.006              | b      | 6.08    | -24.5    | -44.6       | -47.0        | -40.9              | -34.9        | -49.4        | -39.2      | -24.9      | -36.4        | Α       | Α       | AB      | AB       | AB            | AB        | AB        | В         | AB               | AB       | AB      | No                    | No           | -15.2               |
|                    |           | LC GRCK           | 10      | 0.140              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    |           | LC DCEF           | 5       | 0.414              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    | Reference | LC UC             | -       | -                  | -      | -       | -        | -           | -            | -                  | -            | -            | -          | -          | -            | -       | -       | -       | -        | -             | -         | -         | -         | -                | -        | -       | No                    | No           | -                   |
|                    |           | LC DC3            | 6       | 0.001              | -      | -       | -        | -           | b            | 67.3               | 23.8         | 29.4         | 9.84       | 79.6       | -7.75        | -       | -       | -       | -        | С             | AB        | ВС        | ABC       | С                | Α        | С       | No                    | Ţ            | -48.6               |
|                    |           | LC SPDC           | 5       | 0.081              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    |           | LC DCDS           | 5       | 0.032              | -      | -       | -        | -           | b            | 27.9               | 0.703        |              |            | 16.0       | -            | -       | -       | -       | -        | Α             | Α         | Α         | Α         | Α                | Α        | -       | No                    | No           | -                   |
| Mercury (Hg)-      |           | LC DC2            | 2       | 0.065              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
| Total              | Mine-     | LC DC4            | 2       | 0.421              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    | Exposed   | LC DC1            | 5       | 0.482              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    | •         | FR FR5            | 2       | 0.384              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    |           | LC FRUS           | -       | -                  | -      | -       | -        | -           | -            | -                  | -            | -            | -          | -          | -            | -       | -       | -       | -        | -             | -         | -         | -         | -                | -        | -       | No                    | No           | -                   |
|                    |           | LC FRB            | 5       | 0.199              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |
|                    |           | LC GRCK           | 3       | 0.689              | nc     | nc      | nc       | nc          | nc           | nc                 | nc           | nc           | nc         | nc         | nc           | nc      | nc      | nc      | nc       | nc            | nc        | nc        | nc        | nc               | nc       | nc      | No                    | No           | nc                  |



\*Bold Significant increase or decrease from base year <sup>b</sup>.

Notes: "ns" = not significant: "-" insufficient data for comparison, where insufficient data is less than 6 months of recorded data or > 75% LRL data in a given year "nc" = nost.

Notes: "ns" = not significant; "-" insufficient data for comparison, where insufficient data is less than 6 months of recorded data or > 75% LRL data in a given year. "nc" = post-hoc test not conducted because of non-significant year term.

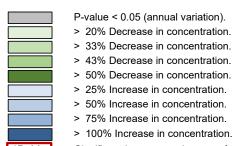
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha$  = 0.05) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>&</sup>lt;sup>c</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                   |             |         |    | nual<br>ation <sup>a</sup> | Q1: Is | there a | •     | or neg   | (b) of | monito   | ring?    |        |         |       | se year | Q2: Is | the 202 | 2 annua | al mean | greate | r or less | s than a | ll annua<br>(2022 |      | rical me | eans (20 | )12 to 2022) a | nd the pre | vious year |
|-------------------|-------------|---------|----|----------------------------|--------|---------|-------|----------|--------|----------|----------|--------|---------|-------|---------|--------|---------|---------|---------|--------|-----------|----------|-------------------|------|----------|----------|----------------|------------|------------|
| Parameter         | Area Type   | Area    |    |                            |        | '       |       | ide oi D | merenc | e (IVIOL | , 110111 | Dase I | ear (D) |       |         |        |         |         |         |        |           |          |                   |      |          |          | 2022 vs.       | 2022 v     | s. 2021    |
|                   |             |         | DF | P-Value                    | 2012   | 2013    | 2014  | 2015     | 2016   | 2017     | 2018     | 2019   | 2020    | 2021  | 2022    | 2012   | 2013    | 2014    | 2015    | 2016   | 2017      | 2018     | 2019              | 2020 | 2021     | 2022     | 2012-2021      | Trend      | MOD        |
|                   | D (         | LC DCEF | 10 | 0.722                      | nc     | nc      | nc    | nc       | nc     | nc       | nc       | nc     | nc      | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc                | nc   | nc       | nc       | No             | No         | nc         |
|                   | Reference   | LC UC   | 8  | 0.005                      | -      | -       | b     | 5.47     | 5.97   | 5.36     | 8.53     | 0.950  | 8.38    | 7.00  | 11.9    | -      | -       | В       | AB      | AB     | AB        | AB       | В                 | AB   | AB       | Α        | No             | No         | 4.57       |
|                   |             | LC DC3  | 10 | 0.001                      | b      | -1.36   | -6.80 | -4.64    | 9.07   | 53.0     | 188      | 243    | 262     | 279   | 320     | FG     | FG      | FG      | G       | F      | Е         | D        | С                 | ВС   | В        | Α        | <b>↑</b>       | <b>↑</b>   | 10.7       |
|                   |             | LC_SPDC | 7  | 0.001                      | -      | -       | 1     | b        | 10.5   | 50.9     | 191      | 230    | 244     | 436   | 588     | -      | -       | -       | F       | F      | Е         | D        | CD                | С    | В        | Α        | <u> </u>       | <u> </u>   | 28.3       |
|                   |             | LC_DCDS | 8  | 0.001                      | -      | -       | b     | 0.311    | 12.0   | 48.8     | 177      | 215    | 234     | 407   | 538     | -      | -       | F       | F       | F      | Е         | D        | С                 | С    | В        | Α        | <u> </u>       | 1          | 25.7       |
| Molybdenum (Mo)-  |             | LC_DC2  | 5  | 0.001                      | b      | 8.10    | -     | -        | -      | -        | -        | 170    | 159     | 345   | 406     | С      | С       | -       | -       | -      | -         | -        | В                 | В    | Α        | Α        | No             | No         | 13.7       |
| Total             | Mine-       | LC_DC4  | 3  | 0.001                      | -      | -       | -     | -        | -      | -        | -        | b      | -5.99   | 55.8  | 83.4    | -      | -       | -       | -       | -      | -         | -        | С                 | С    | В        | Α        | <b>↑</b>       | <b>↑</b>   | 17.7       |
|                   | Exposed     | LC_DC1  | 10 | 0.001                      | b      | 2.13    | -10.8 | -7.11    | 0.379  | 4.80     | 36.3     | 41.4   | 27.0    | 105   | 137     | D      | D       | D       | D       | D      | D         | С        | С                 | С    | В        | Α        | <b>↑</b>       | <b>↑</b>   | 15.5       |
|                   |             | FR_FR5  | 9  | 0.001                      | b      | 4.51    | -2.11 | -6.12    | 4.01   | -2.52    | -7.84    | -      | 17.6    | 17.4  | 62.8    | В      | В       | В       | В       | В      | В         | В        | -                 | В    | В        | Α        | 1              | <b>↑</b>   | 38.7       |
|                   |             | LC_FRUS | 1  | 0.877                      | nc     | nc      | nc    | nc       | nc     | nc       | nc       | nc     | nc      | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc                | nc   | nc       | nc       | No             | No         | nc         |
|                   |             | LC_FRB  | 10 | 0.001                      | b      | 0.242   | -4.55 | -6.34    | -3.37  | -6.78    | -2.94    | -2.42  | 9.88    | 18.4  | 49.5    | ВС     | ВС      | ВС      | С       | ВС     | С         | С        | С                 | ВС   | В        | Α        | 1              | <b>↑</b>   | 26.3       |
|                   |             | LC_GRCK | 10 | 0.693                      | nc     | nc      | nc    | nc       | nc     | nc       | nc       | nc     | nc      | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc                | nc   | nc       | nc       | No             | No         | nc         |
|                   | Reference   | LC_DCEF | -  | -                          | -      | -       | -     | -        | -      | -        | -        | -      | -       | -     | -       | -      | -       | -       | -       | -      | -         | -        | -                 | -    | -        | -        | No             | No         | -          |
|                   | Neierence   | LC_UC   | -  | -                          | -      | -       | -     | -        | ı      | -        | -        | -      | -       | -     | -       | -      | -       | -       | -       | -      | -         | -        | -                 | -    | -        | -        | No             | No         | -          |
|                   |             | LC_DC3  | 10 | 0.001                      | b      | -11.2   | -16.0 | 31.8     | 36.4   | 114      | 459      | 673    | 1,293   | 1,158 | 1,720   | FG     | G       | G       | F       | F      | Е         | D        | С                 | В    | В        | Α        | <b>↑</b>       | <b>↑</b>   | 44.6       |
|                   |             | LC_SPDC | 7  | 0.001                      | -      | -       | -     | b        | -14.9  | 25.7     | 235      | 365    | 683     | 559   | 1,049   | -      | -       | -       | EF      | F      | E         | D        | С                 | В    | В        | Α        | <b>↑</b>       | <b>↑</b>   | 74.3       |
|                   |             | LC_DCDS | 8  | 0.001                      | -      | -       | b     | 44.9     | 42.3   | 126      | 510      | 716    | 1,278   | 1,089 | 2,004   | -      | -       | G       | F       | F      | E         | D        | С                 | В    | В        | Α        | <b>1</b>       | 1          | 77.0       |
| Nickel (Ni)-Total |             | LC_DC2  | 5  | 0.001                      | b      | -7.96   | -     | -        | -      | -        | -        | 522    | 677     | 780   | 1,348   | D      | D       | -       | -       | -      | -         | -        | С                 | BC   | В        | Α        | <b></b>        | 1          | 64.5       |
| Moker (M)-Total   | Mine-       | LC_DC4  | 3  | 0.001                      | -      | -       | -     | -        | -      | -        | -        | b      | 20.8    | 66.0  | 195     | -      | -       | -       | -       | -      | -         | -        | С                 | С    | В        | Α        | <b>↑</b>       | <b>↑</b>   | 77.7       |
|                   | Exposed     | LC_DC1  | 10 | 0.001                      | b      | -0.146  | 26.5  | 23.6     | 10.1   | 22.5     | 124      | 173    | 252     | 332   | 653     | Е      | E       | Е       | E       | Е      | Е         | D        | CD                | BC   | В        | Α        | 1              | <b>↑</b>   | 74.4       |
|                   |             | FR_FR5  | 9  | 0.013                      | b      | 12.8    | -26.2 | -36.9    | 28.5   | -10.5    | -12.1    | -      | -2.14   | 3.73  | 32.3    | AB     | AB      | AB      | В       | Α      | AB        | AB       | -                 | AB   | AB       | Α        | No             | No         | 27.5       |
|                   |             | LC_FRUS | 1  | 0.033                      | -      | -       | b     | -23.8    | -      | -        | -        | -      | -       | -     | -       | -      | -       | Α       | Α       | -      | -         | -        | -                 | -    | -        | -        | No             | No         | -          |
|                   |             | LC_FRB  | 10 | 0.001                      | b      | -25.1   | -55.9 | -63.0    | -45.7  | -49.9    | -43.2    | -51.2  | -32.7   | -16.9 | -15.2   | Α      | ABCD    | DE      | E       | BCDE   | DE        | CDE      | DE                | ABCD | ABC      | AB       | No             | No         | 2.08       |
|                   |             | LC_GRCK | -  | -                          | -      | -       | -     | -        | -      | -        | -        | -      | -       | -     | -       | -      | -       | -       | -       | -      | -         | -        | -                 | -    | -        | -        | No             | No         | -          |
|                   | Reference   | LC_DCEF | 10 | 0.001                      | b      | 9.77    | 8.40  | 17.4     | 21.8   | 23.6     | 18.1     | 28.7   | 28.1    | 24.8  | 29.1    | D      | CD      | CD      | ВС      | AB     | AB        | ВС       | Α                 | AB   | AB       | AB       | No             | No         | 3.42       |
| ]                 | 1.010101100 | LC_UC   | 8  | 0.001                      | -      | -       | b     | -1.45    | 17.4   | 22.2     | 35.2     | 40.6   | 37.0    | 50.3  | 46.0    | -      | -       | D       | D       | С      | BC        | AB       | AB                | AB   | Α        | Α        | No             | No         | -2.84      |
|                   |             | LC_DC3  | 10 | 0.001                      | b      | 12.8    | 6.86  | 24.1     | 74.4   | 332      | 1,325    |        | 3,446   | 4,306 | 5,293   | Н      | Н       | Н       | Н       | G      | F         | E        | D                 | С    | В        | Α        | 1              | 1          | 22.4       |
|                   |             | LC_SPDC | 7  | 0.001                      | -      | -       | -     | b        | 32.2   | 253      | 994      |        | 2,616   |       | 4,066   | -      | -       | -       | Н       | G      | F         | E        | D                 | С    | В        | Α        | 1              | <b>1</b>   | 19.9       |
|                   |             | LC_DCDS | 8  | 0.001                      | -      | -       | b     | 2.42     | 34.0   | 223      | 974      |        | 2,603   | _     | _       | -      | -       | Н       | Н       | G      | F         | E        | D                 | С    | В        | Α        | 1              | <b>↑</b>   | 25.4       |
| Selenium (Se)-    |             | LC_DC2  | 5  | 0.001                      | b      | 16.1    | -     | -        | -      | -        | -        | 1,315  | 2,508   | _     | _       | D      | D       | -       | -       | -      | -         | -        | С                 | В    | AB       | Α        | No             | No         | 17.4       |
| Total             | Mine-       | LC_DC4  | 3  | 0.001                      | -      | -       | -     | -        | -      | -        | -        | b      | 75.6    | 149   | 187     | -      | -       | -       | -       | -      | -         | -        | D                 | С    | В        | Α        | 1              | <b>↑</b>   | 15.1       |
|                   | Exposed     | LC_DC1  | 10 | 0.001                      | b      | 6.43    | 6.45  | 10.2     | 23.4   | 99.1     | 421      | 661    | 1,177   | 1,847 | 2,143   | F      | F       | F       | F       | F      | Е         | D        | С                 | В    | Α        | Α        | No             | No         | 15.2       |
|                   |             | FR_FR5  | 9  | 0.001                      | b      | 17.8    | 19.1  | 6.17     | 8.33   | 20.9     | 24.1     | -      | 32.1    | 47.8  | 35.0    | Е      | BCDE    | BCDE    | DE      | CDE    | ABCDE     | ABCD     | -                 | ABC  | Α        | AB       | No             | No         | -8.61      |
|                   |             | LC_FRUS | 1  | 0.136                      | nc     | nc      | nc    | nc       | nc     | nc       | nc       | nc     | nc      | nc    | nc      | nc     | nc      | nc      | nc      | nc     | nc        | nc       | nc                | nc   | nc       | nc       | No             | No         | nc         |
|                   |             | LC_FRB  | 10 | 0.001                      | b      | 22.9    | 22.5  | 13.5     | 11.3   | 27.4     | 24.5     | 25.9   | 41.0    | 59.1  | 42.3    | D      | BCD     | BCD     | CD      | CD     | ВС        | BC       | BC                | AB   | Α        | AB       | No             | No         | -10.6      |
|                   |             | LC_GRCK | 10 | 0.002                      | b      | 12.4    | 8.12  | 6.99     | 6.81   | 13.5     | 12.8     | 13.9   | 13.7    | 17.5  | 12.0    | В      | AB      | AB      | AB      | AB     | Α         | Α        | Α                 | Α    | Α        | AB       | No             | No         | -4.75      |



\*Bold Significant increase or decrease from base year <sup>b</sup>.

Notes: "ns" = not significant; "-" insufficient data for comparison, where insufficient data is less than 6 months of recorded data or > 75% LRL data in a given year. "nc" = post-hoc test not conducted because of non-significant year term.

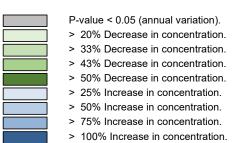
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha = 0.05$ ) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>°</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                      |           |         | An    | nual               | Q1: Is   | there a | positive   | or neg  |          |        |                      | entration | ns since | the ba | se year | Q2: Is | the 202 | 2 annua      | al mean    | greate | r or less | than a     | II annu | al histor | ical me   | ans (20   | )12 to 2022) a        | nd the prev  | vious vear     |
|----------------------|-----------|---------|-------|--------------------|--|---------|------------|---------|----------|--------|----------------------|-----------|----------|--------|---------|--------|---------|--------------|------------|--------|-----------|------------|---------|-----------|-----------|-----------|-----------------------|--------------|----------------|
|                      |           |         |       | ation <sup>a</sup> |  |         |            |         | • •      | monito |                      |           |          |        |         | Q2. 10 | 202     | <b>2</b> aa. | ui iiiouii | grouto | 01 1000   | , tilali a | (2022   |           | ioui iiio | ,u115 (20 | 712 (0 2022) 0        | ina the pro- | vious your     |
| Parameter            | Area Type | Area    | Valle | ation              |  |         | Magnitu    | de of D | ifferenc | e (MOE | )) <sup>b</sup> from | Base Y    | ear (b)  | C      |         |        |         |              |            |        |           |            | (2022   | -):       |           |           |                       |              |                |
|                      |           |         | DF    | P-Value            | 2012   | 2013    | 2014       | 2015    | 2016     | 2017   | 2018                 | 2019      | 2020     | 2021   | 2022    | 2012   | 2013    | 2014         | 2015       | 2016   | 2017      | 2018       | 2019    | 2020      | 2021      | 2022      | 2022 vs.<br>2012-2021 | 2022 vs      | s. 2021<br>MOD |
|                      |           | LC DCEF | 10    | 0.002              | b  | 2.72    | 0.397      | 7.82    | 16.1     | 14.9   | 8.71                 | 14.1      | 2.53     | 8.68   | 12.4    | Α      | Α       | Α            | Α          | Α      | ۸         | Α          | ۸       | Α         | Α         | Α         | No                    | No           | 3.44           |
|                      | Reference | LC UC   | 8     | 0.002              | -  | 2.12    | 0.397<br>b | 6.33    | 11.5     | 5.31   | 4.08                 |           | 0.346    | 10.1   | 4.27    | -      | -       | В            | AB         | A      | A<br>AB   | AB         | A<br>AB | В         | AB        | AB        | No                    | No           | -5.27          |
|                      |           | LC_DC3  | 10    | 0.003              | b  | -4.31   | -8.33      | 13.6    | 47.2     | 113    | 367                  | 468       | 706      | 833    | 942     | G      | G       | G            | G          |        | E         | D          | С       | В         | A         | A         | No                    | No           | 11.6           |
|                      |           | LC_DC3  | 7     | 0.001              | -  | -4.51   | -0.33      | b       | 14.6     | 73.9   | 258                  | 329       | 519      | 622    | 739     | -      | -       | -            | G          | G      | F         | E          | D       | С         | В         | A         | 140                   | 110          | 16.3           |
|                      |           | LC_DCDS | 8     | 0.001              | <del>                                     </del> | -       | b          | 8.57    | 17.5     | 64.5   | 246                  | 316       | 489      | 569    | 693     | -      | _       | G            | G          | G      | F         | E          | D       | C         | В         | A         | <u> </u>              | <u> </u>     | 18.6           |
|                      |           | LC_DCD3 | 5     | 0.001              | b  | 17.7    | -          | - 0.57  | - 17.5   | 04.5   | 240                  | 324       | 459      | 597    | 674     | D      | D       | -            | -          |        | <u> </u>  |            | С       | В         | A         | A         | No                    | No           | 11.0           |
| Uranium (U)-Total    | Mine-     | LC_DC2  | 3     | 0.001              | -  | -       | -          |         |          | _      | -                    | b         | 12.9     | 59.9   | 89.2    | -      | -       | -            |            |        | _         | _          | D       | С         | В         | A         | 110                   | 110          | 18.3           |
|                      | Exposed   | LC_DC4  | 10    | 0.001              | -<br>b   | 4.08    | -7.28      | -0.728  | 10.0     | 18.1   | 67.9                 |           | 94.5     | 175    | 225     | EFG    | EFG     | G            | FG         | EF.    | E         | D          | CD      | C         | В         | A         | <u> </u>              | <u> </u>     | 18.4           |
|                      | Джроооч   | FR FR5  | 9     | 0.001              | b  | 7.50    | 3.47       | 1.80    | 12.7     | 16.9   | 18.7                 | -         | 32.5     | 45.2   | 44.7    | C      | С       | С            | C          | BC     | BC        | BC         | -       | AB        | A         | A         | No                    | No           | -0.361         |
|                      |           | LC FRUS | 1     | 0.199              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |
|                      |           | LC FRB  | 10    | 0.001              | b  | 10.2    | 7.32       | 8.03    | 16.3     | 22.7   | 21.7                 | 28.0      | 33.7     | 52.8   | 48.8    | E      | DE      | DE           | DE         | CDE    | BCD       | BCD        | BC      | В         | A         | A         | No                    | No           | -2.66          |
|                      |           | LC GRCK | 10    | 0.357              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |
|                      |           | LC DCEF | -     | -                  | -  | -       | -          | -       | -        | -      | -                    | -         | -        | -      | -       | -      | -       | -            | -          | -      | -         | -          | -       | -         | -         | -         | No                    | No           | -              |
|                      | Reference | LC UC   | -     | _                  | -  | -       | -          | -       | -        | _      | -                    | -         | -        | _      | _       | -      | -       | -            | -          | -      | -         | -          | -       | -         | _         | _         | No                    | No           | -              |
|                      |           | LC DC3  | 9     | 0.001              | b  | -7.32   | -          | 17.2    | 21.8     | 65.6   | 84.6                 | 83.1      | 255      | 368    | 375     | D      | D       | -            | D          | D      | CD        | С          | С       | В         | Α         | Α         | No                    | No           | 1.49           |
|                      |           | LC SPDC | 7     | 0.001              | -  | -       | -          | b       | -20.5    | -17.1  | -6.99                |           | 95.5     | 136    | 201     | -      | -       | -            | С          | C      | С         | C          | C       | В         | В         | Α         | 1                     | <b>↑</b>     | 27.3           |
|                      |           | LC DCDS | 6     | 0.001              | -  | -       | b          | -       | -        | 38.6   | 16.0                 | 33.5      | 152      | 182    | 308     | -      | -       | С            | -          | -      | С         | С          | С       | В         | В         | Α         | <u> </u>              | <u> </u>     | 44.7           |
| 7' - (7 ·) T · ( · ) |           | LC DC2  | 4     | 0.001              | b  | -       | -          | -       | -        | -      | -                    | 5.83      | 50.5     | 125    | 173     | В      | -       | -            | -          | -      | -         | -          | В       | В         | Α         | Α         | No                    | No           | 21.4           |
| Zinc (Zn)-Total      | Mine-     | LC DC4  | 2     | 0.001              | -  | -       | -          | -       | -        | -      | -                    | -         | b        | 13.2   | 124     | -      | -       | -            | -          | -      | -         | -          | -       | В         | В         | Α         | <b>↑</b>              | <b>↑</b>     | 97.9           |
|                      | Exposed   | LC_DC1  | 2     | 0.805              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |
|                      |           | FR_FR5  | 2     | 0.264              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |
|                      |           | LC_FRUS |       | -                  | -  | -       | -          | -       | -        | -      | -                    | -         | -        | -      | -       | -      | -       | -            | -          | -      | -         | -          | -       | -         | -         | -         | No                    | No           | -              |
|                      |           | LC_FRB  | 1     | 0.162              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |
|                      |           | LC_GRCK | -     | -                  | -  | -       | -          | -       | -        | -      | -                    | -         | -        | -      | -       | -      | -       | -            | -          | -      | -         | -          | -       | -         | -         | -         | No                    | No           | -              |
|                      | Reference | LC_DCEF | 10    | 0.002              | b  | 6.37    | -3.77      | -11.9   | -8.58    | -4.96  | 6.61                 | -1.64     | -6.97    | -3.13  | -4.42   | AB     | Α       | AB           | В          | AB     | AB        | Α          | AB      | AB        | AB        | AB        | No                    | No           | -1.33          |
|                      | Reference | LC_UC   | 8     | 0.008              | -  | -       | b          | -16.2   | -25.3    | -22.5  | -5.66                | -14.0     | -4.58    | -5.26  | -0.271  | -      | -       | AB           | AB         | В      | AB        | AB         | AB      | AB        | AB        | Α         | No                    | No           | 5.27           |
|                      |           | LC_DC3  | 10    | 0.001              | b  | -2.30   | -7.48      | 3.83    | 4.31     | 42.6   | 139                  | 122       | 238      | 190    | 492     | EF     | EF      | F            | F          | F      | Е         | CD         | D       | В         | BC        | Α         | 1                     | 1            | 104            |
|                      |           | LC_SPDC | 7     | 0.001              | -  | -       | -          | b       | -14.8    | 28.2   | 67.3                 |           | 306      | 255    | 643     | -      | -       | -            | EF         | F      | DE        | CD         | С       | В         | В         | Α         | <u></u>               | <b>↑</b>     | 109            |
|                      |           | LC_DCDS | 8     | 0.001              | -  | -       | b          | -14.0   | -24.1    | 15.7   | 49.4                 | 61.6      | 254      | 215    | 561     | -      | -       | EF           | EF         | F      | DE        | CD         | С       | В         | В         | Α         | <b>↑</b>              | 1            | 110            |
| Cadmium (Cd)-        |           | LC_DC2  | 5     | 0.001              | b  | 7.20    | -          | -       | -        | -      | -                    | 68.1      | 153      | 175    | 354     | D      | D       | -            | -          | -      | -         | -          | С       | В         | В         | Α         | <u></u>               | <b>↑</b>     | 65.0           |
| Dissolved            | Mine-     | LC_DC4  | 3     | 0.001              | -  | -       | -          | -       | -        | -      | _                    | b         | 32.9     | 54.7   | 116     | -      | -       | -            | -          | -      | -         | -          | D       | С         | В         | Α         | 1                     | 1            | 39.4           |
|                      | Exposed   | LC_DC1  | 10    | 0.001              | b  | 1.62    | -3.30      | -8.95   | -7.41    | 4.61   | 23.5                 | 21.5      | 61.2     | 95.8   | 168     | DE     | DE      | Е            | Е          | Е      | Е         | D          | D       | С         | В         | Α         | <b>↑</b>              | 1            | 37.1           |
|                      |           | FR_FR5  | 9     | 0.005              | b  | -10.4   | -6.32      | -18.6   | -24.3    | -22.4  | -9.23                | -         | 4.50     | 0.0160 | 6.24    | AB     | AB      | AB           | AB         | В      | AB        | AB         | -       | AB        | AB        | Α         | No                    | No           | 6.23           |
|                      |           | LC_FRUS | 1     | 0.004              | -  | -       | b          | -34.0   | -        | -      | -                    | -         | -        | -      | -       | -      | -       | Α            | В          | -      | -         | -          | -       | -         | -         | -         | <b>\</b>              | $\downarrow$ | -              |
|                      |           | LC_FRB  | 10    | 0.001              | b  | 14.4    | 7.69       | -26.2   | -33.1    | -26.7  | 7.49                 | -22.0     | -2.25    | 5.91   | 11.8    | ABC    | Α       | Α            | BCD        | D      | CD        | Α          | CD      | AB        | Α         | Α         | No                    | No           | 5.52           |
|                      |           | LC_GRCK | 5     | 0.503              | nc   | nc      | nc         | nc      | nc       | nc     | nc                   | nc        | nc       | nc     | nc      | nc     | nc      | nc           | nc         | nc     | nc        | nc         | nc      | nc        | nc        | nc        | No                    | No           | nc             |



\*Bold Significant increase or decrease from base year <sup>b</sup>.

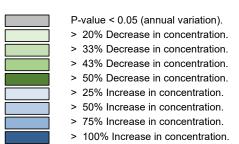
<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha = 0.05$ ) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>°</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

| Parameter         | Area Type                                    | Area    |    | nual<br>ation <sup>a</sup> | Q1: Is 1 | there a <sub>l</sub> |      |      |      | monito | ring? |      |       |       | se year | Q2: Is | the 2022 | 2 annua | al mean | greate | r or les | s than a | III annua<br>(2022 |      | rical me | ans (20 | )12 to 2022) a | nd the pre | vious year |
|-------------------|--|---------|----|----------------------------|----------|----------------------|------|------|------|--------|-------|------|-------|-------|---------|--------|----------|---------|---------|--------|----------|----------|--------------------|------|----------|---------|----------------|------------|------------|
|                   | <b>,</b> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |         | DF | P-Value                    | 2012     | 2013                 | 2014 | 2015 | 2016 | 2017   | 2018  | 2019 | 2020  | 2021  | 2022    | 2012   | 2013     | 2014    | 2015    | 2016   | 2017     | 2018     | 2019               | 2020 | 2021     | 2022    | 2022 vs.       | 2022 v     | s. 2021    |
|                   |  |         | D, | 1 - Value                  | 2012     | 2010                 | 2014 | 2010 | 2010 | 2017   | 2010  | 2013 | 2020  | 2021  | LULL    | 2012   | 2010     | 2017    | 2010    | 2010   | 2017     | 2010     | 2013               | 2020 | 2021     | 2022    | 2012-2021      | Trend      | MOD        |
|                   | Reference                                    | LC_DCEF | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | reservice                                    | LC_UC   | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_DC3  | 4  | 0.001                      | -        | -                    | -    | -    | -    | b      | 154   | 31.2 | 150   | 108   | -       | -      | -        | -       | -       | -      | В        | Α        | В                  | Α    | Α        | -       | No             | No         | -          |
|                   | -  | LC_SPDC | 4  | 0.001                      | -        | -                    | -    | -    | -    | b      | 99.5  | 32.4 | 157   | 153   | -       | -      | -        | -       | -       | -      | С        | AB       | ВС                 | Α    | Α        | -       | No             | No         | -          |
|                   |  | LC_DCDS | 4  | 0.001                      | -        | -                    | -    | -    | -    | b      | 141   | 25.8 | 174   | 142   | -       | -      | -        | -       | -       | -      | В        | Α        | В                  | Α    | Α        | -       | No             | No         | -          |
| Cobalt (Co)-      | -  | LC_DC2  | 1  | 0.069                      | nc       | nc                   | nc   | nc   | nc   | nc     | nc    | nc   | nc    | nc    | nc      | nc     | nc       | nc      | nc      | nc     | nc       | nc       | nc                 | nc   | nc       | nc      | No             | No         | nc         |
| Dissolved         | Mine-  | LC_DC4  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | Exposed                                      | LC_DC1  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | FR_FR5  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_FRUS | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_FRB  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | LC_GRCK | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | Reference                                    | LC_DCEF | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | 11010101100                                  | LC_UC   | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_DC3  | 3  | 0.001                      | -        | -                    | -    | -    | -    | -      | -     | b    | 99.2  | 137   | 178     | -      | -        | -       | -       | -      | -        | -        | С                  | В    | AB       | Α       | No             | No         | 17.4       |
|                   | -  | LC_SPDC | 3  | 0.005                      | -        | -                    | -    | -    | -    | -      | -     | b    | 27.3  | 13.4  | 48.7    | -      | -        | -       | -       | -      | -        | -        | В                  | AB   | AB       | Α       | No             | No         | 31.2       |
| DMSeO -           |  | LC_DCDS | 3  | 0.046                      | -        | -                    | -    | -    | -    | -      | -     | b    | 9.87  | 1.40  | 33.6    | -      | -        | -       | -       | -      | -        | -        | Α                  | Α    | Α        | Α       | No             | No         | 31.8       |
| Dimethylselenoxid |  | LC_DC2  | 3  | 0.018                      | -        | -                    | -    | -    | -    | -      | -     | b    | -16.5 | 13.4  | 24.8    | -      | -        | -       | -       | -      | -        | -        | AB                 | В    | AB       | Α       | No             | No         | 10.0       |
| е                 | Mine-  | LC_DC4  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
| _                 | Exposed                                      | LC_DC1  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | FR_FR5  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_FRUS | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_FRB  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | LC_GRCK | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | Reference                                    | LC_DCEF | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | 11010101100                                  | LC_UC   | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   | -  | LC_DC3  | 3  | 0.023                      | -        | -                    | -    | -    | -    | -      | -     | b    | 9.96  | -8.71 | -0.135  | -      | -        | -       | -       | -      | -        | -        | AB                 | Α    | В        | AB      | No             | No         | 9.39       |
|                   | -  | LC_SPDC | 3  | 0.001                      | -        | -                    | -    | -    | -    | -      | -     | b    | -3.79 | -32.5 | -21.1   | -      | -        | -       | -       | -      | -        | -        | Α                  | Α    | В        | В       | No             | No         | 16.9       |
| MeSe(IV) -        | -  | LC_DCDS | 3  | 0.001                      | -        | -                    | -    | -    | -    | -      | -     | b    | -6.36 | -39.6 | -20.9   | -      | -        | -       | -       | -      | -        | -        | Α                  | AB   | С        | В       | No             | 1          | 31.0       |
| Methylseleninic   | _  | LC_DC2  | 3  | 0.001                      | -        | -                    | -    | -    | -    | -      | -     | b    | -27.5 | -28.4 | -17.5   | -      | -        | -       | -       | -      | -        | -        | Α                  | В    | В        | AB      | No             | No         | 15.2       |
| Acid              | Mine-  | LC_DC4  | 1  | 0.688                      | nc       | nc                   | nc   | nc   | nc   | nc     | nc    | nc   | nc    | nc    | nc      | nc     | nc       | nc      | nc      | nc     | nc       | nc       | nc                 | nc   | nc       | nc      | No             | No         | nc         |
| , .5.5            | Exposed                                      | LC_DC1  | 3  | 0.806                      | nc       | nc                   | nc   | nc   | nc   | nc     | nc    | nc   | nc    | nc    | nc      | nc     | nc       | nc      | nc      | nc     | nc       | nc       | nc                 | nc   | nc       | nc      | No             | No         | nc         |
|                   |  | FR_FR5  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | LC_FRUS | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | LC_FRB  | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        | -       | -       | -      | -        | -        | -                  | -    | -        | -       | No             | No         | -          |
|                   |  | LC_GRCK | -  | -                          | -        | -                    | -    | -    | -    | -      | -     | -    | -     | -     | -       | -      | -        |         | -       |        | -        | -        | -                  | -    | -        | -       | No             | No         | -          |



\*Bold Significant increase or decrease from base year <sup>b</sup>.

Note: "pe" = not significant: " " insufficient data for comparison, where insufficient data is less than 6 months of recorded data or > 75% LPL data in a given year. "pe" = per

Notes: "ns" = not significant; "-" insufficient data for comparison, where insufficient data is less than 6 months of recorded data or > 75% LRL data in a given year. "nc" = post-hoc test not conducted because of non-significant year term.

<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term ( $\alpha = 0.05$ ) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>&</sup>lt;sup>c</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.3: Temporal Changes in Water Chemistry Constituents at Stations, Dry Creek LAEMP, 2012 to 2022

|                    |           |         |          | nnual<br>riation <sup>a</sup> | Q1: Is |      |      | e or neg         | (b) of | monito         | ring? |      |                 |      | se year | Q2: Is | the 202 | 2 annu | al mean | greater | or less | s than a | II annua<br>(2022 |      | rical me | ans (20 | 12 to 2022) a | ind the pre | vious year |
|--------------------|-----------|---------|----------|-------------------------------|--------|------|------|------------------|--------|----------------|-------|------|-----------------|------|---------|--------|---------|--------|---------|---------|---------|----------|-------------------|------|----------|---------|---------------|-------------|------------|
| Parameter          | Area Type | Area    | DF       | P-Value                       | 2012   | 2013 | 2014 | ude of D<br>2015 | 2016   | e (MOL<br>2017 | 2018  | 2019 | ear (b)<br>2020 | 2021 | 2022    | 2012   | 2013    | 2014   | 2015    | 2016    | 2017    | 2018     | 2019              | 2020 | 2021     | 2022    | 2022 vs.      | 2022 v      | rs. 2021   |
|                    |           |         | <u> </u> | 1 Value                       | 2012   | 20.0 | 2014 | 2010             | 2010   | 2017           | 2010  | 2010 | 2020            | 2021 | 2022    | 2012   | 2010    | 2014   | 2010    | 2010    |         | 2010     | 2010              | 2020 | 2021     | 2022    | 2012-2021     | Trend       | MOD        |
|                    | Reference | LC_DCEF | 3        | 0.624                         | nc     | nc   | nc   | nc               | nc     | nc             | nc    | nc   | nc              | nc   | nc      | nc     | nc      | nc     | nc      | nc      | nc      | nc       | nc                | nc   | nc       | nc      | No            | No          | nc         |
|                    | Reference | LC_UC   | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_DC3  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 74.3            | 115  | 172     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 26.6       |
|                    |           | LC_SPDC | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 77.7            | 121  | 174     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 24.2       |
|                    |           | LC_DCDS | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 78.8            | 109  | 174     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 31.5       |
| Se(VI) - Selenate  |           | LC_DC2  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 83.3            | 126  | 168     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 18.5       |
| Se(VI) - Selenate  | Mine-     | LC_DC4  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 75.4            | 154  | 197     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 16.7       |
|                    | Exposed   | LC_DC1  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 62.0            | 141  | 175     | -      | -       | -      | -       | -       | -       | -        | D                 | С    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 14.4       |
|                    |           | FR_FR5  | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_FRUS | •        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        |         | No            | No          | -          |
|                    |           | LC_FRB  | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_GRCK | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    | Reference | LC_DCEF | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    | Reference | LC_UC   | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_DC3  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 21.3            | 26.0 | 48.3    | -      | -       | -      | -       | -       | -       | -        | С                 | В    | В        | Α       | 1             | <b>↑</b>    | 17.7       |
|                    |           | LC_SPDC | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 7.58            | 6.34 | 21.2    | -      | -       | -      | -       | -       | -       | -        | В                 | В    | В        | Α       | <b>↑</b>      | <b>↑</b>    | 14.0       |
|                    |           | LC_DCDS | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | 9.71            | 4.33 | 23.9    | -      | -       | -      | -       | -       | -       | -        | В                 | AB   | В        | Α       | No            | <b>↑</b>    | 18.7       |
| Se(IV) - Selenite  |           | LC_DC2  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | -16.1           | 9.39 | 23.9    | -      | -       | -      | -       | -       | -       | -        | BC                | С    | AB       | Α       | No            | No          | 13.3       |
| Se(IV) - Selerinte | Mine-     | LC_DC4  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | -13.5           | 52.9 | 71.1    | -      | -       | -      | -       | -       | -       | -        | В                 | В    | Α        | Α       | No            | No          | 11.9       |
|                    | Exposed   | LC_DC1  | 3        | 0.001                         | -      | -    | -    | -                | -      | -              | -     | b    | -6.43           | 42.7 | 40.8    | -      | -       | -      | -       | -       | -       | -        | В                 | В    | Α        | Α       | No            | No          | -1.35      |
|                    |           | FR_FR5  | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_FRUS | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC_FRB  | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |
|                    |           | LC GRCK | -        | -                             | -      | -    | -    | -                | -      | -              | -     | -    | -               | -    | -       | -      | -       | -      | -       | -       | -       | -        | -                 | -    | -        | -       | No            | No          | -          |

> 20% Decrease in concentration. > 33% Decrease in concentration. > 43% Decrease in concentration. > 50% Decrease in concentration. > 25% Increase in concentration. > 50% Increase in concentration.

P-value < 0.05 (annual variation).

> 75% Increase in concentration.

> 100% Increase in concentration.

\*Bold Significant increase or decrease from base year b.

<sup>&</sup>lt;sup>a</sup> The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

b Magnitude of Difference (MOD) was calculated as the concentrations in each year (or 2022) minus the concentration in the first year (or 2021) divided by the concentration in the first year (or 2021) × 100.

<sup>&</sup>lt;sup>c</sup> Significance between each year determined using all pairwise comparisons with Tukey correction.

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area    | Summary Statistic                                   | Total Dissolved<br>Solids (mg/L) | Lab pH     | Field pH | Dissolved<br>Oxygen<br>(mg/L) | Alkalinity<br>(mg/L) | Nitrate-N<br>(mg/L) | Nitrite-N<br>(mg/L) | Ammonia<br>(mg/L) | Total<br>Phosphorus<br>(mg/L) | Orthophosphate<br>(mg/L) | Sulphate<br>(mg/L) | Total<br>Chloride<br>(mg/L) | Total<br>Fluoride<br>(mg/L) | Total<br>Aluminum<br>(mg/L) |
|---------|---|----------------------------------|------------|----------|-------------------------------|----------------------|---------------------|---------------------|-------------------|-------------------------------|--------------------------|--------------------|-----------------------------|-----------------------------|-----------------------------|
|         | n   | 14                               | 14         | 14       | 24                            | 14                   | 14                  | 14                  | 14                | 14                            | 14                       | 14                 | 14                          | 14                          | 14                          |
|         | Annual Minimum                                      | 99                               | 7.8        | 7.5      | 10                            | 111                  | 0.087               | < 0.001             | < 0.005           | 0.0088                        | 0.0038                   | 5                  | 0.19                        | 0.068                       | < 0.003                     |
|         | Annual Maximum                                      | 179                              | 8.4        | 8.1      | 85                            | 160                  | 0.32                | 0.0023              | 0.011             | 0.021                         | 0.016                    | 7.6                | 0.34                        | 0.11                        | 0.06                        |
|         | Annual Mean   | 144                              | 8.1        | 7.8      | 40                            | 145                  | 0.16                | 0.0011              | 0.0054            | 0.013                         | 0.011                    | 6.4                | 0.27                        | 0.099                       | 0.01                        |
|         | Annual Median                                       | 148                              | 8.2        | 7.9      | 11                            | 149                  | 0.13                | 0.001               | 0.005             | 0.013                         | 0.012                    | 6.6                | 0.29                        | 0.11                        | 0.0038                      |
| LC_DCEF | % < LRL   | 0%                               | 0%         | 0%       | 0%                            | 0%                   | 0%                  | 93%                 | 86%               | 0%                            | 0%                       | 0%                 | 0%                          | 0%                          | 29%                         |
|         | % > BCWQG <sup>a</sup>                              | -                                | -          | 0%       | 0%                            | 0%                   | 0%                  | 0%                  | 0%                | _                             | -                        | 0%                 | 0%                          | _                           | 0%                          |
|         | % > BCWQG <sup>b</sup>                              | _                                | -          | _        | 0%                            | _                    | 0%                  | 0%                  | 0%                | _                             | _                        | _                  | 0%                          | 0%                          | _                           |
|         | % > Level 1 Benchmark/UEC                           | 0%                               |            | _        | -                             | _                    | 0%                  | -                   | -                 | _                             | _                        | 0%                 | -                           | -                           | _                           |
|         | % > Level 2 Benchmark/UEC                           | -                                | -          | -        | -                             |                      | 0%                  | -                   | _                 | _                             | _                        | 0%                 | -                           | -                           | _                           |
|         | % > Level 3 Benchmark/UEC                           | -                                | <u>-</u>   | _        |                               |                      | 0%                  |                     | _                 | -                             | _                        | 0%                 |                             | _                           | _                           |
|         | n   | 57                               | 57         | 65       | 105                           | 63                   | 57                  | <u>-</u><br>57      | 57                | 57                            | 57                       | 57                 | 57                          | 57                          | 57                          |
|         | Annual Minimum                                      | 346                              | 6.8        | 7        | 103                           | 110                  | 12                  | 0.002               | <0.005            | 0.02                          | 0.012                    | 106                | 5.1                         | 0.073                       | 0.0038                      |
|         | Annual Maximum                                      | 964                              | 8.3        | 8.6      | 87                            | 189                  | 57                  | 0.002               | 0.003             | 0.02                          | 0.012                    | 340                | 25                          | 0.073                       | 0.0036                      |
|         | Annual Mean   | 723                              | 8.2        | 8        | 41                            | 149                  | 40                  | 0.016               | 0.013             | 0.048                         | 0.029                    | 241                | 17                          | 0.089                       | 0.018                       |
|         | Annual Median                                       | 781                              | 8.2        | 8.1      | 12                            | 150                  | 46                  | 0.0035              | 0.0054            | 0.026                         | 0.024                    | 258                | 17                          | 0.088                       | 0.016                       |
| 10 000  | % < LRL   | 0%                               | 0%         | 0%       | 0%                            | 0%                   | 0%                  | 46%                 | 88%               | 0.026                         | 0.024                    | 258<br>0%          | 0%                          | 54%                         | 0.012                       |
| LC_DC3  |   |                                  |            |          |                               |                      |                     |                     |                   |                               |                          |                    |                             |                             |                             |
|         | % > BCWQG <sup>a</sup>                              | -                                | -          | 0%       | 0%                            | 0%                   | 100%                | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 0%                          |
|         | % > BCWQG <sup>b</sup>                              | -                                | -          | -        | 0%                            | -                    | 68%                 | 0%                  | 0%                | -                             | -                        | -                  | 0%                          | 0%                          | -                           |
|         | % > Level 1 Benchmark/UEC                           | 0%                               | -          | -        | -                             | -                    | 100%                | -                   | -                 | -                             | -                        | 0%                 | •                           | -                           | -                           |
|         | % > Level 2 Benchmark/UEC                           | -                                | -          | -        | -                             | -                    | 79%                 | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 3 Benchmark/UEC                           | -                                | -          | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | n   | 53                               | 53         | 64       | 102                           | 61                   | 53                  | 53                  | 53                | 53                            | 53                       | 53                 | 53                          | 53                          | 53                          |
|         | Annual Minimum                                      | 322                              | 7.2        | 7.3      | 8.3                           | 109                  | 11                  | 0.0022              | <0.005            | 0.015                         | 0.0041                   | 97                 | 4.6                         | 0.072                       | 0.0047                      |
|         | Annual Maximum                                      | 957                              | 8.4        | 8.5      | 88                            | 173                  | 57                  | 0.069               | 0.07              | 0.04                          | 0.029                    | 335                | 25                          | 0.14                        | 0.2                         |
|         | Annual Mean   | 694                              | 8.2        | 8.1      | 40                            | 146                  | 38                  | 0.0095              | 0.0093            | 0.025                         | 0.021                    | 230                | 16                          | 0.089                       | 0.017                       |
|         | Annual Median                                       | 766                              | 8.2        | 8.1      | 12                            | 147                  | 44                  | 0.0071              | 0.0062            | 0.025                         | 0.023                    | 246                | 18                          | 0.092                       | 0.0086                      |
| LC_SPDC | % < LRL   | 0%                               | 0%         | 0%       | 0%                            | 0%                   | 0.0%                | 13%                 | 43%               | 0%                            | 0%                       | 0%                 | 0%                          | 53%                         | 0%                          |
|         | % > BCWQG <sup>a</sup>                              | -                                | -          | 0%       | 0%                            | 0%                   | 100%                | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 0%                          |
|         | % > BCWQG <sup>b</sup>                              | -                                | -          | -        | 0%                            | -                    | 64%                 | 0%                  | 0%                | -                             | -                        |                    | 0%                          | 0%                          | -                           |
|         | % > Level 1 Benchmark/UEC                           | 0%                               | -          | -        | -                             | -                    | 100%                | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 2 Benchmark/UEC                           | -                                | -          | -        | -                             | -                    | 75%                 | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 3 Benchmark/UEC                           | -                                | -          | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | n   | 56                               | 56         | 65       | 104                           | 62                   | 56                  | 56                  | 56                | 56                            | 56                       | 56                 | 56                          | 56                          | 56                          |
|         | Annual Minimum                                      | 312                              | 6.9        | 7.5      | 9                             | 107                  | 9.6                 | 0.0017              | < 0.005           | 0.017                         | 0.0047                   | 85                 | 4                           | 0.054                       | 0.0054                      |
|         | Annual Maximum                                      | 939                              | 8.4        | 8.5      | 94                            | 176                  | 57                  | 0.064               | 0.035             | 0.036                         | 0.029                    | 334                | 25                          | 0.1                         | 0.069                       |
|         | Annual Mean   | 667                              | 8.2        | 8.1      | 41                            | 147                  | 37                  | 0.0089              | 0.0087            | 0.024                         | 0.021                    | 223                | 16                          | 0.086                       | 0.012                       |
|         | Annual Median                                       | 718                              | 8.2        | 8.1      | 12                            | 148                  | 43                  | 0.007               | 0.0064            | 0.024                         | 0.022                    | 236                | 17                          | 0.085                       | 0.0082                      |
| LC_DCDS | % < LRL   | 0%                               | 0%         | 0%       | 0%                            | 0%                   | 0.0%                | 11%                 | 41%               | 0%                            | 0%                       | 0%                 | 0%                          | 54%                         | 0%                          |
|         | % > BCWQG <sup>a</sup>                              | -                                | -          | 0%       | 0%                            | 0%                   | 100%                | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 0%                          |
|         | % > BCWQG <sup>b</sup>                              | -                                | _          |          | 0%                            | _                    | 64%                 | 0%                  | 0%                | _                             | _                        | _                  | 0%                          | 0%                          | _                           |
|         | % > Level 1 Benchmark/UEC <sup>c</sup>              | 0%                               |            | _        | 570                           |                      | 100%                | -                   | -                 | _                             | _                        | 0%                 | -                           | -                           | _                           |
|         | % > Level 1 Benchmark/UEC % > Level 2 Benchmark/UEC | -                                | -          | +        | -                             |                      | 77%                 |                     | -                 | -                             | -                        | 0%                 |                             |                             | -                           |
|         | % > Level 2 Benchmark/UEC % > Level 3 Benchmark/UEC | -                                | -          | -        | -                             | -                    |                     | -                   | -                 | -                             | -                        |                    | -                           | -                           | -                           |
|         |   | - 50                             | -<br>52    | - 61     | -<br>0E                       | -                    | 0%                  | -<br>52             | - 52              | 52                            | - 52                     | 0%                 | - 52                        | - 52                        | - 52                        |
|         | n<br>Annual Minimum                                 | 52<br>121                        | 52<br>7.2  | 61       | 95<br>9.9                     | 59<br>101            | 52<br>0.46          | 52<br>0.001         | 52<br><0.005      | 0.014                         | 52<br>0.0066             | 52<br>7            | 52<br>0.26                  | 52<br>0.062                 | 52<br>0.0043                |
|         |   |                                  |            | · ·      |                               |                      |                     |                     |                   |                               |                          | -                  |                             | +                           |                             |
|         | Annual Maximum                                      | 856<br>574                       | 8.4<br>8.2 | 8.4      | 88                            | 177<br>148           | 52                  | 0.069               | 0.024             | 0.11                          | 0.026                    | 306                | 34                          | 0.1                         | 0.26                        |
|         | Annual Mean   | 574                              |            | 8.1      | 41                            |                      | 30                  | 0.0075              | 0.0065            | 0.025                         | 0.019                    | 181                | 13                          | 0.084                       | 0.022                       |
| 10.55   | Annual Median                                       | 656                              | 8.2        | 8.1      | 12                            | 148                  | 37                  | 0.0064              | 0.005             | 0.023                         | 0.02                     | 208                | 16                          | 0.082                       | 0.009                       |
| LC_DC2  | % < LRL   | 0%                               | 0%         | 0%       | 0%                            | 0%                   | 0%                  | 10%                 | 69%               | 0%                            | 0%                       | 0%                 | 0%                          | 44%                         | 0%                          |
|         | % > BCWQG <sup>a</sup>                              | -                                | -          | 0%       | 0%                            | 0%                   | 96%                 | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 2%                          |
|         | % > BCWQG <sup>b</sup>                              | -                                | -          | -        | 0%                            | -                    | 54%                 | 0%                  | 0%                | -                             | -                        | -                  | 0%                          | 0%                          | -                           |
|         | % > Level 1 Benchmark/UEC                           | 0%                               | -          | -        | -                             | -                    | 88%                 | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 2 Benchmark/UEC                           | -                                | -          | -        | -                             | -                    | 62%                 | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 3 Benchmark/UEC                           |                                  |            |          |                               |                      | 0%                  |                     |                   |                               |                          | 0%                 |                             |                             | 1                           |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

<sup>°</sup>LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| ## Annual Maximum   636   54   63   98   224   27   0.016   0.015   0.055   0.051   156   12   0.11  | Area        | Summary Statistic         | Total Dissolved<br>Solids (mg/L) | Lab pH   | Field pH | Dissolved<br>Oxygen<br>(mg/L) | Alkalinity<br>(mg/L) | Nitrate-N<br>(mg/L) | Nitrite-N<br>(mg/L) | Ammonia<br>(mg/L) | Total<br>Phosphorus<br>(mg/L) | Orthophosphate (mg/L) | Sulphate<br>(mg/L) | Total<br>Chloride<br>(mg/L) | Total<br>Fluoride<br>(mg/L) | Total<br>Aluminum<br>(mg/L) |
|--|-------------|---------------------------|----------------------------------|----------|----------|-------------------------------|----------------------|---------------------|---------------------|-------------------|-------------------------------|-----------------------|--------------------|-----------------------------|-----------------------------|-----------------------------|
| Annual Maximum   | 1           | n                         | 52                               |          | 58       | 92                            | 58                   | 52                  | 52                  | 52                | 52                            | 52                    | 52                 | 52                          | 52                          | 52                          |
| Annual Mean  | 1           | Annual Minimum            | 214                              | 7.2      | 7.6      | 9.8                           | 107                  | 4                   | 0.0011              | <0.005            | 0.0083                        | 0.0036                | 35                 | 1.7                         | 0.051                       | < 0.003                     |
| Annual Mean  | 1           | Annual Maximum            | 606                              | 8.4      | 8.3      | 96                            | 204                  | 27                  | 0.018               | 0.015             | 0.055                         | 0.019                 | 158                | 12                          | 0.11                        | 0.14                        |
| LC_PC4    Annual Median  | 1           | Annual Mean               | 430                              | 8.2      | 8        | 41                            | 166                  | 18                  | 0.0038              | 0.0054            | 0.016                         |                       | 110                | 7.7                         |                             |                             |
| LC_DC4   | 1           |                           |                                  |          | 8        | 12                            |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| No.   Service   No.      | LC DC4      | % < LRL                   |                                  |          | 0%       |                               |                      |                     |                     |                   |                               |                       | 0%                 |                             |                             |                             |
| No.   DEWOOD   No.   N   |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               | -                     |                    |                             |                             |                             |
| ## N - Level 2 Benchmark/UEC   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               | _                     |                    |                             |                             |                             |
| ## Activated Enerhandriv/EC  | 1           |                           |                                  |          | _        | 070                           |                      |                     |                     |                   |                               | _                     |                    |                             |                             |                             |
| No.   Level 3 Benchmark/UEC   -   -   -   -   -   -   -   -   -  | 1           |                           |                                  |          | -        | -                             |                      |                     |                     |                   |                               | -                     |                    |                             |                             |                             |
| Color  | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             | +                           |                             |
| ## Annual Minimum   208   7.2   7.6   9.6   112   3.7   0.016   -0.006   0.0035   0.0035   33   1.6   0.073   < 0.003   ## Annual Maximum   544   8.5   8.8   91   2.00   2.0   0.007   0.052   0.0070   0.016   0.006   0.006   0.001   ## Annual Mean   410   8.3   8.2   4.2   4.0   4.0   17   0.005   0.0000   0.016   0.0016   0.006   7.2   0.006   0.001   ## **********************************   | <del></del> |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| Annual Maximum   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_PC    Annual Mean   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_RC1  Annual Median  442  8.3  8.2  12  170  006  006  006  006  006  006  006   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_PC1    S_ < LRL   0%   0%   0%   0%   0%   0%   0%   0  | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| ## SEWQG*  | 10.504      |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| No   | LC_DC1      |                           |                                  |          |          |                               |                      |                     |                     |                   | _                             | 0%                    |                    |                             |                             |                             |
| No   | 1           |                           |                                  | -        | υ%       |                               | υ%                   |                     |                     |                   | -                             | -                     |                    |                             |                             | υ%                          |
| No.    | 1           |                           |                                  | -        | -        | 0%                            | -                    |                     | 0%                  | 0%                | -                             | -                     |                    | 0%                          | 0%                          | -                           |
| No.    | 1           |                           | 0%                               | -        | -        | -                             | -                    |                     | -                   | -                 | -                             | -                     |                    | -                           | -                           | -                           |
| Name   | 1           |                           | -                                | -        | -        | -                             | -                    |                     | -                   | -                 | -                             | -                     |                    | -                           | -                           | -                           |
| ## Annual Minimum   332   7.8   6.8   7.5   155   7.8   0.0016   <0.005   <0.002   <0.001   112   1.3   0.12   <0.003   <0.003   <0.001   <0.005   <0.003   <0.001   <0.005   <0.003   <0.001   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005   <0.005    |             | % > Level 3 Benchmark/UEC |                                  | -        | -        | -                             |                      |                     | -                   | -                 | -                             | -                     |                    |                             |                             | -                           |
| Annual Maximum   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| Annual Man   | 1           |                           |                                  |          | 6.8      |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| FR_FRS  Annual Median 691 8.2 8 12 229 19 0.0058 0.005 0.004 0.006 0.00  | 1           | Annual Maximum            | 814                              | 8.3      | 8.4      | 102                           | 250                  | 22                  | 0.02                | 0.013             | 0.073                         | 0.0012                | 338                |                             | 0.22                        | 0.21                        |
| FR_FRS   | 1           | Annual Mean               | 640                              | 8.2      | 7.9      | 40                            |                      | 17                  | 0.0061              | 0.0065            | 0.012                         |                       |                    | 3.2                         | 0.15                        | 0.041                       |
| No.   Service    | 1           | Annual Median             | 691                              | 8.2      | 8        | 12                            | 229                  |                     | 0.0058              | 0.005             | 0.0049                        |                       |                    | 2.9                         | 0.14                        | 0.0079                      |
| No.    | FR_FR5      | % < LRL                   | 0%                               | 0%       | 0%       | 0%                            | 0%                   | 0.0%                | 18%                 | 64%               | 36%                           | 82%                   | 0%                 | 0%                          | 0%                          | 9%                          |
| No.    | 1           | % > BCWQG <sup>a</sup>    | -                                | -        | 0%       | 5%                            | 0%                   | 100%                | 0%                  | 0%                | -                             | -                     | 0%                 | 0%                          | -                           | 9%                          |
| % > Level 1 Benchmark/UEC  | 1           |                           | -                                | -        | -        | 0%                            | •                    | 0%                  | 0%                  | 0%                | -                             | -                     | -                  | 0%                          | 0%                          | _                           |
| % > Level 2 Benchmark/UEC  | 1           |                           | 0%                               | -        | _        |                               | -                    |                     | -                   | _                 | -                             | _                     | 0%                 |                             | _                           | -                           |
| No   No   No   No   No   No   No   No  | 1           |                           |                                  | _        | _        | _                             | _                    |                     | _                   | _                 | _                             | _                     |                    |                             | _                           | _                           |
| Name   | 1           |                           |                                  |          | _        | _                             |                      |                     | _                   | _                 |                               | _                     |                    |                             | +                           | +                           |
| Annual Minimum   323   8.2   7.7   10   155   6.2   0.0025   <0.005   <0.002   <0.001   77   1.3   0.12   0.006  |             |                           |                                  |          | 4        | 5                             |                      |                     |                     | 4                 |                               | 4                     |                    |                             |                             | 4                           |
| Annual Maximum   | 1           | Annual Minimum            |                                  | •        | •        |                               |                      | ·                   | •                   | •                 | •                             | · ·                   | ·                  | •                           |                             |                             |
| Annual Mean  | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| Annual Median   552   8.3   8.2   13   197   12   0.0038   0.005   0.001   199   2.8   0.15   0.027  | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| C_FRUS   |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| Note      | I C EDIIG   |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| No   SCWQGb  | LO_PRUS     |                           |                                  | <u> </u> |          |                               |                      |                     |                     |                   |                               | 7 3 70                |                    |                             |                             |                             |
| %   Level 1 Benchmark/UEC  | 1           |                           |                                  | -        | 0 70     |                               | U /0                 | 7.7                 |                     |                   | -                             | -                     | U /0               |                             |                             | 0 /0                        |
| Note   Senchmark/UEC   Sench   |             |                           |                                  | -        | -        |                               | -                    |                     |                     |                   | -                             | -                     | -                  |                             |                             | -                           |
| % > Level 3 Benchmark/UEC         -         -         -         -         0%         -         -         -         0%         -         -         -         0%         -   |             |                           |                                  | -        | -        |                               |                      |                     |                     |                   | -                             |                       |                    |                             |                             |                             |
| N   26   26   25   46   26   26   26   26   26   26   26   | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             | 1                           |
| Annual Minimum   298   8.2   7.7   9.5   146   5.9   0.0019   <0.005   <0.002   <0.001   79   1   0.1   0.0037   |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| Annual Maximum 744 8.5 8.4 92 255 20 0.014 0.014 0.027 0.0019 298 5.4 0.19 0.13  Annual Mean 538 8.3 8.1 46 195 13 0.0057 0.0054 0.0084 0.0011 198 2.8 0.15 0.032  Annual Median 579 8.3 8.2 13 200 14 0.0052 0.005 0.0052 0.001 210 2.6 0.14 0.022  **N > LC_FRB**  **Security of the control of t | 1           |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_FRB         Annual Mean         538         8.3         8.1         46         195         13         0.0057         0.0054         0.0084         0.0011         198         2.8         0.15         0.032           Annual Median         579         8.3         8.2         13         200         14         0.0052         0.005         0.001         210         2.6         0.14         0.022           % < LRL         0%         0%         0%         0%         0.0%         4%         85%         8%         69%         0%         0%         0%           % > BCWQG³         -         -         0%         0%         0%         0%         0%         0%         0%         0%         0%         0%         0%         0%         -         -         0%         0%         0%         -         -         0%         0%         0%         -         -         0%         0%         0%         -         -         0%         0%         -         -         -         0%         -         -         -         0%         -         -         -         0%         -         -         -         -         0%         -         -  |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_FRB         Annual Median         579         8.3         8.2         13         200         14         0.0052         0.005         0.001         210         2.6         0.14         0.022           W < LRL         0%         0%         0%         0%         0.006         4%         85%         8%         69%         0%         0%         0%           % > BCWQG³         -         -         0%         0%         0%         0%         0%         -         -         0%         0%           % > BCWQG³         -         -         -         0%         -         0%         0%         -         -         0%         0%           % > BCWQG³         -         -         -         0%         -         0%         0%         -         -         -         0%         0%           % > Level 1 Benchmark/UEC         0%         -         -         -         0%         - <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>  |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| LC_FRB         % < LRL         0%         0%         0%         0%         0%         0.0%         4%         85%         8%         69%         0%         0%         0%           % > BCWQG³         -         -         0%         0%         0%         0%         0%         -         -         0%         0%         -         0%           % > BCWQG³         -         -         -         0%         -         0%         0%         -         -         0%         0%         -         -         0%         0%         -         -         0%         0%         -         -         0%         0%         -         -         0%         0%         -         -         -         0%         0%         -         -         -         0%         0%         -         -         -         0%         0%         -         -         -         0%         -         -         -         0%         -   |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| % > BCWQG³         -         -         0%         0%         0%         100%         0%         -         -         0%         0%         -         0%           % > BCWQG¹b         -         -         -         0%         -         0%         0%         -         -         -         0%         -           % > Level 1 Benchmark/UEC         0%         -         -         -         -         0%         -         -         -         -         -           % > Level 2 Benchmark/UEC         -         -         -         0%         -  |             |                           |                                  |          |          |                               |                      |                     |                     |                   |                               |                       |                    |                             |                             |                             |
| % > BCWQGb         -         -         0%         -         0%         0%         -         -         -         0%         0%         -           % > Level 1 Benchmark/UEC         0%         -         -         -         0%         -  | LC_FRB      |                           |                                  | 0%       |          |                               |                      |                     |                     |                   | 8%                            | 69%                   |                    |                             |                             |                             |
| % > Level 1 Benchmark/UEC       0%       -       -       -       0%       -       -       -       -       -         % > Level 2 Benchmark/UEC       -       -       -       0%       -       -       -       0%       -  | 1           |                           | -                                | -        | 0%       |                               | 0%                   |                     |                     | 0%                | -                             | -                     | 0%                 |                             | -                           | 0%                          |
| % > Level 1 Benchmark/UEC       0%       -       -       -       0%       -       -       -       -       -         % > Level 2 Benchmark/UEC       -       -       -       0%       -       -       -       0%       -       -       -       0%       - <td>1</td> <td>% &gt; BCWQG<sup>b</sup></td> <td>-</td> <td>-</td> <td></td> <td>0%</td> <td>-</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>-</td> <td>-</td> <td>-</td> <td>0%</td> <td>0%</td> <td>-</td>   | 1           | % > BCWQG <sup>b</sup>    | -                                | -        |          | 0%                            | -                    | 0%                  | 0%                  | 0%                | -                             | -                     | -                  | 0%                          | 0%                          | -                           |
| % > Level 2 Benchmark/UEC 0% 0% 0%   |             |                           | 0%                               | -        | -        |                               | -                    |                     |                     |                   | -                             | -                     | 0%                 |                             |                             | -                           |
|  |             |                           |                                  | -        | -        | -                             | -                    |                     | -                   | -                 | -                             | -                     |                    | -                           | -                           | -                           |
|  |             | % > Level 3 Benchmark/UEC | -                                | -        | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                     | 0%                 | -                           | -                           | -                           |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

<sup>°</sup>LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area    | Summary Statistic                      | Total Dissolved<br>Solids (mg/L) | Lab pH | Field pH | Dissolved<br>Oxygen<br>(mg/L) | Alkalinity<br>(mg/L) | Nitrate-N<br>(mg/L) | Nitrite-N<br>(mg/L) | Ammonia<br>(mg/L) | Total<br>Phosphorus<br>(mg/L) | Orthophosphate<br>(mg/L) | Sulphate<br>(mg/L) | Total<br>Chloride<br>(mg/L) | Total<br>Fluoride<br>(mg/L) | Total<br>Aluminum<br>(mg/L) |
|---------|--|----------------------------------|--------|----------|-------------------------------|----------------------|---------------------|---------------------|-------------------|-------------------------------|--------------------------|--------------------|-----------------------------|-----------------------------|-----------------------------|
|         | n                                      | 14                               | 14     | 14       | 24                            | 14                   | 14                  | 14                  | 14                | 14                            | 14                       | 14                 | 14                          | 14                          | 14                          |
|         | Annual Minimum                         | 181                              | 8.2    | 8        | 10                            | 155                  | 0.03                | <0.001              | <0.005            | 0.0023                        | <0.001                   | 14                 | <0.1                        | 0.098                       | 0.0035                      |
|         | Annual Maximum                         | 264                              | 8.4    | 8.6      | 103                           | 193                  | 0.64                | 0.0014              | 0.0083            | 0.024                         | 0.0035                   | 54                 | 0.55                        | 0.15                        | 0.23                        |
|         | Annual Mean                            | 227                              | 8.3    | 8.3      | 43                            | 172                  | 0.098               | 0.001               | 0.0052            | 0.0071                        | 0.0019                   | 45                 | 0.19                        | 0.13                        | 0.04                        |
|         | Annual Median                          | 230                              | 8.4    | 8.3      | 13                            | 172                  | 0.049               | 0.001               | 0.005             | 0.0052                        | 0.0018                   | 49                 | 0.17                        | 0.13                        | 0.011                       |
| LC_GRCK | % < LRL                                | 0%                               | 0%     | 0%       | 0%                            | 0%                   | 0.0%                | 93%                 | 93%               | 0%                            | 36%                      | 0%                 | 7%                          | 0%                          | 7%                          |
| _       | % > BCWQG <sup>a</sup>                 | -                                | -      | 0%       | 0%                            | 0%                   | 0%                  | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 14%                         |
|         | % > BCWQG <sup>b</sup>                 | -                                | -      | -        | 0%                            | -                    | 0%                  | 0%                  | 0%                | -                             | -                        | -                  | 0%                          | 0%                          | -                           |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | 0%                               | -      | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 2 Benchmark/UEC              | -                                | -      | -        | 1                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | 1                           | -                           | -                           |
|         | % > Level 3 Benchmark/UEC              | -                                | -      | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 |                             | -                           | -                           |
|         | n                                      | 12                               | 12     | 12       | 21                            | 12                   | 12                  | 12                  | 12                | 12                            | 12                       | 12                 | 12                          | 12                          | 12                          |
|         | Annual Minimum                         | 237                              | 8.1    | 7.8      | 11                            | 255                  | 0.025               | <0.001              | <0.005            | <0.002                        | <0.001                   | 14                 | 0.12                        | 0.094                       | <0.003                      |
|         | Annual Maximum                         | 341                              | 8.4    | 8.2      | 87                            | 281                  | 0.087               | <0.001              | 0.011             | 0.027                         | 0.0021                   | 26                 | 0.33                        | 0.16                        | 0.096                       |
|         | Annual Mean                            | 282                              | 8.3    | 8        | 42                            | 267                  | 0.053               | <0.001              | 0.0055            | 0.0063                        | 0.0011                   | 17                 | 0.16                        | 0.14                        | 0.014                       |
|         | Annual Median                          | 282                              | 8.3    | 8        | 12                            | 266                  | 0.058               | <0.001              | 0.005             | 0.0022                        | 0.001                    | 17                 | 0.14                        | 0.14                        | 0.0048                      |
| LC_UC   | % < LRL                                | 0%                               | 0%     | 0%       | 0%                            | 0%                   | 0.0%                | 100%                | 92%               | 42%                           | 92%                      | 0%                 | 0%                          | 0%                          | 33%                         |
| -       | % > BCWQG <sup>a</sup>                 | -                                | -      | 0%       | 0%                            | 0%                   | 0%                  | 0%                  | 0%                | -                             | -                        | 0%                 | 0%                          | -                           | 0%                          |
|         | % > BCWQG <sup>b</sup>                 | -                                | -      | -        | 0%                            | -                    | 0%                  | 0%                  | 0%                | -                             | -                        | -                  | 0%                          | 0%                          | 1                           |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | 0%                               | -      | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | •                           | -                           | -                           |
|         | % > Level 2 Benchmark/UEC              | -                                | -      | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 | -                           | -                           | -                           |
|         | % > Level 3 Benchmark/UEC              | -                                | -      | -        | -                             | -                    | 0%                  | -                   | -                 | -                             | -                        | 0%                 |                             | -                           | -                           |

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

 $<sup>^{\</sup>rm a}$  Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

 $<sup>^{\</sup>rm c}$  LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area    | Summary Statistic                      | Total<br>Antimony<br>(mg/L) | Total Arsenic<br>(mg/L) | Total Barium (mg/L) | Total<br>Beryllium<br>(mg/L) | Total Boron<br>(mg/L) | Total<br>Cadmium<br>(µg/L) | Total<br>Chromium<br>(mg/L) | Total Cobalt<br>(μg/L) | Total Iron<br>(mg/L) | Total Lead<br>(mg/L) | Total Lithium<br>(mg/L) | Total<br>Manganese<br>(mg/L) | Total<br>Mercury<br>(mg/L) | Total<br>Molybdenum<br>(mg/L) | Total Nickel<br>(µg/L) |
|---------|--|-----------------------------|-------------------------|---------------------|------------------------------|-----------------------|----------------------------|-----------------------------|------------------------|----------------------|----------------------|-------------------------|------------------------------|----------------------------|-------------------------------|------------------------|
|         | n                                      | 14                          | 14                      | 14                  | 14                           | 14                    | 14                         | 14                          | 14                     | 14                   | 14                   | 14                      | 14                           | 13                         | 14                            | 14                     |
|         | Annual Minimum                         | 0.00012                     | 0.00012                 | 0.2                 | <0.00002                     | 0.01                  | 0.028                      | <0.0001                     | <0.0001                | <0.01                | <0.00005             | 0.01                    | <0.0001                      | <0.0000005                 | 0.00076                       | <0.5                   |
|         | Annual Maximum                         | 0.00017                     | 0.00028                 | 0.28                | <0.00002                     | 0.011                 | 0.068                      | 0.00086                     | <0.0001                | 0.05                 | 0.00008              | 0.022                   | 0.0031                       | <0.0000005                 | 0.0027                        | 0.73                   |
|         | Annual Mean                            | 0.00014                     | 0.00019                 | 0.25                | <0.00002                     | 0.01                  | 0.041                      | 0.00018                     | <0.0001                | 0.018                | 0.000053             | 0.018                   | 0.00072                      | <0.0000005                 | 0.0012                        | 0.52                   |
|         | Annual Median                          | 0.00014                     | 0.00018                 | 0.25                | <0.00002                     | 0.01                  | 0.035                      | 0.00011                     | <0.0001                | 0.01                 | 0.00005              | 0.019                   | 0.00012                      | <0.0000005                 | 0.0012                        | 0.5                    |
| LC_DCEF | % < LRL                                | 0%                          | 0%                      | 0%                  | 100%                         | 21%                   | 0%                         | 43%                         | 100%                   | 57%                  | 86%                  | 0%                      | 36%                          | 100%                       | 0%                            | 86%                    |
| 20_502. | % > BCWQG <sup>a</sup>                 | 0%                          | -                       | 0%                  | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                       | 0%                           | 85%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                      | -                   | -                            | -                     | _                          | -                           | 0%                     | 0%                   | 0%                   | _                       | 0%                           | -                          | 0%                            | _                      |
|         | % > Level 1 Benchmark/UEC              | _                           | -                       | _                   |                              | -                     |                            | _                           | -                      | -                    | -                    |                         | -                            | _                          | -                             |                        |
|         | % > Level 2 Benchmark/UEC              |                             |                         | -                   |                              | _                     |                            | _                           | _                      |                      |                      | _                       |                              |                            | -                             |                        |
|         | % > Level 3 Benchmark/UEC              |                             | _                       | _                   |                              | _                     |                            |                             | _                      |                      | _                    | _                       |                              | _                          |                               | -                      |
|         | n                                      | 57                          | 57                      | 57                  | 57                           | 57                    | 57                         | 57                          | 57                     | 57                   | 57                   | 57                      | 57                           | 56                         | 57                            | 57                     |
|         | Annual Minimum                         | 0.00056                     | 0.0003                  | 0.1                 | <0.00002                     | <0.01                 | 0.19                       | <0.0001                     | 0.0001                 | <0.01                | <0.00005             | 0.014                   | 0.00041                      | 0.00000057                 | 0.0037                        | 8.8                    |
|         | Annual Maximum                         | 0.00036                     | 0.0003                  | 0.26                | <0.00002                     | 0.013                 | 0.19                       | 0.00036                     | 0.0001                 | 0.18                 | 0.00003              | 0.014                   | 0.00041                      | 0.00000037                 | 0.0054                        | 22                     |
|         | Annual Mean                            | 0.00093                     | 0.00046                 | 0.20                | <0.00002                     | 0.013                 | 0.4                        | 0.00030                     | 0.0004                 | 0.18                 | 0.00023              | 0.037                   | 0.0093                       | 0.00000022                 | 0.0034                        | 15                     |
|         | Annual Median                          | 0.00066                     | 0.00035                 | 0.16                | <0.00002                     | 0.01                  | 0.31                       | 0.00012                     | 0.00012                | 0.022                | 0.00005              | 0.037                   | 0.002                        | 0.00000031                 | 0.0047                        | 16                     |
| LC_DC3  | % < LRL                                | 0.00000                     | 0.00033                 | 0%                  | 100%                         | 35%                   | 0%                         | 46%                         | 32%                    | 28%                  | 95%                  | 0%                      | 0.0010                       | 75%                        | 0.0047                        | 0%                     |
| FO_DO3  | % > BCWQG <sup>a</sup>                 | 0%                          | -                       | 0%                  | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                       | 0%                           | 79%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                      | -                   | -                            | -                     | · ·                        | -                           | 0%                     | 0%                   | 0%                   |                         | 0%                           | -                          | 0%                            | _                      |
|         | % > Level 1 Benchmark/UEC              | -                           | -                       | _                   |                              | _                     |                            | _                           | -                      | -                    | -                    |                         | -                            | _                          | -                             | _                      |
|         | % > Level 2 Benchmark/UEC              | -                           | _                       | -                   |                              | _                     |                            | _                           | _                      | _                    | _                    | _                       |                              | _                          | -                             | -                      |
|         | % > Level 3 Benchmark/UEC              | _                           | _                       | -                   | -                            | _                     | -                          | _                           | _                      | -                    | _                    | _                       | _                            | _                          | _                             | _                      |
|         | n                                      | 53                          | 53                      | 53                  | 53                           | 53                    | 53                         | 53                          | 53                     | 53                   | 53                   | 53                      | 53                           | 53                         | 53                            | 53                     |
|         | Annual Minimum                         | 0.00056                     | 0.00027                 | 0.099               | <0.00002                     | <0.01                 | 0.18                       | <0.0001                     | <0.0001                | <0.01                | <0.00005             | 0.014                   | 0.00089                      | <0.0000005                 | 0.0038                        | 8                      |
|         | Annual Maximum                         | 0.00095                     | 0.00047                 | 0.27                | <0.00002                     | 0.012                 | 0.4                        | 0.00047                     | 0.00034                | 0.21                 | 0.00022              | 0.054                   | 0.0072                       | 0.0000017                  | 0.01                          | 21                     |
|         | Annual Mean                            | 0.00067                     | 0.00035                 | 0.19                | <0.00002                     | 0.011                 | 0.28                       | 0.00013                     | 0.00011                | 0.018                | 0.000054             | 0.035                   | 0.0026                       | 0.00000076                 | 0.0075                        | 14                     |
|         | Annual Median                          | 0.00066                     | 0.00034                 | 0.2                 | <0.00002                     | 0.01                  | 0.29                       | 0.00011                     | 0.0001                 | 0.01                 | 0.00005              | 0.039                   | 0.0023                       | 0.00000065                 | 0.0076                        | 14                     |
| LC_SPDC | % < LRL                                | 0%                          | 0%                      | 0%                  | 100%                         | 42%                   | 0%                         | 43%                         | 60%                    | 57%                  | 92%                  | 0%                      | 0%                           | 75%                        | 0%                            | 0%                     |
|         | % > BCWQG <sup>a</sup>                 | 0%                          | _                       | 0%                  | 0%                           | 0%                    | -                          | 0%                          | 0%                     | •                    | 0%                   | -                       | 0%                           | 77%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | _                           | 0%                      | _                   | _                            | _                     | -                          | _                           | 0%                     | 0%                   | 0%                   | _                       | 0%                           | _                          | 0%                            | _                      |
|         | % > Level 1 Benchmark/UEC              | -                           | _                       | -                   | _                            | _                     | _                          | _                           | _                      | -                    | _                    | _                       | _                            | -                          | _                             | _                      |
|         | % > Level 2 Benchmark/UEC              | -                           | _                       | -                   | _                            | _                     | _                          | _                           | _                      | -                    | -                    | _                       | _                            | _                          | -                             | _                      |
|         | % > Level 3 Benchmark/UEC              | -                           | -                       | -                   | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | n                                      | 56                          | 56                      | 56                  | 56                           | 56                    | 56                         | 56                          | 56                     | 56                   | 56                   | 56                      | 56                           | 56                         | 56                            | 56                     |
|         | Annual Minimum                         | 0.00052                     | 0.00024                 | 0.11                | < 0.00002                    | <0.01                 | 0.15                       | <0.0001                     | <0.0001                | <0.01                | <0.00005             | 0.012                   | 0.0011                       | <0.0000005                 | 0.0036                        | 7.2                    |
|         | Annual Maximum                         | 0.00078                     | 0.00043                 | 0.27                | 0.000046                     | 0.015                 | 0.35                       | 0.00057                     | 0.00026                | 0.1                  | 0.00013              | 0.051                   | 0.0061                       | 0.0000016                  | 0.0091                        | 19                     |
|         | Annual Mean                            | 0.00063                     | 0.00033                 | 0.2                 | 0.00002                      | 0.011                 | 0.27                       | 0.00013                     | 0.00011                | 0.014                | 0.000051             | 0.035                   | 0.0022                       | 0.00000069                 | 0.0071                        | 14                     |
|         | Annual Median                          | 0.00061                     | 0.00033                 | 0.21                | 0.00002                      | 0.01                  | 0.28                       | 0.0001                      | 0.0001                 | 0.01                 | 0.00005              | 0.039                   | 0.0019                       | 0.00000064                 | 0.0071                        | 13                     |
| LC_DCDS | % < LRL                                | 0%                          | 0%                      | 0%                  | 98%                          | 34%                   | 0%                         | 52%                         | 70%                    | 68%                  | 98%                  | 0%                      | 0%                           | 82%                        | 0%                            | 0%                     |
| _       | % > BCWQG <sup>a</sup>                 | 0%                          | -                       | 0%                  | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                       | 0%                           | 79%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                      | -                   | -                            | -                     | -                          | -                           | 0%                     | 0%                   | 0%                   | -                       | 0%                           | -                          | 0%                            | -                      |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | -                           | -                       | -                   | -                            | -                     | 0%                         | -                           | -                      | -                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | % > Level 2 Benchmark/UEC              | -                           | -                       | -                   | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | % > Level 3 Benchmark/UEC              | -                           | -                       | -                   | -                            | -                     | -                          | -                           | -                      | 1                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | n                                      | 52                          | 52                      | 52                  | 52                           | 52                    | 52                         | 52                          | 52                     | 52                   | 52                   | 52                      | 52                           | 52                         | 52                            | 52                     |
|         | Annual Minimum                         | 0.00018                     | 0.00023                 | 0.14                | <0.00002                     | <0.01                 | 0.051                      | 0.0001                      | <0.0001                | <0.01                | <0.00005             | 0.0084                  | 0.00066                      | 0.0000005                  | 0.0011                        | 1.6                    |
|         | Annual Maximum                         | 0.00063                     | 0.0005                  | 0.36                | 0.00004                      | 0.013                 | 0.3                        | 0.0034                      | 0.00024                | 0.27                 | 0.0004               | 0.044                   | 0.013                        | 0.000001                   | 0.0084                        | 14                     |
|         | Annual Mean                            | 0.00048                     | 0.00029                 | 0.25                | 0.00002                      | 0.011                 | 0.2                        | 0.00019                     | 0.0001                 | 0.031                | 0.000062             | 0.031                   | 0.002                        | 0.00000061                 | 0.0054                        | 8.8                    |
|         | Annual Median                          | 0.00048                     | 0.00029                 | 0.26                | 0.00002                      | 0.01                  | 0.23                       | 0.0001                      | 0.0001                 | 0.01                 | 0.00005              | 0.036                   | 0.0013                       | 0.0000006                  | 0.0057                        | 9.2                    |
| LC_DC2  | % < LRL                                | 0%                          | 0%                      | 0%                  | 98%                          | 60%                   | 0%                         | 52%                         | 92%                    | 52%                  | 83%                  | 0%                      | 0%                           | 77%                        | 0%                            | 0%                     |
|         | % > BCWQG <sup>a</sup>                 | 0%                          | -                       | 0%                  | 0%                           | 0%                    | -                          | 2%                          | 0%                     | -                    | 0%                   | -                       | 0%                           | 75%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                      | -                   | -                            | -                     | -                          | -                           | 0%                     | 0%                   | 0%                   | -                       | 0%                           | -                          | 0%                            | -                      |
|         | % > Level 1 Benchmark/UEC              | -                           | -                       | -                   | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | % > Level 2 Benchmark/UEC              | -                           | -                       | -                   | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                       | -                            | -                          | -                             | -                      |
|         | % > Level 3 Benchmark/UEC              | -                           | _                       | I I                 |                              | i l                   |                            | I                           | 1                      |                      | 1                    | I                       |                              | I                          | _                             | _                      |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

<sup>°</sup>LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area     | Summary Statistic                                   | Total<br>Antimony<br>(mg/L) | Total Arsenic<br>(mg/L) | Total Barium<br>(mg/L) | Total<br>Beryllium<br>(mg/L) | Total Boron<br>(mg/L) | Total<br>Cadmium<br>(μg/L) | Total<br>Chromium<br>(mg/L) | Total Cobalt<br>(μg/L) | Total Iron<br>(mg/L) | Total Lead<br>(mg/L) | Total Lithium (mg/L) | Total<br>Manganese<br>(mg/L) | Total<br>Mercury<br>(mg/L) | Total<br>Molybdenum<br>(mg/L) | Total Nickel (μg/L) |
|----------|---|-----------------------------|-------------------------|------------------------|------------------------------|-----------------------|----------------------------|-----------------------------|------------------------|----------------------|----------------------|----------------------|------------------------------|----------------------------|-------------------------------|---------------------|
|          | n   | 52                          | 52                      | 52                     | 52                           | 52                    | <u>(μ<b>g/L)</b></u><br>52 | (Hig/L)<br>52               | 52                     | 52                   | 52                   | 52                   | (IIIg/L)<br>52               | 51                         | (IIIg/L)<br>52                | 52                  |
|          | Annual Minimum                                      | 0.00017                     | 0.00014                 | 0.17                   | <0.00002                     | <0.01                 | 0.087                      | <0.0001                     | <0.0001                | <0.01                | <0.00005             | 0.01                 | 0.0007                       | <0.0000005                 | 0.0016                        | 1.2                 |
|          | Annual Maximum                                      | 0.00017                     | 0.00014                 | 0.17                   | <0.00002                     | 0.012                 | 0.087                      | 0.00028                     | 0.00017                | 0.14                 | 0.00003              | 0.026                | 0.0007                       | 0.000003                   | 0.0010                        | 7.6                 |
|          | Annual Mean   | 0.00032                     | 0.00030                 | 0.28                   | <0.00002                     | 0.012                 | 0.19                       | 0.00020                     | 0.00017                | 0.025                | 0.00021              | 0.020                | 0.0073                       | 0.0000013                  | 0.0029                        | 3.4                 |
|          | Annual Median                                       | 0.00029                     | 0.00021                 | 0.20                   | <0.00002                     | 0.01                  | 0.12                       | 0.00012                     | 0.0001                 | 0.023                | 0.00005              | 0.019                | 0.0018                       | 0.000005                   | 0.0029                        | 3.6                 |
| 1.0.004  | % < LRL   | 0.0003                      | 0.0002                  | 0%                     | 100%                         | 79%                   | 2%                         | 56%                         | 94%                    | 48%                  | 88%                  | 0.02                 | 0.0013                       | 94%                        | 0.0020                        | 0%                  |
| LC_DC4   |   | 0%                          | -                       | 0%                     | 0%                           | 0%                    | 2 /0                       | 0%                          | 0%                     | -                    | 0%                   | 0 70                 | 0%                           | 78%                        | 0%                            | -                   |
|          | % > BCWQG <sup>a</sup>                              |                             |                         | -                      |                              | 070                   | -                          |                             | _                      | 0%                   | 0%                   | -                    | 0%                           | _                          | 0%                            |                     |
|          | % > BCWQG <sup>b</sup>                              | -                           | 0%                      | -                      | -                            | -                     | -                          | -                           | 0%                     |                      | -                    | -                    | _                            | -                          | 1                             | -                   |
|          | % > Level 1 Benchmark/UEC                           | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | % > Level 2 Benchmark/UEC % > Level 3 Benchmark/UEC | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          |   | -                           | -                       | -                      | 52                           | 52                    | <u>-</u><br>               | -<br>52                     | -<br>52                | -<br>52              | 52                   | 52                   | -                            | -                          | 52                            | -                   |
|          | n<br>Americal Minimum                               | 52                          | 52<br>0.00011           | 52                     | <0.00002                     | _                     | 51                         | <0.0001                     | <0.0001                | _                    | <0.00005             | 0.01                 | 52                           | 52<br><0.0000005           | 0.0018                        | 52                  |
|          | Annual Minimum                                      | 0.00015                     |                         | 0.17                   |                              | <0.01                 | 0.07                       |                             |                        | <0.01                |                      |                      | 0.00075                      |                            |                               | 1.1                 |
|          | Annual Maximum Annual Mean                          | 0.00051<br>0.00029          | 0.00035<br>0.00021      | 0.37<br>0.28           | <0.00002<br><0.00002         | 0.014<br>0.01         | 0.17<br>0.098              | 0.00063<br>0.00013          | 0.00018<br>0.0001      | 0.16<br>0.03         | 0.00019<br>0.000057  | 0.025<br>0.019       | 0.0092<br>0.0025             | 0.0000014<br>0.00000058    | 0.0039<br>0.0027              | 6.4<br>2.7          |
|          | Annual Median                                       | 0.00029                     | 0.00021                 | 0.28                   | <0.00002                     | 0.01                  | 0.098                      | 0.00013                     | 0.0001                 | 0.03                 | 0.000057             | 0.019                | 0.0025                       | 0.0000058                  | 0.0027                        |                     |
| 1.0 004  | % < LRL   | 0.0003                      | 0.0002                  | 0.3                    | 100%                         | 73%                   | 0.098                      | 52%                         | 92%                    | 13%                  | 83%                  | 0.02                 | 0.002                        | 96%                        | 0.0027                        | 2.9<br>0%           |
| LC_DC1   |   | 0%                          |                         | 0%                     | 0%                           | 0%                    | U 70                       | 0%                          | 0%                     |                      | 0%                   |                      | 0%                           | 77%                        | 0%                            |                     |
|          | % > BCWQG <sup>a</sup>                              |                             | - 00/                   | U 70                   |                              | U 70                  | -                          |                             | 0%                     | - 0%                 | 0%                   | -                    | 0%                           |                            | 0%                            | -                   |
|          | % > BCWQG <sup>b</sup>                              | -                           | 0%                      | -                      | -                            | -                     | -                          | -                           | -                      |                      |                      | -                    | _                            | -                          | _                             | -                   |
|          | % > Level 1 Benchmark/UEC                           | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | % > Level 2 Benchmark/UEC % > Level 3 Benchmark/UEC | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | % > Level 3 Benchmark/UEC                           | -<br>11                     | 11                      | -<br>11                | <u>-</u><br>11               | - 11                  | <u>-</u><br>11             | 11                          | 11                     | <u>-</u><br>11       | 11                   | 11                   | <u>-</u><br>11               | 11                         | 11                            | -<br>11             |
|          | Annual Minimum                                      | <0.0001                     | <0.0001                 | 0.056                  | <0.00002                     | 11<br><0.01           | 0.022                      | 0.00012                     | <0.0001                | <0.01                | <0.00005             | 0.018                | 0.0015                       | <0.000005                  | 0.00072                       | <0.5                |
|          | Annual Maximum                                      | 0.0001                      | 0.00033                 | 0.036                  | 0.000033                     | 0.012                 | 0.022                      | 0.00012                     | 0.00042                | 0.43                 | 0.00045              | 0.018                | 0.0013                       | <0.0000005                 | 0.00072                       | 3.5                 |
|          | Annual Mean   | 0.00024                     | 0.00033                 | 0.12                   | 0.000033                     | 0.012                 | 0.15                       | 0.00041                     | 0.00042                | 0.43                 | 0.00045              | 0.041                | 0.041                        | <0.0000005                 | 0.0041                        | 1.7                 |
|          | Annual Median                                       | 0.00013                     | 0.00015                 | 0.096                  | 0.000021                     | 0.011                 | 0.031                      | 0.00022                     | 0.00014                | 0.077                | 0.000097             | 0.034                | 0.0072                       | <0.0000005                 | 0.0014                        | 1.7                 |
| ED EDE   | % < LRL   | 36%                         | 36%                     | 0.1                    | 91%                          | 36%                   | 0.036                      | 0.00017                     | 73%                    | 27%                  | 73%                  | 0.037                | 0.0022                       | 100%                       | 0.0012                        | 9%                  |
| FR_FR5   | % > BCWQG <sup>a</sup>                              | 0%                          | -                       | 0%                     | 0%                           | 0%                    | 0 70                       | 0%                          | 0%                     | -                    | 0%                   | -                    | 0%                           | 64%                        | 0%                            | 9 70                |
|          |   |                             | 0%                      |                        |                              | 1                     | -                          |                             | 0%                     | 0%                   | 0%                   |                      | 0%                           |                            | 0%                            |                     |
|          | % > BCWQG <sup>b</sup> % > Level 1 Benchmark/UEC    | -                           |                         | -                      | -                            | -                     | -                          | -                           | -                      |                      | -                    | -                    | _                            | -                          | -                             | -                   |
|          | % > Level 2 Benchmark/UEC                           | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | % > Level 3 Benchmark/UEC                           | -                           | -                       | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | /6 > Level 3 Belicillia NOEC                        | 4                           | 4                       | 4                      | 4                            | 4                     | 4                          | 4                           | 4                      | 4                    | 4                    | 4                    | 4                            | 4                          | 4                             | 4                   |
|          | Annual Minimum                                      | <0.0001                     | <0.0001                 | 0.055                  | <0.00002                     | <0.01                 | 0.022                      | 0.00013                     | <0.0001                | 0.01                 | <0.00005             | 0.017                | 0.0018                       | <0.000005                  | 0.00079                       | <0.5                |
|          | Annual Maximum                                      | 0.00017                     | 0.00021                 | 0.11                   | <0.00002                     | <0.01                 | 0.056                      | 0.0004                      | 0.00012                | 0.18                 | 0.00035              | 0.031                | 0.013                        | <0.000005                  | 0.0014                        | 2.7                 |
|          | Annual Mean   | 0.00017                     | 0.00021                 | 0.086                  | <0.00002                     | <0.01                 | 0.030                      | 0.0004                      | 0.00012                | 0.18                 | 0.00033              | 0.025                | 0.0069                       | <0.000005                  | 0.0014                        | 1.5                 |
|          | Annual Median                                       | 0.00013                     | 0.00016                 | 0.080                  | <0.00002                     | <0.01                 | 0.039                      | 0.00023                     | 0.00011                | 0.07                 | 0.00013              | 0.025                | 0.0062                       | <0.000005                  | 0.0011                        | 1.4                 |
| LC_FRUS  | % < LRL   | 50%                         | 25%                     | 0%                     | 100%                         | 100%                  | 0%                         | 0%                          | 50%                    | 0%                   | 50%                  | 0%                   | 0.0002                       | 100%                       | 0%                            | 25%                 |
| 23_1 NOO | % > BCWQG <sup>a</sup>                              | 0%                          | -                       | 0%                     | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                    | 0%                           | 100%                       | 0%                            | -                   |
|          | % > BCWQG <sup>b</sup>                              | -                           | 0%                      | -                      | -                            |                       |                            | -                           | 0%                     | 0%                   | 0%                   | _                    | 0%                           | -                          | 0%                            | _                   |
|          | % > Level 1 Benchmark/UEC                           | -                           | -                       | -                      | <u> </u>                     | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | % > Level 2 Benchmark/UEC                           | -                           | -                       | -                      | <u>-</u>                     |                       |                            | -                           | _                      |                      |                      |                      |                              |                            | -                             | -                   |
|          | % > Level 3 Benchmark/UEC                           | -                           | -                       | -                      | <u> </u>                     | -                     | <u> </u>                   | -                           | _                      | -                    | -                    | -                    | -                            | -                          | -                             | -                   |
|          | n   | 26                          | 26                      | 26                     | 26                           | 26                    | 26                         | 26                          | 26                     | 26                   | 26                   | 26                   | 26                           | 26                         | 26                            | 26                  |
|          | Annual Minimum                                      | <0.0001                     | <0.0001                 | 0.054                  | <0.00002                     | <0.01                 | 0.017                      | 0.00011                     | <0.0001                | 0.01                 | <0.00005             | 0.015                | 0.00086                      | <0.0000005                 | 0.00081                       | <0.5                |
|          | Annual Maximum                                      | 0.00022                     | 0.00023                 | 0.14                   | <0.00002                     | 0.012                 | 0.083                      | 0.00066                     | 0.00015                | 0.16                 | 0.00015              | 0.042                | 0.013                        | <0.0000005                 | 0.007                         | 2.6                 |
|          | Annual Mean   | 0.00014                     | 0.00014                 | 0.097                  | <0.00002                     | 0.01                  | 0.039                      | 0.0002                      | 0.00011                | 0.055                | 0.000066             | 0.028                | 0.0042                       | <0.0000005                 | 0.0015                        | 1.4                 |
|          | Annual Median                                       | 0.00013                     | 0.00012                 | 0.1                    | <0.00002                     | 0.01                  | 0.035                      | 0.00016                     | 0.0001                 | 0.042                | 0.00005              | 0.029                | 0.003                        | <0.0000005                 | 0.0012                        | 1.5                 |
| LC_FRB   | % < LRL   | 23%                         | 27%                     | 0%                     | 100%                         | 81%                   | 0%                         | 0%                          | 85%                    | 19%                  | 65%                  | 0%                   | 0%                           | 100%                       | 0%                            | 15%                 |
|          | % > BCWQG <sup>a</sup>                              | 0%                          | -                       | 0%                     | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                    | 0%                           | 81%                        | 0%                            | -                   |
|          | % > BCWQG <sup>b</sup>                              | -                           | 0%                      | _                      | _                            | _                     | -                          | _                           | 0%                     | 0%                   | 0%                   | _                    | 0%                           | _                          | 0%                            | _                   |
|          | % > Level 1 Benchmark/UEC                           | -                           | -                       | -                      | _                            | -                     | -                          | -                           | -                      | -                    | -                    | _                    | -                            | _                          | -                             | _                   |
|          | % > Level 2 Benchmark/UEC                           | -                           | -                       | _                      | _                            | -                     | _                          | -                           | _                      | _                    | -                    | _                    | _                            | -                          | _                             | -                   |
|          | % > Level 3 Benchmark/UEC                           | -                           | -                       | _                      | _                            | _                     | _                          | -                           | _                      | _                    | -                    | -                    | -                            | -                          | _                             | _                   |
|          | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,             | <u>I</u>                    | 1                       |                        |                              |                       |                            | l                           | ı                      | 1                    | 1                    | L                    | <u>I</u>                     | 1                          |                               |                     |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

 $<sup>^{\</sup>rm c}$ LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area    | Summary Statistic                      | Total<br>Antimony<br>(mg/L) | Total Arsenic (mg/L) | Total Barium<br>(mg/L) | Total<br>Beryllium<br>(mg/L) | Total Boron<br>(mg/L) | Total<br>Cadmium<br>(µg/L) | Total<br>Chromium<br>(mg/L) | Total Cobalt<br>(µg/L) | Total Iron<br>(mg/L) | Total Lead<br>(mg/L) | Total Lithium (mg/L) | Total<br>Manganese<br>(mg/L) | Total<br>Mercury<br>(mg/L) | Total<br>Molybdenum<br>(mg/L) | Total Nickel<br>(µg/L) |
|---------|--|-----------------------------|----------------------|------------------------|------------------------------|-----------------------|----------------------------|-----------------------------|------------------------|----------------------|----------------------|----------------------|------------------------------|----------------------------|-------------------------------|------------------------|
|         | n                                      | 14                          | 14                   | 14                     | 14                           | 14                    | 14                         | 14                          | 14                     | 14                   | 14                   | 14                   | 14                           | 14                         | 14                            | 14                     |
|         | Annual Minimum                         | <0.0001                     | <0.0001              | 0.056                  | <0.00002                     | 0.012                 | <0.005                     | 0.00013                     | <0.0001                | <0.01                | <0.00005             | 0.0052               | 0.0013                       | <0.000005                  | 0.001                         | <0.5                   |
|         | Annual Maximum                         | <0.0001                     | 0.00025              | 0.068                  | 0.000022                     | 0.017                 | 0.034                      | 0.0005                      | 0.00028                | 0.45                 | 0.00036              | 0.0076               | 0.049                        | <0.0000005                 | 0.0036                        | 1                      |
|         | Annual Mean                            | <0.0001                     | 0.00014              | 0.062                  | 0.00002                      | 0.014                 | 0.0096                     | 0.00026                     | 0.00012                | 0.075                | 0.000085             | 0.0066               | 0.0073                       | <0.000005                  | 0.0016                        | 0.54                   |
|         | Annual Median                          | <0.0001                     | 0.00012              | 0.063                  | 0.00002                      | 0.013                 | 0.0063                     | 0.00022                     | 0.0001                 | 0.018                | 0.00005              | 0.0066               | 0.002                        | <0.0000005                 | 0.0014                        | 0.5                    |
| LC_GRCK | % < LRL                                | 100%                        | 29%                  | 0%                     | 93%                          | 0%                    | 14%                        | 0%                          | 86%                    | 7%                   | 79%                  | 0%                   | 0%                           | 100%                       | 0%                            | 86%                    |
|         | % > BCWQG <sup>a</sup>                 | 0%                          | -                    | 0%                     | 0%                           | 0%                    | -                          | 0%                          | 0%                     | -                    | 0%                   | -                    | 0%                           | 79%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                   | -                      | -                            | -                     | -                          | -                           | 0%                     | 0%                   | 0%                   | -                    | 0%                           | -                          | 0%                            | -                      |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | -                           | -                    | -                      | -                            | -                     | 0%                         | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |
|         | % > Level 2 Benchmark/UEC              | ı                           | -                    | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |
|         | % > Level 3 Benchmark/UEC              | -                           | -                    | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |
|         | n                                      | 12                          | 12                   | 12                     | 12                           | 12                    | 12                         | 12                          | 12                     | 12                   | 12                   | 12                   | 12                           | 12                         | 12                            | 12                     |
|         | Annual Minimum                         | <0.0001                     | <0.0001              | 0.099                  | <0.00002                     | 0.011                 | 0.007                      | <0.0001                     | <0.0001                | <0.01                | <0.00005             | 0.0049               | 0.00055                      | <0.0000005                 | 0.00058                       | <0.5                   |
|         | Annual Maximum                         | <0.0001                     | 0.00016              | 0.12                   | <0.00002                     | 0.014                 | 0.063                      | 0.0012                      | <0.0001                | 0.23                 | 0.00011              | 0.0071               | 0.036                        | 0.0000028                  | 0.0012                        | <0.5                   |
|         | Annual Mean                            | <0.0001                     | 0.00011              | 0.11                   | <0.00002                     | 0.012                 | 0.018                      | 0.00022                     | <0.0001                | 0.036                | 0.000055             | 0.0059               | 0.0059                       | 0.0000013                  | 0.00076                       | <0.5                   |
|         | Annual Median                          | <0.0001                     | 0.0001               | 0.11                   | <0.00002                     | 0.012                 | 0.011                      | 0.0001                      | <0.0001                | 0.012                | 0.00005              | 0.0059               | 0.0015                       | 0.000005                   | 0.00072                       | <0.5                   |
| LC_UC   | % < LRL                                | 100%                        | 50%                  | 0%                     | 100%                         | 0%                    | 0%                         | 42%                         | 100%                   | 50%                  | 92%                  | 0%                   | 0%                           | 92%                        | 0%                            | 100%                   |
| _       | % > BCWQG <sup>a</sup>                 | 0%                          | -                    | 0%                     | 0%                           | 0%                    | -                          | 8%                          | 0%                     | -                    | 0%                   | -                    | 0%                           | 83%                        | 0%                            | -                      |
|         | % > BCWQG <sup>b</sup>                 | ı                           | 0%                   | -                      | -                            | -                     | -                          | -                           | 0%                     | 0%                   | 0%                   | -                    | 0%                           | -                          | 0%                            | -                      |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | -                           | -                    | -                      | -                            | -                     | 0%                         | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |
|         | % > Level 2 Benchmark/UEC              | -                           | -                    | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |
|         | % > Level 3 Benchmark/UEC              |                             | -                    | -                      | -                            | -                     | -                          | -                           | -                      | -                    | -                    | -                    | -                            | -                          | -                             | -                      |

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

 $<sup>^{\</sup>rm a}$  Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

 $<sup>^{\</sup>rm c}$  LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area     | Summary Statistic  | Total<br>Selenium<br>(µg/L) | Total Silver<br>(mg/L) | Total<br>Thallium<br>(mg/L) | Total<br>Uranium<br>(mg/L) | Total Zinc<br>(mg/L) | Dissolved<br>Cadmium<br>(µg/L) | Dissolved<br>Copper<br>(mg/L) | Dissolved<br>Iron (mg/L) | Dissolved<br>Nickel (µg/L) |
|----------|--|-----------------------------|------------------------|-----------------------------|----------------------------|----------------------|--------------------------------|-------------------------------|--------------------------|----------------------------|
|          | n  | 14                          | 14                     | 14                          | 14                         | 14                   | 14                             | 14                            | 14                       | 12                         |
|          | Annual Minimum   | 1.3                         | <0.00001               | <0.00001                    | 0.0002                     | < 0.003              | 0.021                          | <0.0002                       | <0.01                    | <0.5                       |
|          | Annual Maximum   | 1.8                         | <0.00001               | <0.00001                    | 0.00045                    | 0.0041               | 0.044                          | 0.0004                        | <0.01                    | 0.58                       |
|          | Annual Mean  | 1.5                         | <0.00001               | <0.00001                    | 0.00036                    | 0.0031               | 0.032                          | 0.00025                       | <0.01                    | 0.51                       |
|          | Annual Median  | 1.5                         | < 0.00001              | <0.00001                    | 0.00036                    | 0.003                | 0.031                          | 0.00022                       | <0.01                    | 0.5                        |
| LC_DCEF  | % < LRL  | 0%                          | 100%                   | 100%                        | 0%                         | 93%                  | 0%                             | 36%                           | 100%                     | 92%                        |
|          | % > BCWQG <sup>a</sup>   | 0%                          | 0%                     | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | -                        | -                          |
|          | % > BCWQG <sup>b</sup>   | -                           | 0%                     | _                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | _                          |
|          | % > Level 1 Benchmark/UEC  | _                           | -                      | _                           | _                          | -                    | 0%                             | -                             | -                        | 0%                         |
|          | % > Level 2 Benchmark/UEC  | -                           | _                      | _                           | -                          | _                    | -                              | _                             | -                        | 0%                         |
|          | % > Level 3 Benchmark/UEC  | -                           | _                      | _                           | -                          | _                    | _                              | _                             | _                        | 0%                         |
|          | n  | 59                          | 57                     | 57                          | 57                         | 57                   | 58                             | 58                            | 58                       | 12                         |
|          | Annual Minimum   | 34                          | <0.00001               | 0.000013                    | 0.0014                     | 0.0076               | 0.16                           | 0.0002                        | 0.01                     | 8.5                        |
|          | Annual Maximum   | 114                         | <0.00001               | 0.000013                    | 0.004                      | 0.017                | 0.46                           | 0.0073                        | 0.012                    | 19                         |
|          | Annual Mean  | 79                          | <0.00001               | 0.00002                     | 0.0028                     | 0.012                | 0.29                           | 0.00041                       | 0.01                     | 14                         |
|          | Annual Median  | 84                          | <0.00001               | 0.000019                    | 0.0031                     | 0.011                | 0.29                           | 0.00026                       | 0.01                     | 15                         |
| LC_DC3   | % < LRL  | 0%                          | 100%                   | 0%                          | 0%                         | 0%                   | 0%                             | 10%                           | 95%                      | 0%                         |
| E0_500   | % > BCWQG <sup>a</sup>   | 100%                        | 0%                     | 0%                          | 0%                         | 0%                   | 2%                             | 2%                            | -                        | -                          |
|          | % > BCWQG <sup>b</sup>   | -                           | 0%                     |                             | -                          | 0%                   | 0%                             | 2%                            | 0%                       | <del>  _</del>             |
|          | % > Level 1 Benchmark/UEC  | -                           | -                      | -                           | -                          | -                    | 0%                             | -                             | -                        | 100%                       |
|          | % > Level 1 Benchmark/UEC  | _                           |                        | _                           |                            |                      | -                              |                               | _                        | 67%                        |
|          | % > Level 3 Benchmark/UEC  |                             |                        |                             |                            |                      | _                              | _                             | _                        | 0%                         |
|          | n  | 55                          | 53                     | 53                          | 53                         | 53                   | 53                             | 53                            | 53                       | 12                         |
|          | Annual Minimum   | 31                          | <0.00001               | 0.000014                    | 0.0013                     | 0.0072               | 0.15                           | <0.0002                       | <0.01                    | 8.5                        |
|          | Annual Maximum   | 114                         | 0.000015               | 0.000014                    | 0.0038                     | 0.015                | 0.38                           | 0.0017                        | 0.014                    | 18                         |
|          | Annual Mean  | 76                          | 0.00001                | 0.000019                    | 0.0027                     | 0.011                | 0.26                           | 0.00031                       | 0.01                     | 14                         |
|          | Annual Median  | 82                          | 0.00001                | 0.000018                    | 0.003                      | 0.01                 | 0.26                           | 0.00028                       | 0.01                     | 13                         |
| LC_SPDC  | % < LRL  | 0%                          | 98%                    | 0%                          | 0%                         | 0%                   | 0%                             | 9%                            | 96%                      | 0%                         |
| LO_01 D0 | % > BCWQG <sup>a</sup>   | 100%                        | 0%                     | 0%                          | 0%                         | 0%                   | 0%                             | 4%                            | -                        | -                          |
|          | % > BCWQG <sup>b</sup>   | -                           | 0%                     | -                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | _                          |
|          | % > BCWQG<br>% > Level 1 Benchmark/UEC                           | -                           | -                      |                             | -                          | -                    | 0%                             | -                             | - 076                    | 100%                       |
|          | % > Level 2 Benchmark/UEC  | -                           | -                      | -                           | -                          | -                    | 0 70                           | -                             | -                        | 67%                        |
|          | % > Level 3 Benchmark/UEC  | -                           | _                      | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|          | n  | 57                          | 56                     | 56                          | 56                         | 56                   | 56                             | 56                            | 56                       | 12                         |
|          | Annual Minimum   | 28                          | <0.00001               | 0.000012                    | 0.0011                     | 0.0062               | 0.14                           | <0.0002                       | <0.01                    | 7.4                        |
|          | Annual Maximum   | 112                         | <0.00001               | 0.000012                    | 0.0038                     | 0.0002               | 0.37                           | 0.0019                        | 0.012                    | 17                         |
|          | Annual Mean  | 72                          | <0.00001               | 0.00004                     | 0.0036                     | 0.018                | 0.37                           | 0.0019                        | 0.012                    | 13                         |
|          | Annual Median  | 78                          | <0.00001               | 0.000018                    | 0.0020                     | 0.011                | 0.26                           | 0.00031                       | 0.01                     | 12                         |
| LC_DCDS  | % < LRL  | 0%                          | 100%                   | 0%                          | 0.0029                     | 0%                   | 0%                             | 20%                           | 98%                      | 0%                         |
| LO_DOD3  | % > BCWQG <sup>a</sup>   | 100%                        | 0%                     | 0%                          | 0%                         | 0%                   | 0%                             | 2%                            | -                        | -                          |
|          | % > BCWQG <sup>b</sup>   | -                           | 0%                     |                             | -                          | 0%                   | 0%                             | 0%                            | 0%                       | _                          |
|          |  | 100%                        | 0 /0                   | <u>-</u>                    | <u>-</u>                   | 0 70                 | 0%                             | 0 /0                          | 0 70                     | 92%                        |
|          | % > Level 1 Benchmark/UEC <sup>c</sup> % > Level 2 Benchmark/UEC |                             | -                      | -                           | -                          | -                    | 0 /0                           | -                             | -                        | 58%                        |
|          | % > Level 2 Benchmark/UEC % > Level 3 Benchmark/UEC              | -                           | -                      | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|          | % > Level 3 Benchmark/UEC  | 53                          | 52                     | -<br>52                     | -<br>52                    | -<br>52              | 52                             | 52                            | 52                       | 12                         |
|          | Annual Minimum   | 6.2                         | <0.00001               | <0.00001                    | 0.00031                    | <0.003               | 0.043                          | 0.0002                        | <0.01                    | 3.7                        |
|          | Annual Maximum   | 97                          | <0.00001               | 0.00001                     | 0.00031                    | 0.003                | 0.043                          | 0.0002                        | 0.01                     | 13                         |
|          | Annual Mean  | 60                          | <0.00001               | 0.000022                    | 0.0033                     | 0.0069               | 0.19                           | 0.003                         | 0.01                     | 8.4                        |
|          | Annual Median  | 68                          | <0.00001               | 0.000013                    | 0.0021                     | 0.0009               | 0.19                           | 0.00033                       | 0.01                     | 8.6                        |
| LC_DC2   | % < LRL  | 0%                          | 100%                   | 23%                         | 0.0023                     | 4%                   | 0.2                            | 27%                           | 98%                      | 0%                         |
| LO_DC2   |  | 100%                        | 0%                     | 0%                          | 0%                         | 0%                   | 0%                             | 4%                            | -                        |                            |
|          | % > BCWQG <sup>a</sup>   | 100 /0                      |                        | U /0                        | U /0                       |                      |                                |                               | - 00/                    | <del>-</del>               |
|          | % > BCWQG <sup>b</sup>   | -                           | 0%                     | -                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | 070/                       |
|          | % > Level 1 Benchmark/UEC  | -                           | -                      | -                           | -                          | -                    | 0%                             | -                             | -                        | 67%                        |
|          | % > Level 2 Benchmark/UEC  | -                           | -                      | -                           | -                          | -                    | -                              | -                             | -                        | 25%                        |
|          | % > Level 3 Benchmark/UEC  | -                           | -                      | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

<sup>°</sup>LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area      | Summary Statistic                                   | Total<br>Selenium<br>(µg/L) | Total Silver (mg/L) | Total<br>Thallium<br>(mg/L) | Total<br>Uranium<br>(mg/L) | Total Zinc<br>(mg/L) | Dissolved<br>Cadmium<br>(µg/L) | Dissolved<br>Copper<br>(mg/L) | Dissolved<br>Iron (mg/L) | Dissolved<br>Nickel (µg/L) |
|-----------|---|-----------------------------|---------------------|-----------------------------|----------------------------|----------------------|--------------------------------|-------------------------------|--------------------------|----------------------------|
|           | n   | 53                          | 52                  | 52                          | 52                         | 52                   | 52                             | 52                            | 52                       | 12                         |
|           | Annual Minimum                                      | 12                          | <0.00001            | <0.00001                    | 0.00058                    | <0.003               | 0.068                          | <0.0002                       | <0.01                    | 1.6                        |
|           | Annual Maximum                                      | 52                          | <0.00001            | 0.000015                    | 0.0015                     | 0.84                 | 0.15                           | 0.0015                        | <0.01                    | 5                          |
|           | Annual Mean   | 36                          | <0.00001            | 0.00001                     | 0.0011                     | 0.02                 | 0.1                            | 0.00029                       | <0.01                    | 3.1                        |
|           | Annual Median                                       | 38                          | <0.00001            | 0.00001                     | 0.0011                     | 0.0032               | 0.099                          | 0.0002                        | <0.01                    | 2.9                        |
| LC_DC4    | % < LRL   | 0%                          | 100%                | 94%                         | 0%                         | 42%                  | 0%                             | 52%                           | 100%                     | 0%                         |
| _         | % > BCWQG <sup>a</sup>                              | 100%                        | 0%                  | 0%                          | 0%                         | 2%                   | 0%                             | 4%                            | -                        | -                          |
|           | % > BCWQG <sup>b</sup>                              | -                           | 0%                  | -                           | -                          | 2%                   | 0%                             | 0%                            | 0%                       | -                          |
|           | % > Level 1 Benchmark/UEC                           | -                           | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|           | % > Level 2 Benchmark/UEC                           | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|           | % > Level 3 Benchmark/UEC                           | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|           | n   | 55                          | 52                  | 52                          | 52                         | 52                   | 52                             | 52                            | 52                       | 12                         |
|           | Annual Minimum                                      | 11                          | <0.00001            | <0.00001                    | 0.00057                    | <0.003               | 0.06                           | <0.0002                       | <0.01                    | 1.3                        |
|           | Annual Maximum                                      | 50                          | <0.00001            | 0.000025                    | 0.0014                     | 0.14                 | 0.12                           | 0.0007                        | 0.017                    | 4                          |
|           | Annual Mean   | 34                          | <0.00001            | 0.00001                     | 0.0011                     | 0.0074               | 0.082                          | 0.00025                       | 0.01                     | 2.4                        |
|           | Annual Median                                       | 36                          | <0.00001            | 0.00001                     | 0.0011                     | 0.003                | 0.079                          | 0.0002                        | 0.01                     | 2.3                        |
| LC_DC1    | % < LRL   | 0%                          | 100%                | 92%                         | 0%                         | 71%                  | 0%                             | 58%                           | 96%                      | 0%                         |
| _         | % > BCWQG <sup>a</sup>                              | 100%                        | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | -                        | -                          |
|           | % > BCWQG <sup>b</sup>                              | -                           | 0%                  | -                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | -                          |
|           | % > Level 1 Benchmark/UEC                           | -                           | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|           | % > Level 2 Benchmark/UEC                           | _                           | _                   | _                           | -                          | _                    | -                              | _                             | _                        | 0%                         |
|           | % > Level 3 Benchmark/UEC                           | _                           | _                   | _                           | -                          | _                    | _                              | _                             | _                        | 0%                         |
|           | n   | 11                          | 11                  | 11                          | 11                         | 11                   | 11                             | 11                            | 11                       | 11                         |
|           | Annual Minimum                                      | 31                          | <0.00001            | <0.0001                     | 0.0016                     | <0.003               | 0.02                           | <0.0002                       | <0.01                    | <0.5                       |
|           | Annual Maximum                                      | 86                          | <0.00001            | 0.000013                    | 0.0034                     | 0.0075               | 0.058                          | 0.00022                       | <0.01                    | 3.1                        |
|           | Annual Mean   | 67                          | <0.00001            | 0.00001                     | 0.0028                     | 0.0035               | 0.032                          | 0.0002                        | <0.01                    | 1.3                        |
|           | Annual Median                                       | 72                          | <0.00001            | 0.00001                     | 0.003                      | 0.003                | 0.028                          | 0.0002                        | <0.01                    | 1.3                        |
| FR_FR5    | % < LRL   | 0%                          | 100%                | 91%                         | 0%                         | 64%                  | 0%                             | 82%                           | 100%                     | 18%                        |
| FK_FK3    | % > BCWQG <sup>a</sup>                              | 100%                        | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | 10070                    | 1070                       |
|           |   | -                           | 0%                  | 0 70                        | 0 70                       | 0%                   | 0%                             | 0%                            | 0%                       | <del>-</del>               |
|           | % > BCWQG <sup>b</sup>                              |                             | -                   | -                           | -                          |                      | _                              |                               | 0%                       | 0%                         |
|           | % > Level 1 Benchmark/UEC % > Level 2 Benchmark/UEC | -                           | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|           | % > Level 3 Benchmark/UEC                           | _                           | _                   | -                           | -                          | _                    | _                              | -                             | _                        | 0%                         |
|           | n   | 5                           | 4                   | 4                           | 4                          | 4                    | 4                              | 4                             | 4                        | 4                          |
|           | Annual Minimum                                      | 23                          | <0.00001            | <0.00001                    | 0.0015                     | <0.003               | 0.02                           | <0.0002                       | 0.01                     | <0.5                       |
|           | Annual Maximum                                      | 50                          | 0.0015              | <0.00001                    | 0.0015                     | 0.0055               | 0.027                          | 0.00026                       | 0.01                     | 2.4                        |
|           | Annual Mean   | 37                          | 0.00037             | <0.00001                    | 0.0020                     | 0.0038               | 0.025                          | 0.00020                       | 0.01                     | 1.3                        |
|           | Annual Median                                       | 41                          | 0.000012            | <0.00001                    | 0.0021                     | 0.0034               | 0.023                          | 0.00022                       | 0.01                     | 1.1                        |
| LC_FRUS   | % < LRL   | 0%                          | 50%                 | 100%                        | 0%                         | 50%                  | 0%                             | 75%                           | 75%                      | 25%                        |
| 20_1 1100 | % > BCWQG <sup>a</sup>                              | 100%                        | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | -                        | -                          |
|           | % > BCWQG <sup>b</sup>                              | -                           | 0%                  | -                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | -                          |
|           | % > Level 1 Benchmark/UEC                           | _                           | -                   | _                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|           | % > Level 2 Benchmark/UEC                           | _                           | _                   | -                           | -                          | _                    | -                              | _                             | -                        | 0%                         |
|           | % > Level 3 Benchmark/UEC                           | _                           | _                   | _                           | -                          | _                    | -                              | -                             | -                        | 0%                         |
|           | n   | 26                          | 26                  | 26                          | 26                         | 26                   | 26                             | 26                            | 26                       | 12                         |
|           | Annual Minimum                                      | 21                          | <0.00001            | <0.00001                    | 0.0013                     | <0.003               | 0.012                          | <0.0002                       | <0.01                    | <0.5                       |
|           | Annual Maximum                                      | 70                          | <0.00001            | <0.00001                    | 0.0031                     | 0.0045               | 0.044                          | 0.0029                        | 0.016                    | 1.9                        |
|           | Annual Mean   | 48                          | <0.00001            | <0.00001                    | 0.0023                     | 0.0031               | 0.028                          | 0.00031                       | 0.01                     | 0.97                       |
|           | Annual Median                                       | 49                          | <0.00001            | <0.00001                    | 0.0024                     | 0.003                | 0.028                          | 0.0002                        | 0.01                     | 0.85                       |
| LC_FRB    | % < LRL   | 0%                          | 100%                | 100%                        | 0%                         | 81%                  | 0%                             | 62%                           | 88%                      | 17%                        |
| LO_I ND   | % > BCWQG <sup>a</sup>                              | 100%                        | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 4%                            | -                        | -                          |
|           | % > BCWQG % > BCWQG <sup>b</sup>                    | 10070                       | 0%                  | 0 70                        | 0 /0                       | 0%                   | 0%                             | 0%                            | 0%                       | -                          |
|           |   | -                           |                     | -                           | -                          | U%                   |                                |                               | U%                       | - 00/                      |
|           | % > Level 1 Benchmark/UEC                           | -                           | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|           | % > Level 2 Benchmark/UEC % > Level 3 Benchmark/UEC | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|           | 1 % 2 Level 3 Benchmark/UEC                         | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |

<sup>&</sup>gt; 5% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 50% of samples exceed the guideline or benchmark.

<sup>&</sup>gt; 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

<sup>&</sup>lt;sup>a</sup> Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

 $<sup>^{\</sup>circ}$ LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.4: Summary of Water Chemistry Data for Key Parameters for the Dry Creek LAEMP Monitoring Stations, 2022

| Area    | Summary Statistic                      | Total<br>Selenium<br>(µg/L) | Total Silver (mg/L) | Total<br>Thallium<br>(mg/L) | Total<br>Uranium<br>(mg/L) | Total Zinc<br>(mg/L) | Dissolved<br>Cadmium<br>(µg/L) | Dissolved<br>Copper<br>(mg/L) | Dissolved<br>Iron (mg/L) | Dissolved<br>Nickel (µg/L) |
|---------|--|-----------------------------|---------------------|-----------------------------|----------------------------|----------------------|--------------------------------|-------------------------------|--------------------------|----------------------------|
|         | n                                      | 14                          | 14                  | 14                          | 14                         | 14                   | 14                             | 14                            | 14                       | 12                         |
|         | Annual Minimum                         | 1.1                         | <0.00001            | <0.00001                    | 0.0007                     | < 0.003              | <0.005                         | <0.0002                       | <0.01                    | <0.5                       |
|         | Annual Maximum                         | 2.9                         | <0.00001            | 0.000015                    | 0.0012                     | 0.0035               | 0.0072                         | 0.00032                       | <0.01                    | <0.5                       |
|         | Annual Mean                            | 2.1                         | <0.00001            | 0.000011                    | 0.001                      | 0.003                | 0.0056                         | 0.00021                       | <0.01                    | <0.5                       |
|         | Annual Median                          | 2                           | <0.00001            | 0.00001                     | 0.001                      | 0.003                | 0.0052                         | 0.0002                        | <0.01                    | <0.5                       |
| LC_GRCK | % < LRL                                | 0%                          | 100%                | 79%                         | 0%                         | 93%                  | 50%                            | 86%                           | 100%                     | 100%                       |
| _       | % > BCWQG <sup>a</sup>                 | 57%                         | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | -                        | -                          |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                  | -                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | -                          |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | 0%                          | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|         | % > Level 2 Benchmark/UEC              | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|         | % > Level 3 Benchmark/UEC              | -                           | -                   | 1                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|         | n                                      | 12                          | 12                  | 12                          | 12                         | 12                   | 11                             | 11                            | 11                       | 11                         |
|         | Annual Minimum                         | 0.27                        | < 0.00001           | <0.00001                    | 0.00034                    | < 0.003              | 0.0061                         | <0.0002                       | <0.01                    | <0.5                       |
|         | Annual Maximum                         | 0.48                        | <0.00001            | <0.00001                    | 0.00043                    | 0.0037               | 0.012                          | 0.00029                       | 0.015                    | <0.5                       |
|         | Annual Mean                            | 0.36                        | < 0.00001           | <0.00001                    | 0.00037                    | 0.0031               | 0.0083                         | 0.00021                       | 0.01                     | <0.5                       |
|         | Annual Median                          | 0.35                        | < 0.00001           | <0.00001                    | 0.00036                    | 0.003                | 0.0082                         | 0.0002                        | 0.01                     | <0.5                       |
| LC_UC   | % < LRL                                | 0%                          | 100%                | 100%                        | 0%                         | 83%                  | 0%                             | 73%                           | 82%                      | 100%                       |
| _       | % > BCWQG <sup>a</sup>                 | 0%                          | 0%                  | 0%                          | 0%                         | 0%                   | 0%                             | 0%                            | -                        | -                          |
|         | % > BCWQG <sup>b</sup>                 | -                           | 0%                  | 1                           | -                          | 0%                   | 0%                             | 0%                            | 0%                       | -                          |
|         | % > Level 1 Benchmark/UEC <sup>c</sup> | 0%                          | -                   | -                           | -                          | -                    | 0%                             | -                             | -                        | 0%                         |
|         | % > Level 2 Benchmark/UEC              | -                           | -                   | •                           | -                          | -                    | -                              | -                             | -                        | 0%                         |
|         | % > Level 3 Benchmark/UEC              | -                           | -                   | -                           | -                          | -                    | -                              | -                             | -                        | 0%                         |

> 5% of samples exceed the guideline or benchmark.

> 50% of samples exceed the guideline or benchmark.

> 95% of samples exceed the guideline or benchmark.

Notes: "UEC" = Updated Effects Concentration. "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline. UEC's are shown for Nitrate and Sulphate, Interim Screen Vaues are shown for Total Nickel, and EVWQP benchmarks are shown for all other relevant parameters. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

 $<sup>^{\</sup>rm a}$  Long-term average BCQWG for the Protection of Aquatic Life.

<sup>&</sup>lt;sup>b</sup> Short-term maximum BCQWG for the Protection of Aquatic Life.

 $<sup>^{\</sup>circ}$ LC\_DCDS, LC\_UC, and LC\_GRCK Site Performance Objective for Total Cadmium and Total Selenium

Table C.5: Raw Selenium Speciation Data (Brooks) from Dry Creek, Fording River, and Grace Creek, 2022

| Wate              | er Body        | station | Sample Date            | DMSeO -<br>Dimethylselenoxide<br>(mg/L) | MeSe(IV) -<br>Methylseleninic Acid<br>(mg/L) | MeSe(VI) -<br>Methaneselenonic Acid<br>(mg/L) | Se(IV) - Selenite (mg/L) | Se(VI) - Selenate (mg/L) | SeCN - Selenocyanate<br>(mg/L) | Selenium Unknown<br>(mg/L) | Selenosulfate (mg/L) | SeMe -<br>Selenomethionine<br>(mg/L) | DMDSe- Dimethyl<br>Diselenide (mg/L) | DMSe - Dimethyl<br>selenide (mg/L) | Organoselenium<br>(mg/L) <sup>a</sup> |
|-------------------|----------------|---------|------------------------|---|--|---|--------------------------|--------------------------|--------------------------------|----------------------------|----------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|
|                   |                |         | 5-Jan-22<br>9-Feb-22   | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00001<br><0.00001      | 0.00130<br>0.00131       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 7-Mar-22               | <0.00001                                | <0.00001                                     | <0.00001                                      | <0.00001                 | 0.00133                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
| Dry Creek         |                |         | 6-Apr-22<br>3-May-22   | <0.00001<br><0.00001                    | <0.00001<br><0.00001                         | <0.00001<br><0.00001                          | <0.00001<br>0.00002      | 0.00136<br>0.00155       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
| East<br>Tributary | Reference      | LC_DCEF | 7-Jul-22<br>2-Aug-22   | <0.00001                                | <0.00001                                     | <0.00001                                      | <0.00002<br><0.00002     | 0.00151<br>0.00167       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 12-Sep-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | <0.00002                 | 0.00149                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 18-Oct-22<br>15-Nov-22 | <0.00001<br><0.00001                    | <0.00001<br><0.00001                         | <0.00001<br><0.00001                          | <0.00002<br><0.00002     | 0.00135<br>0.00138       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 7-Dec-22<br>11-May-22  | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001                                      | <0.00002<br>0.00003      | 0.00128<br>0.00152       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001<br><0.00001                  |
| Grace Creek       |                | LC_GRCK | 14-Jun-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | <0.00001                 | <0.00001                 | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 14-Sep-22<br>5-Jan-22  | <0.00001<br><0.00001                    | <0.00001<br><0.00001                         | <0.00001<br><0.00001                          | 0.00004<br>0.00019       | 0.00185<br>0.02690       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 12-Jan-22<br>19-Jan-22 | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00023<br>0.00016       | 0.03340<br>0.03390       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 2-Feb-22               | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00016                  | 0.03380                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 9-Feb-22<br>15-Feb-22  | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00020<br>0.00021       | 0.03410<br>0.03750       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 22-Feb-22<br>1-Mar-22  | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001                                      | 0.00015<br>0.00019       | 0.03450<br>0.03480       | <0.00001<br><0.00001           | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001                              |
|                   |                |         | 9-Mar-22               | <0.00001                                | <0.00001                                     |   | 0.00019                  | 0.03400                  | <0.00001                       | <0.00001                   | <0.00001             |                                      | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 15-Mar-22<br>23-Mar-22 | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001<br><0.00001                          | 0.00022<br>0.00021       | 0.03780<br>0.03730       | <0.00001<br><0.00001           | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 30-Mar-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00031                  | 0.02330                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|                   |                |         | 6-Apr-22<br>12-Apr-22  | <0.00001                                | <0.00001<br><0.00001                         | <0.00001<br><0.00001                          | 0.00013<br>0.00025       | 0.01020<br>0.02190       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 19-Apr-22<br>24-Apr-22 | <0.00001<br><0.00001                    | 0.00001<br>0.00001                           | <0.00001                                      | 0.00030<br>0.00037       | 0.03080<br>0.03010       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00001                    |
|                   |                |         | 3-May-22               | <0.00001                                | 0.00002                                      | <0.00001                                      | 0.00034                  | 0.02160                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|                   |                |         | 12-May-22<br>17-May-22 | <0.00001                                | <0.00001<br>0.00001                          | <0.00001                                      | 0.00025<br>0.00029       | 0.01800<br>0.01900       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br>0.00001                   |
|                   |                |         | 24-May-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00032                  | 0.02090                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|                   |                |         | 31-May-22<br>7-Jun-22  | <0.00001<br><0.00001                    | 0.00001<br><0.00001                          | <0.00001<br><0.00001                          | 0.00022<br>0.00022       | 0.01510<br>0.01540       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br><0.00001                   |
|                   |                |         | 14-Jun-22<br>21-Jun-22 | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001                                      | 0.00021<br>0.00018       | 0.01810<br>0.01020       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 28-Jun-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00017                  | 0.01420                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                | LC_DC1  | 7-Jul-22<br>12-Jul-22  | <0.00001                                | 0.00002                                      | <0.00001                                      | 0.00021<br>0.00025       | 0.01870<br>0.02140       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00002<br>0.00001                    |
|                   |                |         | 18-Jul-22              | 0.000013                                | 0.00002                                      | <0.00001                                      | 0.00041                  | 0.03280                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|                   |                |         | 28-Jul-22<br>2-Aug-22  | <0.00001<br><0.00001                    | 0.00001<br>0.00001                           | <0.00001<br><0.00001                          | 0.00027<br>0.00032       | 0.02770<br>0.03480       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00001                    |
|                   |                |         | 9-Aug-22<br>18-Aug-22  | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00028<br>0.00032       | 0.03470<br>0.03710       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00001                    |
|                   |                |         | 23-Aug-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00032                  | 0.03990                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|                   |                |         | 30-Aug-22<br>8-Sep-22  | <0.00001                                | 0.00001<br><0.00001                          | <0.00001<br><0.00001                          | 0.00033                  | 0.04160<br>0.04100       | <0.00001                       | <0.00001<br><0.00001       | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br><0.00001                   |
|                   |                |         | 13-Sep-22<br>20-Sep-22 | 0.00001<br><0.00001                     | 0.00001                                      | <0.00001                                      | 0.00032<br>0.00031       | 0.04400<br>0.04280       | <0.00001<br><0.00001           | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003                               |
|                   | Mine-exposed   |         | 27-Sep-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00030                  | 0.04040                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
| Dry Creek         | Willie exposed |         | 4-Oct-22<br>11-Oct-22  | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00031<br>0.00025       | 0.04200<br>0.03900       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
| 2., 5.56          |                |         | 18-Oct-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00027                  | 0.04420                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 25-Oct-22<br>1-Nov-22  | <0.00001<br><0.00001                    | <0.00001<br><0.00001                         | <0.00001                                      | 0.00027<br>0.00023       | 0.04710<br>0.04420       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 8-Nov-22<br>15-Nov-22  | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001                                      | 0.00011<br>0.00016       | 0.03220<br>0.04550       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 22-Nov-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00016                  | 0.04120                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 29-Nov-22<br>7-Dec-22  | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00011<br>0.00015       | 0.03650<br>0.04240       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 13-Dec-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00010                  | 0.03830                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                | _       | 20-Dec-22<br>29-Dec-22 | <0.00001<br><0.00001                    | <0.00001                                     | <0.00001<br><0.00001                          | 0.00013<br>0.00012       | 0.04180<br>0.04680       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 5-Jan-22<br>12-Jan-22  | 0.00002<br>0.00002                      | 0.00001                                      | <0.00001                                      | 0.00068<br>0.00073       | 0.05590<br>0.06200       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003<br>0.00002                    |
|                   |                |         | 19-Jan-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00066                  | 0.06570                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 24-Jan-22<br>2-Feb-22  | 0.00002<br>0.00001                      | <0.00001<br>0.00001                          | <0.00001<br><0.00001                          | 0.00073<br>0.00069       | 0.06660<br>0.06630       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00002<br>0.00002                    |
|                   |                |         | 9-Feb-22<br>15-Feb-22  | 0.00002<br>0.00001                      | <0.00001                                     | <0.00001                                      | 0.00073<br>0.00075       | 0.06610<br>0.06740       | <0.00001<br><0.00001           | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00002<br>0.00003                    |
|                   |                |         | 22-Feb-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00063                  | 0.06650                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|                   |                |         | 3-Mar-22<br>7-Mar-22   | <0.00001                                | 0.00001<br><0.00001                          | <0.00001                                      | 0.00065<br>0.00061       | 0.06210<br>0.06340       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br><0.00001                   |
|                   |                |         | 15-Mar-22              | 0.00001                                 | 0.00001                                      | <0.00001                                      | 0.00082                  | 0.07550                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|                   |                |         | 23-Mar-22<br>30-Mar-22 | 0.00001<br>0.00001                      | <0.00001<br>0.00001                          | <0.00001<br><0.00001                          | 0.00085<br>0.00046       | 0.06700<br>0.02200       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00003                    |
|                   |                | LC_DC2  | 6-Apr-22<br>12-Apr-22  | <0.00001<br><0.00001                    | <0.00001<br><0.00001                         | <0.00001                                      | 0.00042<br>0.00046       | 0.02230<br>0.02030       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|                   |                |         | 19-Apr-22              | 0.00001                                 | 0.00002                                      | <0.00001                                      | 0.00069                  | 0.03710                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|                   |                |         | 28-Apr-22<br>3-May-22  | 0.00001                                 | <0.00001<br>0.00001                          | <0.00001<br><0.00001                          | 0.00054<br>0.00047       | 0.01900<br>0.02290       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00002                    |
|                   |                |         | 11-May-22              | 0.00001                                 | 0.00001                                      | <0.00001                                      | 0.00047                  | 0.02090                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|                   |                |         | 17-May-22<br>24-May-22 | <0.00001<br><0.00001                    | 0.00001                                      | <0.00001<br><0.00001                          | 0.00028                  | 0.00656<br>0.01610       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001                             | -                                    | -                                  | <0.00001<br>0.00001                   |
|                   |                |         | 31-May-22<br>7-Jun-22  | <0.00001<br><0.00001                    | 0.00001<br>0.00001                           | <0.00001<br><0.00001                          | 0.00032<br>0.00033       | 0.01760<br>0.01870       | <0.00001<br><0.00001           | <0.00001<br><0.00001       | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br>0.00001                    |
|                   |                |         | 14-Jun-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00030                  | 0.02330                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|                   |                |         | 21-Jun-22<br>28-Jun-22 | <0.00001<br><0.00001                    | <0.00001<br>0.00001                          | <0.00001<br><0.00001                          | 0.00027<br>0.00034       | 0.01260<br>0.02220       | <0.00001                       | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br>0.00001                   |
|                   |                |         | 7-Jul-22<br>12-Jul-22  | 0.00001<br>0.00002                      | 0.00001<br>0.00002                           | <0.00001                                      | 0.00046<br>0.00047       | 0.02850<br>0.03070       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00002                               |

Table C.5: Raw Selenium Speciation Data (Brooks) from Dry Creek, Fording River, and Grace Creek, 2022

| Wate      | er Body      | station | Sample Date            | DMSeO - Dimethylselenoxide (mg/L) | MeSe(IV) - Methylseleninic Acid (mg/L) | MeSe(VI) -<br>Methaneselenonic Acid<br>(mg/L) | Se(IV) - Selenite (mg/L) | Se(VI) - Selenate (mg/L)      | SeCN - Selenocyanate (mg/L)      | Selenium Unknown<br>(mg/L) | Selenosulfate (mg/L) | SeMe -<br>Selenomethionine<br>(mg/L) | DMDSe- Dimethyl<br>Diselenide (mg/L) | DMSe - Dimethyl<br>selenide (mg/L) | Organoselenium<br>(mg/L) <sup>a</sup> |
|-----------|--------------|---------|------------------------|-----------------------------------|--|---|--------------------------|-------------------------------|----------------------------------|----------------------------|----------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|
|           |              |         | 18-Jul-22<br>28-Jul-22 | 0.00002<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                          | 0.00059<br>0.00059       | 0.04330<br>0.04280            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00004<br>0.00004                    |
|           |              |         | 2-Aug-22<br>9-Aug-22   | 0.00001<br>0.00002                | 0.00002                                | <0.00001<br><0.00001                          | 0.00068<br>0.00073       | 0.05650<br>0.05790            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              |         | 18-Aug-22              | 0.00002                           | 0.00003                                | <0.00001                                      | 0.00080                  | 0.06490                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 23-Aug-22<br>30-Aug-22 | 0.00002<br>0.00003                | 0.00002                                | <0.00001                                      | 0.00086<br>0.00081       | 0.06860<br>0.06770            | <0.00001                         | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00004<br>0.00005                    |
|           |              |         | 8-Sep-22               | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00089                  | 0.07190                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 13-Sep-22<br>20-Sep-22 | 0.00003<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                          | 0.00098<br>0.00085       | 0.07860<br>0.07540            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005<br>0.00004                    |
|           |              |         | 27-Sep-22<br>4-Oct-22  | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00090<br>0.00101       | 0.07020<br>0.07930            | <0.00001                         | <0.00001                   | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005<br>0.00005                    |
|           |              | LC_DC2  | 11-Oct-22              | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00091                  | 0.07230                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 18-Oct-22<br>25-Oct-22 | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00099                  | 0.08400<br>0.08800            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005<br>0.00004                    |
|           |              |         | 3-Nov-22               | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00088                  | 0.08230                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |         | 8-Nov-22<br>15-Nov-22  | 0.00001<br>0.00002                | 0.00001                                | <0.00001                                      | 0.00062<br>0.00093       | 0.07450<br>0.09550            | <0.00001                         | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              |         | 22-Nov-22<br>29-Nov-22 | 0.00002                           | 0.00001                                | <0.00001                                      | 0.00088                  | 0.08980                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 7-Dec-22               | 0.00001<br><0.00001               | 0.00001<br><0.00001                    | <0.00001<br><0.00001                          | 0.00062<br>0.00074       | 0.08580<br>0.08800            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | 0.00001<br><0.00001  | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00002<br><0.00001                   |
|           |              |         | 13-Dec-22<br>20-Dec-22 | <0.00001                          | <0.00001                               | <0.00001<br><0.00001                          | 0.00066<br>0.00077       | 0.08530<br>0.08420            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|           |              |         | 29-Dec-22              | 0.00001                           | <0.00001                               | <0.00001                                      | 0.00069                  | 0.09620                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|           |              |         | 5-Jan-22<br>12-Jan-22  | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00101                  | 0.08070                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004<br>0.00004                    |
|           |              |         | 19-Jan-22              | 0.00002                           | 0.00001                                | <0.00001                                      | 0.00100                  | 0.08180                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 24-Jan-22<br>2-Feb-22  | 0.00002                           | 0.00001                                | <0.00001                                      | 0.00103                  | 0.07950<br>0.07680            | <0.00001                         | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              |         | 9-Feb-22               | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00099                  | 0.07820                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |         | 15-Feb-22<br>22-Feb-22 | 0.00002<br><0.00001               | 0.00001                                | <0.00001<br><0.00001                          | 0.00107<br>0.00090       | 0.07860<br>0.07800            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00004<br>0.00001                    |
|           |              |         | 2-Mar-22<br>7-Mar-22   | <0.00001<br>0.00001               | 0.00001                                | <0.00001                                      | 0.00094<br>0.00094       | 0.07640<br>0.07650            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001<br>0.00003                    |
|           |              |         | 15-Mar-22              | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00120                  | 0.08580                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 23-Mar-22<br>30-Mar-22 | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00104<br>0.00091       | 0.07110<br>0.03080            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004<br>0.00004                    |
|           |              |         | 6-Apr-22               | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00078                  | 0.03600                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |         | 12-Apr-22<br>17-Apr-22 | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00092<br>0.00091       | 0.03520<br>0.04670            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              |         | 24-Apr-22              | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00107                  | 0.04190                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 3-May-22<br>11-May-22  | 0.00002                           | 0.00003                                | <0.00001                                      | 0.00100<br>0.00096       | 0.04060<br>0.03870            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005<br>0.00005                    |
|           |              |         | 17-May-22              | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00096                  | 0.03970                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |         | 24-May-22<br>31-May-22 | 0.00003<br>0.00001                | 0.00002                                | <0.00001<br><0.00001                          | 0.00100<br>0.00085       | 0.04890<br>0.03930            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005<br>0.00003                    |
| Dry Creek | Mine-exposed |         | 7-Jun-22<br>14-Jun-22  | 0.00002<br>0.00003                | 0.00002<br><0.00001                    | <0.00001                                      | 0.00084<br>0.00090       | 0.04560<br>0.05340            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003<br>0.00003                    |
|           |              |         | 21-Jun-22              | <0.00001                          | 0.00002                                | <0.00001                                      | 0.00072                  | 0.03220                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 27-Jun-22<br>28-Jun-22 | 0.00001                           | 0.00001                                | <0.00001                                      | 0.00082                  | 0.04460<br>0.04530            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              | LC_DC3  | 7-Jul-22               | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00090                  | 0.05700                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 12-Jul-22<br>18-Jul-22 | 0.00003<br>0.00004                | 0.00002                                | <0.00001<br><0.00001                          | 0.00090                  | 0.05890<br>0.06030            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005<br>0.00005                    |
|           |              |         | 25-Jul-22<br>2-Aug-22  | 0.00004<br>0.00004                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                          | 0.00106<br>0.00113       | 0.06810<br>0.07910            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00005                               |
|           |              |         | 9-Aug-22               | 0.00004                           | 0.00002                                | <0.00001                                      | 0.000113                 | 0.07910                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005<br>0.00005                    |
|           |              |         | 16-Aug-22<br>18-Aug-22 | 0.00002                           | 0.00002                                | <0.00001<br><0.00001                          | 0.00100<br>0.00098       | 0.07930<br>0.07290            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | <0.000022                            | -<br><0.00047                      | 0.00003<br>0.00005                    |
|           |              |         | 23-Aug-22              | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00117                  | 0.09120                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |         | 30-Aug-22<br>6-Sep-22  | 0.00003                           | 0.00002                                | <0.00001                                      | 0.00110                  | 0.08490<br>0.08690            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005<br>0.00004                    |
|           |              |         | 13-Sep-22              | 0.00003                           | 0.00001                                | <0.00001                                      | 0.00119                  | 0.09510                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |         | 20-Sep-22<br>27-Sep-22 | 0.00001<br>0.00003                | 0.00002                                | <0.00001<br><0.00001                          | 0.00105<br>0.00113       | 0.09160<br>0.09455            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00003<br>0.00004                    |
|           |              |         | 3-Oct-22<br>11-Oct-22  | 0.00002<br>0.00002                | 0.00002                                | <0.00001                                      | 0.00112<br>0.00104       | 0.09310<br>0.08710            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004<br>0.00003                    |
|           |              |         | 18-Oct-22              | 0.00002                           | 0.00001                                | <0.00001                                      | 0.00120                  | 0.09900                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 25-Oct-22<br>1-Nov-22  | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00120<br>0.00107       | 0.10700<br>0.09260            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004<br>0.00003                    |
|           |              |         | 8-Nov-22               | 0.00002                           | 0.00001                                | <0.00001                                      | 0.00104                  | 0.09440                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 15-Nov-22<br>22-Nov-22 | 0.00002                           | 0.00002<br><0.00001                    | <0.00001                                      | 0.00114                  | 0.10600<br>0.09710            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005<br>0.00002                    |
|           |              |         | 29-Nov-22              | 0.00002                           | 0.00002                                | <0.00001                                      | 0.00094                  | 0.09570                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |         | 7-Dec-22<br>13-Dec-22  | <0.00001<br>0.00001               | <0.00001<br><0.00001                   | <0.00001<br><0.00001                          | 0.00102<br>0.00099       | 0.10000<br>0.10000            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br>0.00001                   |
|           |              |         | 20-Dec-22<br>29-Dec-22 | <0.00001<br><0.00001              | <0.00001                               | <0.00001<br><0.00001                          | 0.00104<br>0.00106       | 0.09940<br>0.11500            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001                              |
|           |              |         | 5-Jan-22               | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00028                  | 0.04710                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |         | 12-Jan-22<br>19-Jan-22 | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00023<br>0.00017       | 0.03550<br>0.03520            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |         | 24-Jan-22              | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00018                  | 0.03630                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |         | 2-Feb-22<br>9-Feb-22   | <0.00001<br><0.00001              | <0.00001<br><0.00001                   | <0.00001                                      | 0.00018<br>0.00018       | 0.03590<br>0.03430            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001<br><0.00001                  |
|           |              |         | 15-Feb-22              | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00021                  | 0.03790                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              | LC_DC4  | 22-Feb-22<br>2-Mar-22  | <0.00001<br><0.00001              | <0.00001<br><0.00001                   | <b>+</b>                                      | 0.00017<br>0.00020       | 0.03740<br>0.03730            | <0.00001<br><0.00001             | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001                              |
|           |              |         | 7-Mar-22<br>15-Mar-22  | <0.00001<br><0.00001              | <0.00001                               | <0.00001<br><0.00001                          | 0.00015<br>0.00020       | 0.03550<br>0.04020            | <0.00001                         | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | <0.00001                              |
|           |              |         | 23-Mar-22              | <0.00001                          | <0.00001                               | <0.00001                                      | 0.00020                  | 0.03930                       | <0.00001                         | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |         | 30-Mar-22<br>6-Apr-22  | <0.00001<br><0.00001              | 0.00001                                | <0.00001                                      | 0.00038<br>0.00032       | 0.02470<br>0.02520            | <0.00001                         | <0.00001<br><0.00001       | <0.00001<br><0.00001 | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00001<br><0.00001                   |
|           |              |         | 12-Apr-22<br>19-Apr-22 | <0.00001<br><0.00001<br><0.00001  | 0.00001                                | <0.00001<br><0.00001<br><0.00001              | 0.00032                  | 0.02320<br>0.02260<br>0.03140 | <0.00001<br><0.00001<br><0.00001 | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |

Table C.5: Raw Selenium Speciation Data (Brooks) from Dry Creek, Fording River, and Grace Creek, 2022

| Wate      | er Body      | station | Sample Date            | DMSeO - Dimethylselenoxide (mg/L) | MeSe(IV) - Methylseleninic Acid (mg/L) | MeSe(VI) - Methaneselenonic Acid (mg/L) | Se(IV) - Selenite (mg/L) | Se(VI) - Selenate (mg/L) | SeCN - Selenocyanate (mg/L) | Selenium Unknown (mg/L) | Selenosulfate (mg/L) | SeMe - Selenomethionine (mg/L) | DMDSe- Dimethyl<br>Diselenide (mg/L) | DMSe - Dimethyl<br>selenide (mg/L) | Organoselenium (mg/L) <sup>a</sup> |
|-----------|--------------|---------|------------------------|-----------------------------------|--|---|--------------------------|--------------------------|-----------------------------|-------------------------|----------------------|--------------------------------|--------------------------------------|------------------------------------|------------------------------------|
|           |              |         | 28-Apr-22<br>3-May-22  | <0.00001<br><0.00001              | <0.00001<br>0.00001                    | <0.00001<br><0.00001                    | 0.00036<br>0.00034       | 0.01980<br>0.02220       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | <0.00001<br>0.00001                |
|           |              |         | 11-May-22<br>17-May-22 | <0.00001                          | 0.00001                                | <0.00001                                | 0.00033<br>0.00035       | 0.02020<br>0.01960       | <0.00001                    | <0.00001                | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00001<br>0.00001                 |
|           |              |         | 24-May-22<br>31-May-22 | <0.00001<br><0.00001              | 0.00001                                | <0.00001                                | 0.00033<br>0.00027       | 0.02270<br>0.01620       | <0.00001                    | <0.00001                | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00001                            |
|           |              |         | 7-Jun-22               | <0.00001                          | 0.00001                                | <0.00001                                | 0.00027                  | 0.01620                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001<br>0.00001                |
|           |              |         | 14-Jun-22<br>21-Jun-22 | <0.00001<br><0.00001              | <0.00001                               | <0.00001<br><0.00001                    | 0.00022<br>0.00021       | 0.01970<br>0.01110       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | <0.00001                           |
|           |              |         | 28-Jun-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00024                  | 0.01870                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 7-Jul-22<br>12-Jul-22  | <0.00001<br>0.00001               | 0.00001                                | <0.00001                                | 0.00024<br>0.00029       | 0.02180<br>0.02300       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00001<br>0.00003                 |
|           |              |         | 18-Jul-22<br>28-Jul-22 | 0.00002<br>0.00001                | 0.00002                                | <0.00001<br><0.00001                    | 0.00043<br>0.00031       | 0.03410<br>0.02940       | <0.00001                    | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00003<br>0.00001                 |
|           |              |         | 2-Aug-22               | <0.00001                          | 0.00001                                | <0.00001                                | 0.00040                  | 0.03730                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00001                            |
|           |              |         | 9-Aug-22<br>18-Aug-22  | <0.00001                          | <0.00001<br>0.00001                    | <0.00001                                | 0.00034<br>0.00034       | 0.03700<br>0.03970       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001<br>0.00001                |
|           |              | LC_DC4  | 23-Aug-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00036                  | 0.04330                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 30-Aug-22<br>8-Sep-22  | <0.00001<br>0.00001               | 0.00001<br><0.00001                    | <0.00001<br><0.00001                    | 0.00038<br>0.00036       | 0.04390<br>0.04420       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00001<br>0.00001                 |
|           |              |         | 13-Sep-22<br>20-Sep-22 | <0.00001<br><0.00001              | <0.00001<br><0.00001                   | <0.00001<br><0.00001                    | 0.00034<br>0.00032       | 0.04670<br>0.04510       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | <0.00001<br><0.00001               |
|           |              |         | 27-Sep-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00032                  | 0.04270                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 4-Oct-22<br>11-Oct-22  | <0.00001                          | <0.00001                               | <0.00001                                | 0.00034                  | 0.04460<br>0.04180       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001<br><0.00001               |
|           |              |         | 18-Oct-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00032                  | 0.04680                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 25-Oct-22<br>3-Nov-22  | <0.00001<br><0.00001              | <0.00001<br><0.00001                   | <0.00001<br><0.00001                    | 0.00031<br>0.00019       | 0.04930<br>0.04160       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | <0.00001<br><0.00001               |
|           |              |         | 8-Nov-22<br>15-Nov-22  | <0.00001<br><0.00001              | <0.00001<br><0.00001                   | <0.00001<br><0.00001                    | 0.00010<br>0.00021       | 0.03340<br>0.05050       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | <0.00001<br><0.00001               |
|           |              |         | 22-Nov-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00017                  | 0.04520                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 29-Nov-22<br>7-Dec-22  | <0.00001                          | <0.00001                               | <0.00001                                | 0.00011<br>0.00015       | 0.04180<br>0.04470       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 13-Dec-22              | <0.00001                          | <0.00001                               | <0.00001                                | 0.00011                  | 0.04160                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001                           |
|           |              |         | 20-Dec-22<br>29-Dec-22 | <0.00001                          | <0.00001                               | <0.00001                                | 0.00016<br>0.00012       | 0.04480<br>0.05100       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | <0.00001<br><0.00001               |
|           |              |         | 5-Jan-22<br>12-Jan-22  | 0.00002<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                    | 0.00092<br>0.00097       | 0.07150<br>0.07340       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00004                            |
|           |              |         | 19-Jan-22              | 0.00002                           | 0.00002                                | <0.00001                                | 0.00097                  | 0.07810                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004<br>0.00003                 |
|           |              |         | 1-Feb-22<br>9-Feb-22   | 0.00002                           | 0.00002                                | <0.00001                                | 0.00086<br>0.00099       | 0.07230<br>0.07800       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004<br>0.00004                 |
|           |              |         | 15-Feb-22              | 0.00002                           | 0.00001                                | <0.00001                                | 0.00093                  | 0.07090                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004                            |
|           |              |         | 22-Feb-22<br>1-Mar-22  | 0.00002<br><0.00001               | 0.00002                                | <0.00001                                | 0.00095                  | 0.07500<br>0.06910       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00003<br>0.00002                 |
|           |              |         | 8-Mar-22               | 0.00002                           | <0.00001                               | <0.00001                                | 0.00098                  | 0.05260                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00002                            |
| Dry Creek | Mine-exposed |         | 15-Mar-22<br>23-Mar-22 | 0.00002<br>0.00003                | 0.00002                                | <0.00001<br><0.00001                    | 0.00119<br>0.00101       | 0.08450<br>0.07080       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00005<br>0.00005                 |
| Dry Creek | wine-exposed |         | 30-Mar-22<br>6-Apr-22  | 0.00002<br><0.00001               | 0.00002<br><0.00001                    | <0.00001                                | 0.00083<br>0.00078       | 0.03010<br>0.03190       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00004<br><0.00001                |
|           |              |         | 12-Apr-22              | 0.00001                           | 0.00001                                | <0.00001                                | 0.00067                  | 0.02660                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00003                            |
|           |              |         | 17-Apr-22<br>24-Apr-22 | 0.00002                           | 0.00002                                | <0.00001                                | 0.00079<br>0.00105       | 0.03720<br>0.04300       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004<br>0.00004                 |
|           |              |         | 5-May-22               | 0.00002<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                    | 0.00084<br>0.00081       | 0.03180<br>0.03320       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004                            |
|           |              |         | 11-May-22<br>17-May-22 | 0.00002                           | 0.00002                                | <0.00001                                | 0.00085                  | 0.03550                  | <0.00001                    | <0.00002                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00005<br>0.00005                 |
|           |              |         | 24-May-22<br>31-May-22 | 0.00003                           | 0.00003                                | <0.00001                                | 0.00087                  | 0.04050<br>0.03310       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00006<br>0.00004                 |
|           |              |         | 7-Jun-22               | <0.00001                          | 0.00002                                | <0.00001                                | 0.00076                  | 0.04000                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00002                            |
|           |              |         | 14-Jun-22<br>21-Jun-22 | 0.00002<br><0.00001               | 0.00003                                | <0.00001<br><0.00001                    | 0.00080<br>0.00062       | 0.04920<br>0.02540       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00005<br>0.00002                 |
|           |              |         | 28-Jun-22<br>7-Jul-22  | 0.00002<br>0.00002                | 0.00003                                | <0.00001                                | 0.00072<br>0.00068       | 0.04130<br>0.04400       | <0.00001                    | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00005<br>0.00006                 |
|           |              | LC_DCDS | 12-Jul-22              | 0.00002                           | 0.00003                                | <0.00001                                | 0.00078                  | 0.04630                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00005                            |
|           |              |         | 18-Jul-22<br>25-Jul-22 | 0.00003<br>0.00005                | 0.00003                                | <0.00001                                | 0.00084<br>0.00108       | 0.05330<br>0.05970       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00006<br>0.00010                 |
|           |              |         | 2-Aug-22               | 0.00003                           | 0.00003                                | <0.00001                                | 0.00100<br>0.00095       | 0.06970<br>0.07020       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00006                            |
|           |              |         | 9-Aug-22<br>16-Aug-22  | 0.00003                           | 0.00003                                | <0.00001                                | 0.00107                  | 0.07610                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00006<br>0.00006                 |
|           |              |         | 18-Aug-22<br>23-Aug-22 | 0.00003<br>0.00003                | 0.00004                                | <0.00001                                | 0.00100<br>0.00113       | 0.07340<br>0.07930       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001                       | <0.000022                            | <0.000047                          | 0.00007<br>0.00006                 |
|           |              |         | 30-Aug-22              | 0.00004                           | 0.00003                                | <0.00001                                | 0.00107                  | 0.07660                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00007                            |
|           |              |         | 6-Sep-22<br>13-Sep-22  | 0.00003                           | 0.00003                                | <0.00001                                | 0.00117<br>0.00122       | 0.07990<br>0.08720       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00006<br>0.00006                 |
|           |              |         | 20-Sep-22<br>27-Sep-22 | 0.00002<br>0.00003                | 0.00003                                | <0.00001                                | 0.00111<br>0.00113       | 0.08400<br>0.08300       | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00005                            |
|           |              |         | 4-Oct-22               | 0.00004                           | 0.00003                                | <0.00001                                | 0.00120                  | 0.08620                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00006<br>0.00006                 |
|           |              |         | 11-Oct-22<br>18-Oct-22 | 0.00002<br>0.00002                | 0.00002                                | <0.00001<br><0.00001                    | 0.00102<br>0.00118       | 0.07720<br>0.09060       | <0.00001                    | <0.00001                | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00004<br>0.00005                 |
|           |              |         | 25-Oct-22              | 0.00003                           | 0.00002                                | <0.00001                                | 0.00122                  | 0.09500                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00005                            |
|           |              |         | 1-Nov-22<br>8-Nov-22   | 0.00002<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                    | 0.00103<br>0.00098       | 0.08360<br>0.08660       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00004<br>0.00003                 |
|           |              |         | 15-Nov-22<br>22-Nov-22 | 0.00002<br>0.00002                | 0.00002<br>0.00001                     | <0.00001<br><0.00001                    | 0.00117<br>0.00113       | 0.10300<br>0.09810       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00005<br>0.00004                 |
|           |              |         | 29-Nov-22              | 0.00002                           | 0.00001                                | <0.00001                                | 0.00108                  | 0.09960                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00003                            |
|           |              |         | 7-Dec-22<br>13-Dec-22  | 0.00001                           | 0.00002                                | <0.00001                                | 0.00107<br>0.00098       | 0.09880<br>0.09890       | <0.00001                    | <0.00001                | <0.00001<br><0.00001 | <0.00001                       | -                                    | -                                  | 0.00003<br>0.00002                 |
|           |              |         | 20-Dec-22              | <0.00001                          | 0.00001                                | <0.00001                                | 0.00114                  | 0.10100                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00001                            |
|           |              |         | 29-Dec-22<br>5-Jan-22  | 0.00002<br>0.00002                | 0.00001<br><0.00001                    | <0.00001<br><0.00001                    | 0.00119<br>0.00068       | 0.11400<br>0.04580       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00003<br>0.00002                 |
|           |              |         | 12-Jan-22<br>19-Jan-22 | 0.00002<br>0.00002                | 0.00002<br>0.00002                     | <0.00001<br><0.00001                    | 0.00102<br>0.00100       | 0.07440<br>0.07830       | <0.00001<br><0.00001        | <0.00001<br><0.00001    | <0.00001<br><0.00001 | <0.00001<br><0.00001           | -                                    | -                                  | 0.00004<br>0.00003                 |
|           |              | LC_SPDC | 2-Feb-22               | 0.00002                           | 0.00002                                | <0.00001                                | 0.00098                  | 0.07500                  | <0.00001                    | <0.00001                | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004                            |
|           |              |         | 9-Feb-22<br>15-Feb-22  | 0.00003                           | 0.00002                                | <0.00001<br><0.00001                    | 0.00101<br>0.00105       | 0.07710<br>0.07610       | <0.00001                    | <0.00001<br><0.00001    | <0.00001             | <0.00001                       | -                                    | -                                  | 0.00004<br>0.00005                 |

Table C.5: Raw Selenium Speciation Data (Brooks) from Dry Creek, Fording River, and Grace Creek, 2022

| Wate      | er Body      | station             | Sample Date            | DMSeO -<br>Dimethylselenoxide<br>(mg/L) | MeSe(IV) -<br>Methylseleninic Acid<br>(mg/L) | MeSe(VI) -<br>Methaneselenonic Acid<br>(mg/L) | Se(IV) - Selenite (mg/L) | Se(VI) - Selenate (mg/L) | SeCN - Selenocyanate<br>(mg/L) | Selenium Unknown<br>(mg/L) | Selenosulfate (mg/L) | SeMe -<br>Selenomethionine<br>(mg/L) | DMDSe- Dimethyl<br>Diselenide (mg/L) | DMSe - Dimethyl<br>selenide (mg/L) | Organoselenium<br>(mg/L) <sup>a</sup> |
|-----------|--------------|---------------------|------------------------|---|--|---|--------------------------|--------------------------|--------------------------------|----------------------------|----------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|
|           |              |                     | 22-Feb-22              | <0.00001                                | 0.00002                                      | <0.00001                                      | 0.00095                  | 0.07890                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|           |              |                     | 2-Mar-22               | <0.00001                                | 0.00002                                      | <0.00001                                      | 0.00100                  | 0.07540                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|           |              |                     | 7-Mar-22               | 0.00002                                 | 0.00002                                      | <0.00001                                      | 0.00096                  | 0.07480                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |                     | 15-Mar-22              | <0.00001                                | 0.00002                                      | <0.00001                                      | 0.00117                  | 0.08500                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|           |              |                     | 23-Mar-22              | 0.00001                                 | 0.00002                                      | <0.00001                                      | 0.00105                  | 0.07130                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 30-Mar-22              | 0.00002                                 | 0.00002                                      | <0.00001                                      | 0.00094<br>0.00082       | 0.03350                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00004                               |
|           |              |                     | 6-Apr-22<br>12-Apr-22  | 0.00002                                 | 0.00002                                      | <0.00001                                      | 0.00082                  | 0.03380                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 17-Apr-22              | 0.00002                                 | 0.00001                                      | <0.00001                                      | 0.00090                  | 0.03260                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    |                                    | 0.00003<br>0.00005                    |
|           |              |                     | 24-Apr-22              | 0.00003                                 | 0.00002                                      | <0.00001                                      | 0.00033                  | 0.04580                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | _                                    | _                                  | 0.00005                               |
|           |              |                     | 5-May-22               | 0.00002                                 | 0.00003                                      | <0.00001                                      | 0.00106                  | 0.03870                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 11-May-22              | 0.00002                                 | 0.00002                                      | <0.00001                                      | 0.00096                  | 0.03680                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |                     | 17-May-22              | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00091                  | 0.03990                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00006                               |
|           |              |                     | 24-May-22              | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00098                  | 0.04580                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 31-May-22              | 0.00003                                 | 0.00002                                      | <0.00001                                      | 0.00082                  | 0.03770                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 7-Jun-22               | <0.00001                                | 0.00003                                      | <0.00001                                      | 0.00083                  | 0.04400                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 14-Jun-22              | 0.00003                                 | 0.00002                                      | <0.00001                                      | 0.00083                  | 0.05220                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 21-Jun-22              | 0.00001                                 | 0.00002                                      | <0.00001                                      | 0.00070                  | 0.02880                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 28-Jun-22              | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00080                  | 0.04570                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 7-Jul-22               | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00080                  | 0.05180                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 12-Jul-22<br>18-Jul-22 | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00092<br>0.00089       | 0.05590<br>0.05850       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00007                               |
| Dry Creek |              | LC_SPDC             | 25-Jul-22              | 0.00005                                 | 0.00004                                      | <0.00001                                      | 0.00089                  | 0.05830                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             |                                      |                                    | 0.00007<br>0.00010                    |
| Dry Orock |              | 20_01 00            | 2-Aug-22               | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00112                  | 0.00300                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | _                                    | _                                  | 0.00010                               |
|           |              |                     | 9-Aug-22               | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00110                  | 0.07880                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           | Mine-exposed |                     | 16-Aug-22              | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00115                  | 0.08070                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00006                               |
|           | ·            |                     | 23-Aug-22              | 0.00004                                 | 0.00003                                      | <0.00001                                      | 0.00123                  | 0.08680                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 30-Aug-22              | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00118                  | 0.08390                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 6-Sep-22               | 0.00004                                 | 0.00004                                      | <0.00001                                      | 0.00128                  | 0.08660                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 13-Sep-22              | 0.00004                                 | 0.00003                                      | <0.00001                                      | 0.00128                  | 0.09050                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00006                               |
|           |              |                     | 20-Sep-22              | 0.00002                                 | 0.00003                                      | <0.00001                                      | 0.00124                  | 0.09170                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 27-Sep-22              | 0.00003                                 | 0.00004                                      | <0.00001                                      | 0.00117                  | 0.09040                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00007                               |
|           |              |                     | 3-Oct-22               | 0.00004                                 | 0.00004                                      | <0.00001                                      | 0.00121                  | 0.08860                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00008                               |
|           |              |                     | 11-Oct-22              | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00112                  | 0.08430                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00006                               |
|           |              |                     | 18-Oct-22<br>25-Oct-22 | 0.00004                                 | 0.00004                                      | <0.00001                                      | 0.00129<br>0.00127       | 0.09920<br>0.10300       | <0.00001                       | <0.00001                   | <0.00001             | <0.00001<br><0.00001                 | -                                    | -                                  | 0.00007                               |
|           |              |                     | 1-Nov-22               | 0.00002                                 | 0.00003                                      | <0.00001                                      | 0.00127                  | 0.10300                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             |                                      |                                    | 0.00005<br>0.00005                    |
|           |              |                     | 8-Nov-22               | 0.00003                                 | 0.00003                                      | <0.00001                                      | 0.00113                  | 0.09170                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             |                                      |                                    | 0.00003                               |
|           |              |                     | 15-Nov-22              | 0.00001                                 | 0.00001                                      | <0.00001                                      | 0.00104                  | 0.10300                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | _                                    |                                    | 0.00002                               |
|           |              |                     | 22-Nov-22              | 0.00002                                 | 0.00003                                      | <0.00001                                      | 0.00109                  | 0.09710                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00005                               |
|           |              |                     | 29-Nov-22              | 0.00002                                 | 0.00002                                      | <0.00001                                      | 0.00102                  | 0.09930                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00004                               |
|           |              |                     | 7-Dec-22               | 0.00002                                 | 0.00001                                      | <0.00001                                      | 0.00112                  | 0.10000                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 13-Dec-22              | 0.00001                                 | 0.00001                                      | <0.00001                                      | 0.00099                  | 0.09700                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00003                               |
|           |              |                     | 20-Dec-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00116                  | 0.10100                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|           | ]            |                     | 29-Dec-22              | 0.00002                                 | <0.00001                                     | <0.00001                                      | 0.00122                  | 0.11400                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00002                               |
|           |              | LC_FRB              | 10-Sep-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00017                  | 0.03470                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001                               |
|           |              | - <u>-</u> - · · ·- | 30-Nov-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00019                  | 0.05060                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
| Fording   |              |                     | 11-May-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00018                  | 0.05270                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
| River     |              | LC_FRUS             | 22-Jun-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00008                  | 0.02130                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | <0.00001                              |
|           |              |                     | 10-Sep-22              | <0.00001                                | 0.00001                                      | <0.00001                                      | 0.00017                  | 0.04220                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | 0.00001<br><0.00001                   |
|           |              |                     | 30-Nov-22              | <0.00001                                | <0.00001                                     | <0.00001                                      | 0.00017                  | 0.04260                  | <0.00001                       | <0.00001                   | <0.00001             | <0.00001                             | -                                    | -                                  | _                                     |

Level 2: Sum of MeSelV and DMSeO ≥ 0.000025 mg/L Level 3: Sum of MeSelV and DMSeO > 0.00005 mg/L

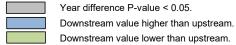
## Notes:

<sup>&#</sup>x27;-' = No data available

<sup>&</sup>lt;sup>a</sup> For the calculation of organoselenium, if both dimethylselenoxide and methylseleninic acid were non-detect values the result is reported as <0.01

Table C.6: Differences in Concentrations Between Areas Upstream (LC\_FRUS) and Downstream (LC\_FRB) of Dry Creek Input into Fording River, 2014 to 2022

| Parameter                 | Year  | Q1. Do differences in<br>Concentrations<br>(downstream - upstream)<br>vary among years? | Q2. Is there a difference in concentrations downstream compared to upstream? <sup>b</sup> |  |
|---------------------------|---|---|---|--|
|                           |   | Year P-value <sup>a</sup>   | Magnitude of Difference (%)   |  |
|                           | 2014  |   |   |  |
| Nitrate (as N)            | 2015  | 0.126   | NS  |  |
| iviliale (as iv)          | 2021  | 0.120   | 110   |  |
|                           | 2022  |   |   |  |
|                           | 2014  |   | NS  |  |
| Nitrite (as N)            | 2015  | 0.001   | NS  |  |
| TVILLICE (as IV)          | 2021  | 0.001   | NS  |  |
|                           | 2022  |   | 50  |  |
|                           | <lrl< td=""><td></td><td></td></lrl<>         |   |   |  |
| Total Kjeldahl Nitrogen   | 2015  | 0.606   | NS  |  |
| Total Injuralii Nili Ogen | 2021  | ] 0.500   | 140   |  |
|                           | 2022  |   |   |  |
|                           | 2014  |   | NS  |  |
| Orthophosphate            | 2015  | 0.782   |   |  |
| Orthophosphate            | <lrl< td=""><td rowspan="2">0.782</td></lrl<> | 0.782   |   |  |
|                           | <lrl< td=""><td></td></lrl<>                  |   |   |  |
|                           | 2014  |   | NS  |  |
| Dhaanhamia (D) Tatal      | 2015  | 1 0.444   |   |  |
| Phosphorus (P)-Total      | 2021  | 0.444   |   |  |
|                           | 2022  | 1   |   |  |
|                           | 2014  |   | NS  |  |
| 0.1.1.1                   | 2015  | 0.040   | NS  |  |
| Sulphate                  | 2021  | 0.046   | -11   |  |
|                           | 2022  |   | NS  |  |
|                           | 2014  |   | -3.2  |  |
| <b>-</b>                  | 2015  |   | NS  |  |
| Total Dissolved Solids    | 2021  | 0.009   | -9.5  |  |
|                           | 2022  |   | NS  |  |
|                           | 2014  | 0.883   | ·   |  |
|                           | 2015  |   |   |  |
| Antimony (Sb)-Total       | 2021  |   | NS  |  |
|                           | 2022  |   |   |  |
|                           | 2014  |   |   |  |
|                           | 2015  |   |   |  |
| Barium (Ba)-Total         | 2021  | 0.503   | 3.9   |  |
|                           | 2022  | 1   |   |  |
| Boron (B)-Total           | 2014  |   |   |  |
|                           | 2015  | 1   |   |  |
|                           | <lrl< td=""><td>0.412</td><td>NS</td></lrl<>  | 0.412   | NS  |  |
|                           | <lrl< td=""><td>1</td><td></td></lrl<>        | 1   |   |  |
|                           | `LITL   |   |   |  |



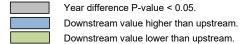
Notes: "ns" indicates non-significant difference (p-value > 0.05) between upstream and downstream. <LRL = Insufficient sample size (<3) for values above detection limits to complete analyses.

<sup>&</sup>lt;sup>a</sup> P-value from an Analysis of Variance conducted on the difference in concentrations upstream and downstream of Dry creek. If significant, each year was compared to upstream separately.

b Post-hoc contrasts testing the difference DS- US against zero with the magnitude of difference (MOD) calculated as (DS-US)/US\*100% and application of Kaplan-Meier means for concentrations. Post-hoc tests were adjusted for the number of comparisons using Tukey's Honestly Significant Difference (HSD) tests.

Table C.6: Differences in Concentrations Between Areas Upstream (LC\_FRUS) and Downstream (LC\_FRB) of Dry Creek Input into Fording River, 2014 to 2022

| Parameter              | Year   | Q1. Do differences in<br>Concentrations<br>(downstream - upstream)<br>vary among years? | Q2. Is there a difference in concentrations downstream compared to upstream? <sup>b</sup> |  |
|------------------------|--|---|---|--|
|                        |  | Year P-value <sup>a</sup>   | Magnitude of Difference (%)   |  |
|                        | <lrl< td=""><td></td><td rowspan="4"><lrl< td=""></lrl<></td></lrl<> |   | <lrl< td=""></lrl<>   |  |
| Cobalt (Co)-Total      | <lrl< td=""><td>- <lrl< td=""></lrl<></td></lrl<>                    | - <lrl< td=""></lrl<>   |   |  |
|                        | <lrl< td=""><td></td></lrl<>   |   |   |  |
|                        | <lrl< td=""><td></td></lrl<>   |   |   |  |
|                        | 2014   |   | NS  |  |
| Lithium (Li)-Total     | 2015   | 0.403   |   |  |
| (=-/                   | 2021   |   |   |  |
|                        | 2022   |   |   |  |
|                        | 2014   | _   | NS  |  |
| Manganese (Mn)-Total   | 2015   | 0.710   |   |  |
| , ,                    | 2021   | -   |   |  |
|                        | 2022   |   |   |  |
|                        | <lrl< td=""><td></td><td rowspan="7"><lrl<br>NS</lrl<br></td></lrl<> |   | <lrl<br>NS</lrl<br>   |  |
| Mercury (Hg)-Total     | <lrl< td=""><td>- <lrl< td=""></lrl<></td></lrl<>                    | - <lrl< td=""></lrl<>   |   |  |
|                        | <lrl<br><lrl< td=""><td></td></lrl<></lrl<br>                        |   |   |  |
|                        | _  |   |   |  |
|                        | 2014   | 0.316   |   |  |
| Molybdenum (Mo)-Total  | 2013   |   |   |  |
|                        | 2021   | -   |   |  |
|                        | 2014   |   | NS  |  |
|                        | 2015   | -   |   |  |
| Nickel (Ni)-Total      | 2021   | 0.315   |   |  |
|                        | 2022   | -   |   |  |
|                        | 2014   |   | NS  |  |
|                        | 2015   | -   |   |  |
| Selenium (Se)-Total    | 2021   | 0.951   |   |  |
|                        | 2022   | 1   |   |  |
|                        | 2014   | 0.094   | NS  |  |
| Lleanione (LI) Tatal   | 2015   |   |   |  |
| Uranium (U)-Total      | 2021   |   |   |  |
|                        | 2022   | 1   |   |  |
|                        | <lrl< td=""><td></td><td rowspan="3"><lrl< td=""></lrl<></td></lrl<> |   | <lrl< td=""></lrl<>   |  |
| Zinc (Zn) Total        | <lrl< td=""><td rowspan="2"><lrl< td=""></lrl<></td></lrl<>          | <lrl< td=""></lrl<>   |   |  |
| Zinc (Zn)-Total        | <lrl< td=""></lrl<>  |   |   |  |
|                        | <lrl< td=""><td></td><td colspan="2"></td></lrl<>                    |   |   |  |
|                        | 2014   |   | NS  |  |
| Cadmium (Cd)-Dissolved | 2015   | 0.746   |   |  |
|                        | 2021   | 0.740   |   |  |
|                        | 2022   |   |   |  |



comparisons using Tukey's Honestly Significant Difference (HSD) tests.

Notes: "ns" indicates non-significant difference (p-value > 0.05) between upstream and downstream. <LRL = Insufficient sample size (<3) for values above detection limits to complete analyses.

<sup>&</sup>lt;sup>a</sup> P-value from an Analysis of Variance conducted on the difference in concentrations upstream and downstream of Dry creek. If

significant, each year was compared to upstream separately.

<sup>b</sup> Post-hoc contrasts testing the difference DS- US against zero with the magnitude of difference (MOD) calculated as (DS-US)/US\*100% and application of Kaplan-Meier means for concentrations. Post-hoc tests were adjusted for the number of

## APPENDIX D TOXICITY

Table D.1: Summary of 2022 LC\_SPDC, Acute Toxicity Results

| EMS ID  | Area    | Sample<br>Date | Endpoint    | Result<br>96-Hour Rainbow Trout | Result<br>48-Hour <i>Daphnia magna</i> |
|---------|---------|----------------|-------------|---------------------------------|--|
| E288273 | LC_DC3  | 3-Oct-22       | % mortality | 0                               | 0                                      |
|         |         | 4-Oct-22       |             | 0                               | 0                                      |
|         |         | 5-Oct-22       |             | 0                               | 0                                      |
|         |         | 6-Oct-22       |             | 0                               | 0                                      |
|         |         | 7-Oct-22       |             | 0                               | 0                                      |
| E295210 | LC_DCDS | 4-Oct-22       |             | 0                               | 0                                      |
|         |         | 5-Oct-22       |             | 0                               | 0                                      |
|         |         | 6-Oct-22       |             | 0                               | 0                                      |
|         |         | 7-Oct-22       |             | 0                               | 0                                      |
| E295211 | LC_SPDC | 12-Jan-22      |             | 0                               | 0                                      |
|         |         | 5-May-22       |             | 0                               | 0                                      |
|         |         | 11-May-22      |             | 0                               | 0                                      |
|         |         | 17-May-22      |             | 0                               | 0                                      |
|         |         | 24-May-22      |             | 0                               | 0                                      |
|         |         | 31-May-22      |             | 0                               | 0                                      |
|         |         | 7-Jun-22       |             | 0                               | 0                                      |
|         |         | 15-Jun-22      |             | 0                               | 0                                      |
|         |         | 16-Aug-22      |             | 0                               | 0                                      |
|         |         | 3-Oct-22       |             | 0                               | 0                                      |
|         |         | 15-Nov-22      |             | 0                               | 0                                      |

## APPENDIX E BENTHIC INVERTEBRATE COMMUNITY

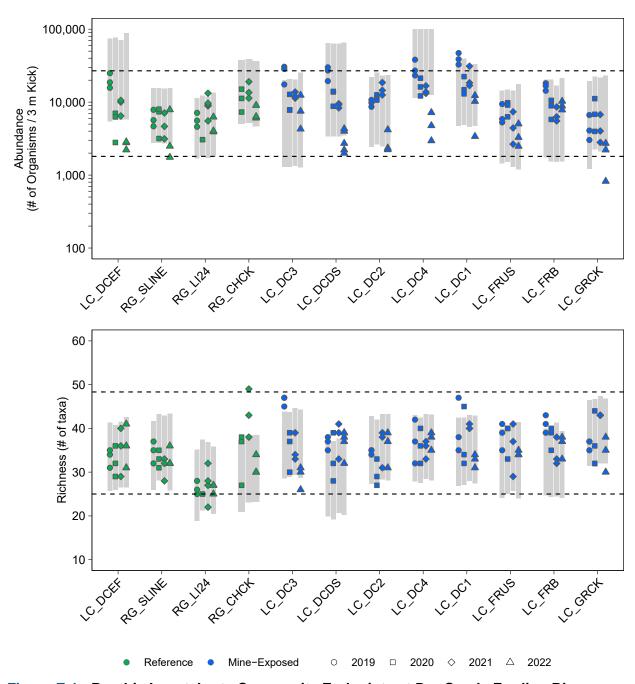


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

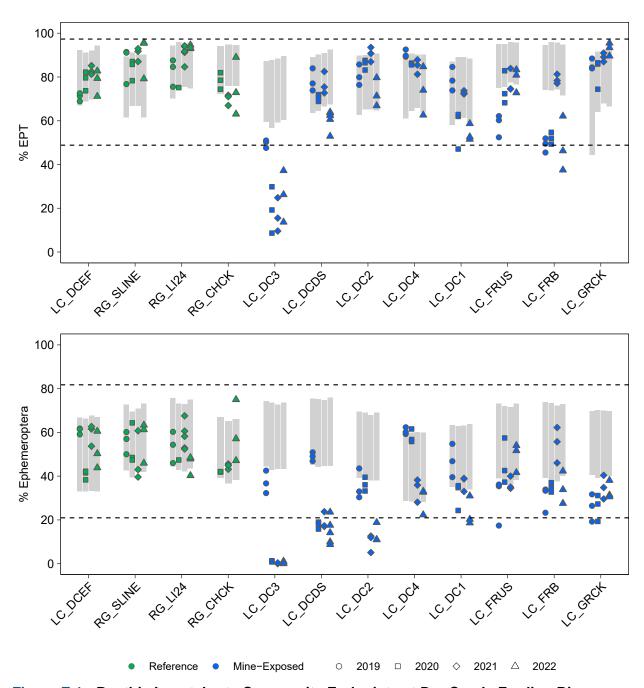


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

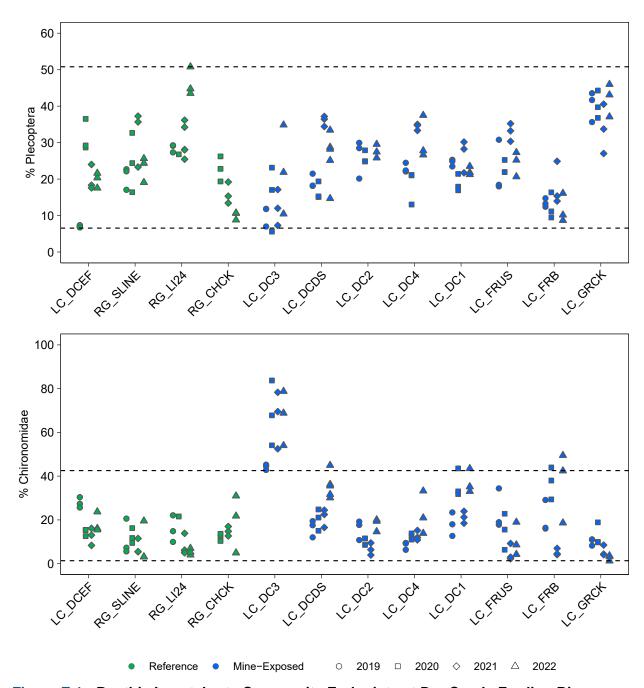


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

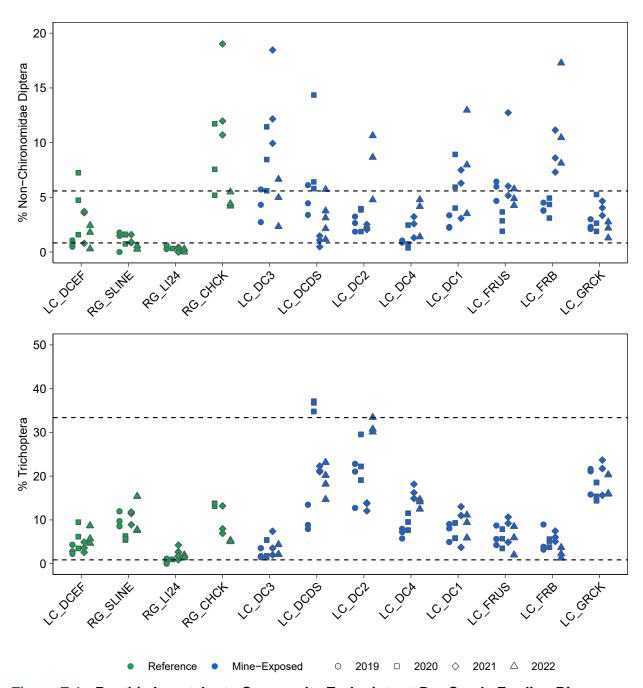


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

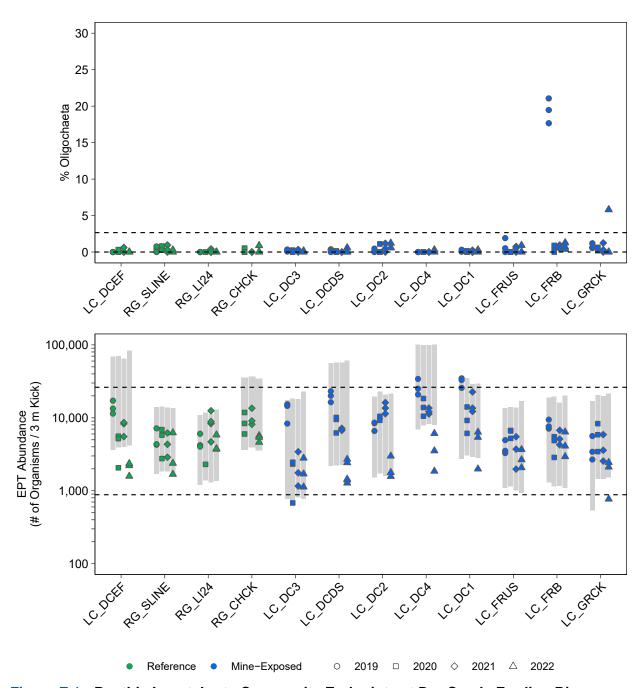


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

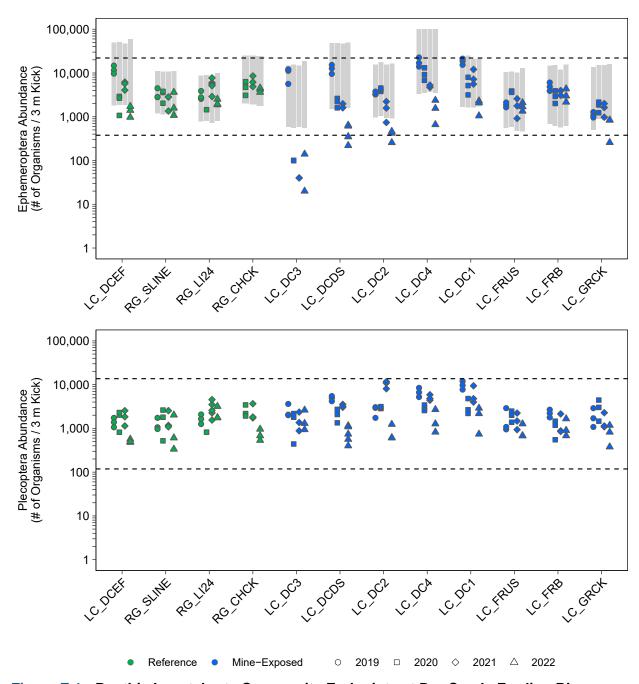


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

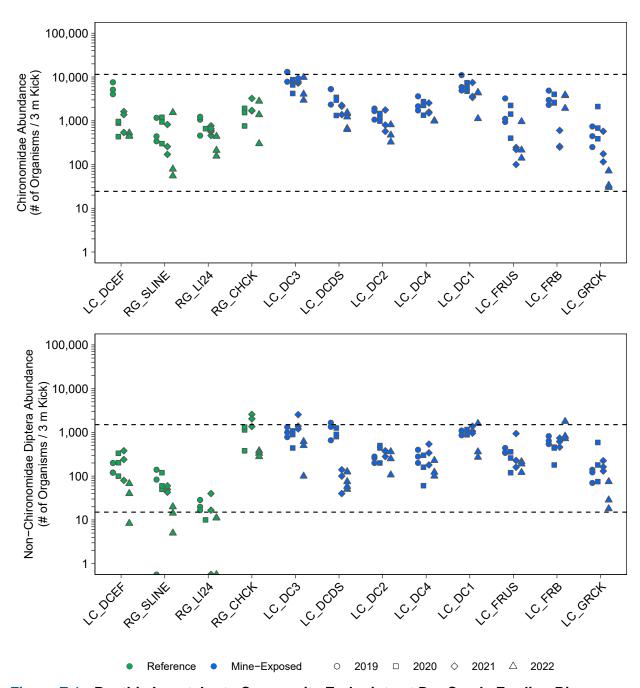


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

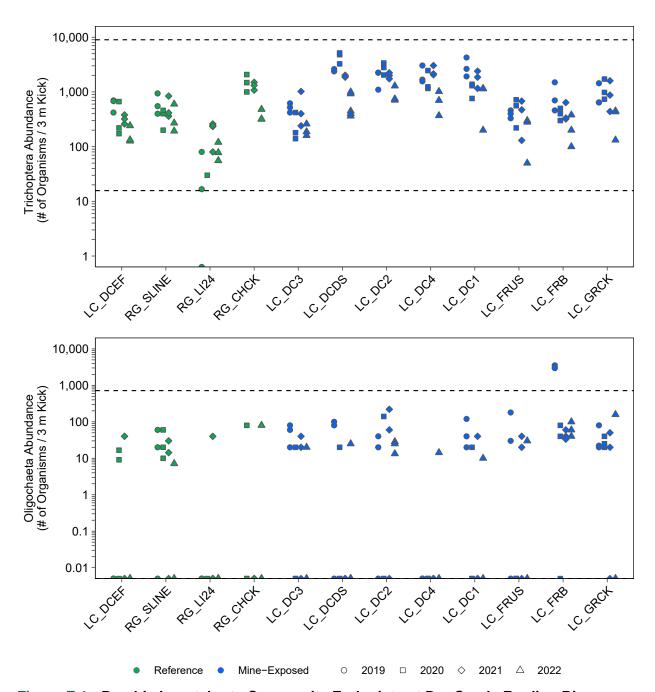


Figure E.1: Benthic Invertebrate Community Endpoints at Dry Creek, Fording River, Grace Creek, and Dry Creek East Tributary Sampling Areas, LCO Dry Creek LAEMP, September 2019 to 2022

Notes: Upper and Lower Dry Creek = LC\_DCDS and LC\_DC1, respectively, and upstream and downstream in the Fording River = FR\_FR5/LC\_FRUS and LC\_FRB, respectively. Site specific normal ranges using regression models shown with grey shading (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines.

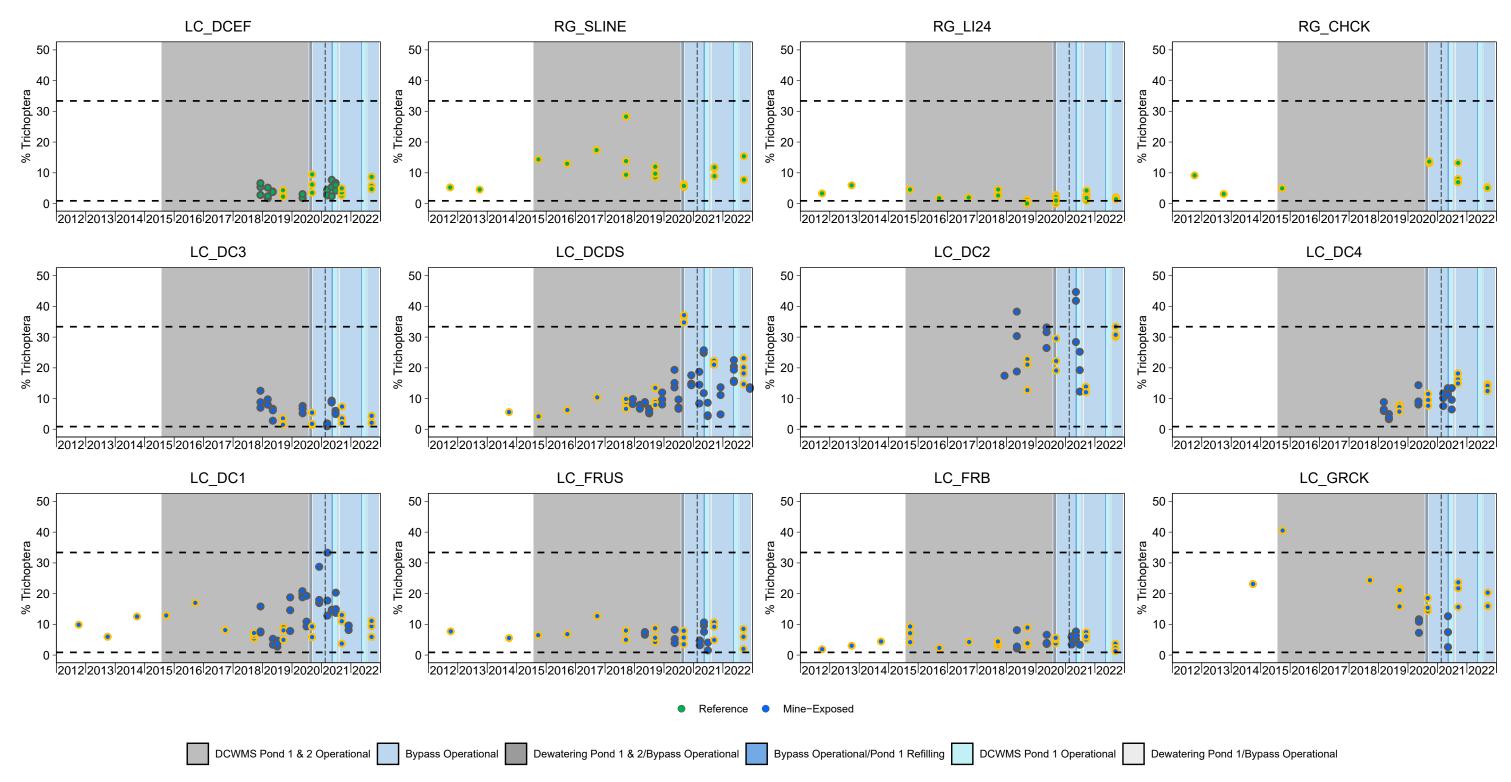


Figure E.2: Benthic Invertebrate Community % Trichoptera from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

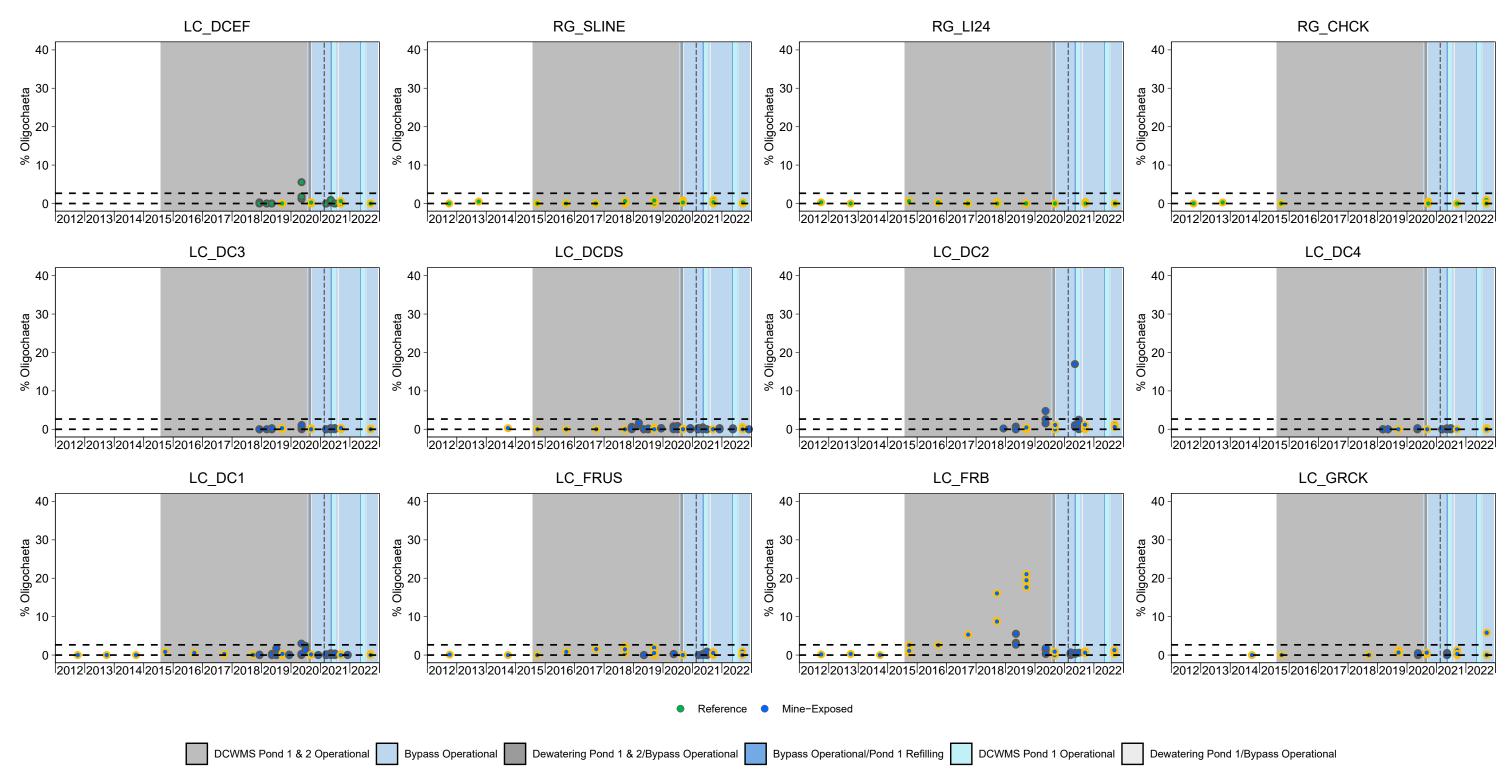


Figure E.3: Benthic Invertebrate Community % Oligochaeta from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_DCD, LC\_DCD, LC\_DC1).

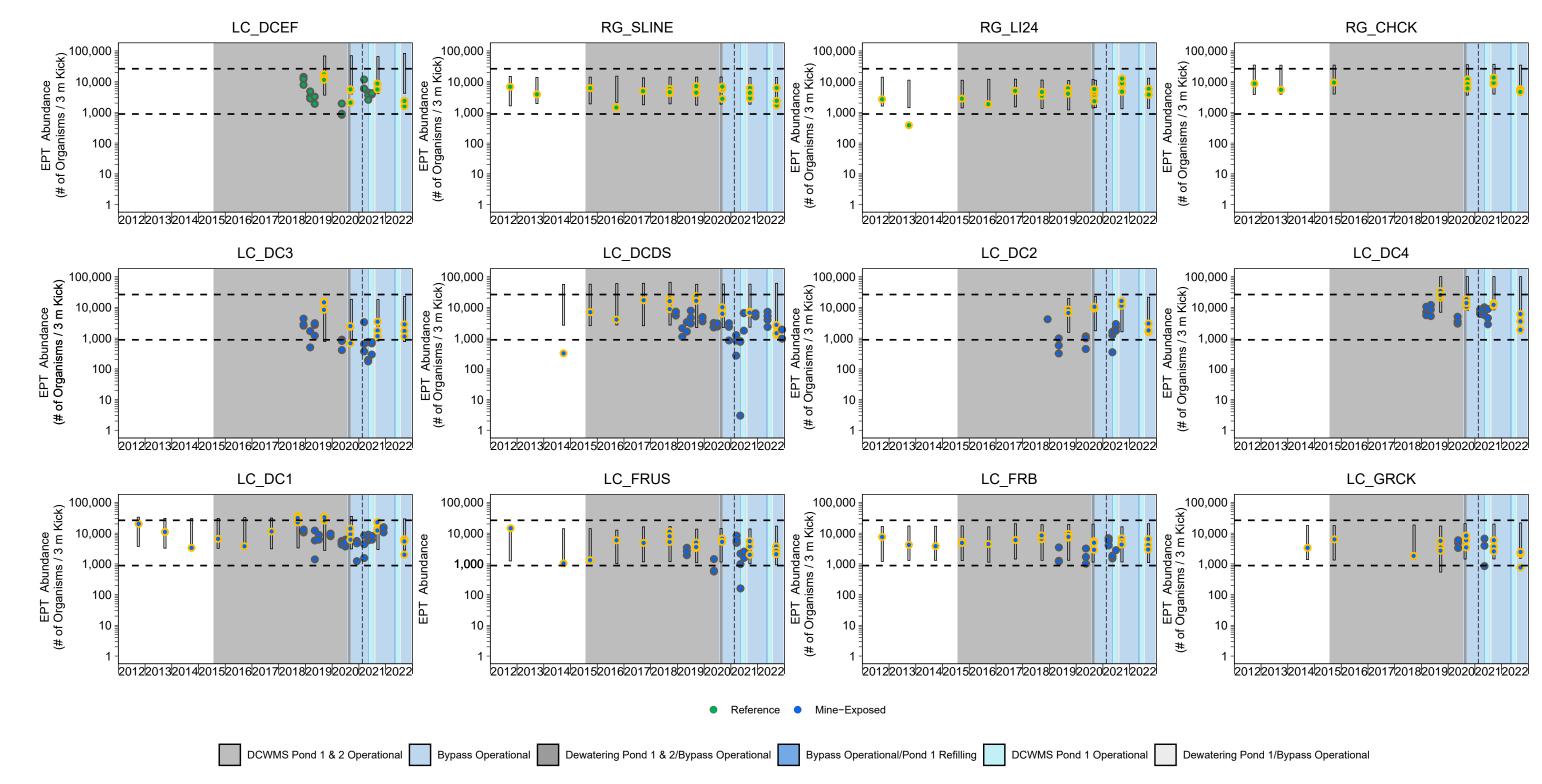


Figure E.4: Benthic Invertebrate Community EPT Abundance from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DCD4, and LC\_DC1).

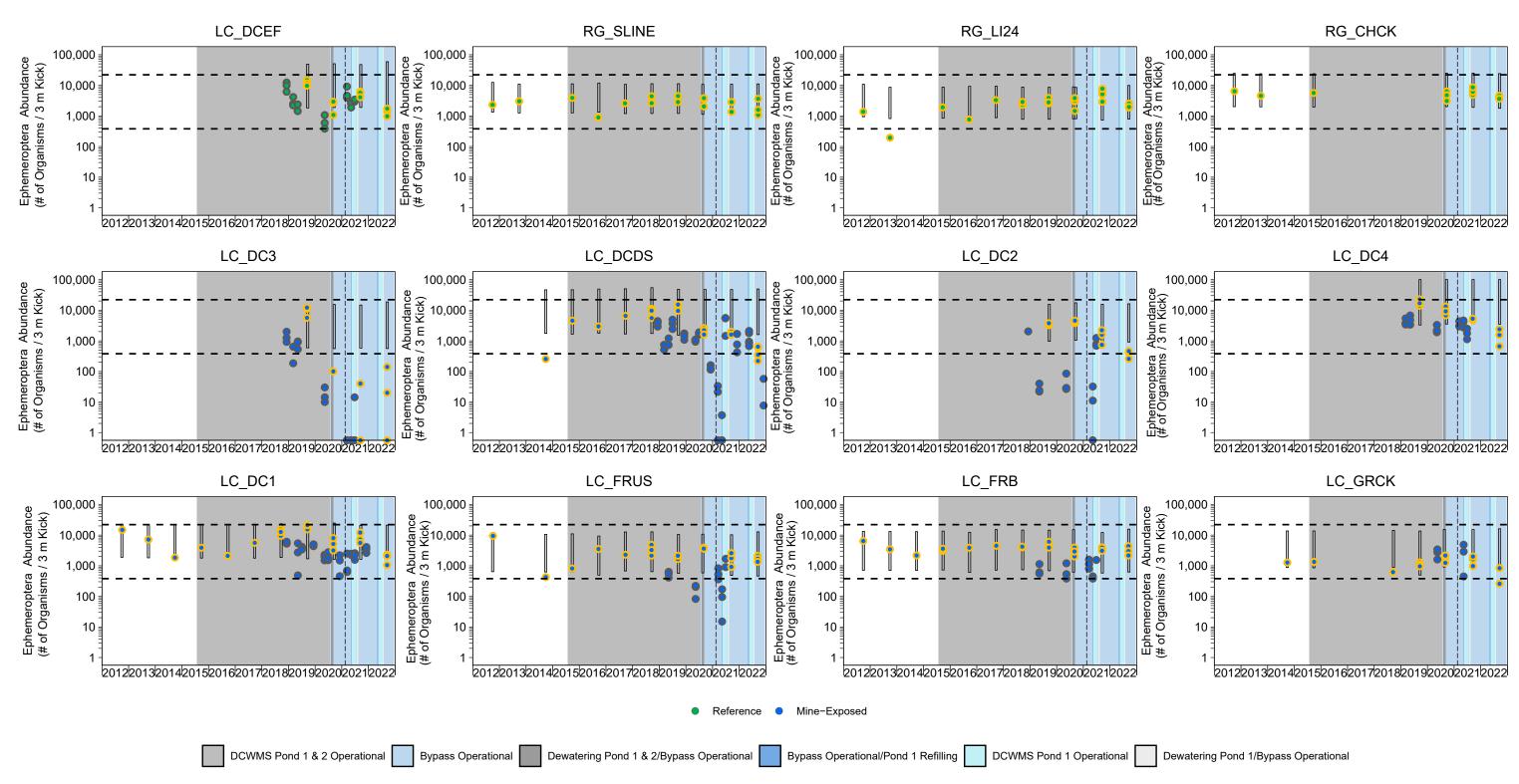


Figure E.5: Benthic Invertebrate Community Ephemeroptera Abundance from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Site specific normal ranges using regression models shown with grey shading and black rectangle (when available). Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC1).

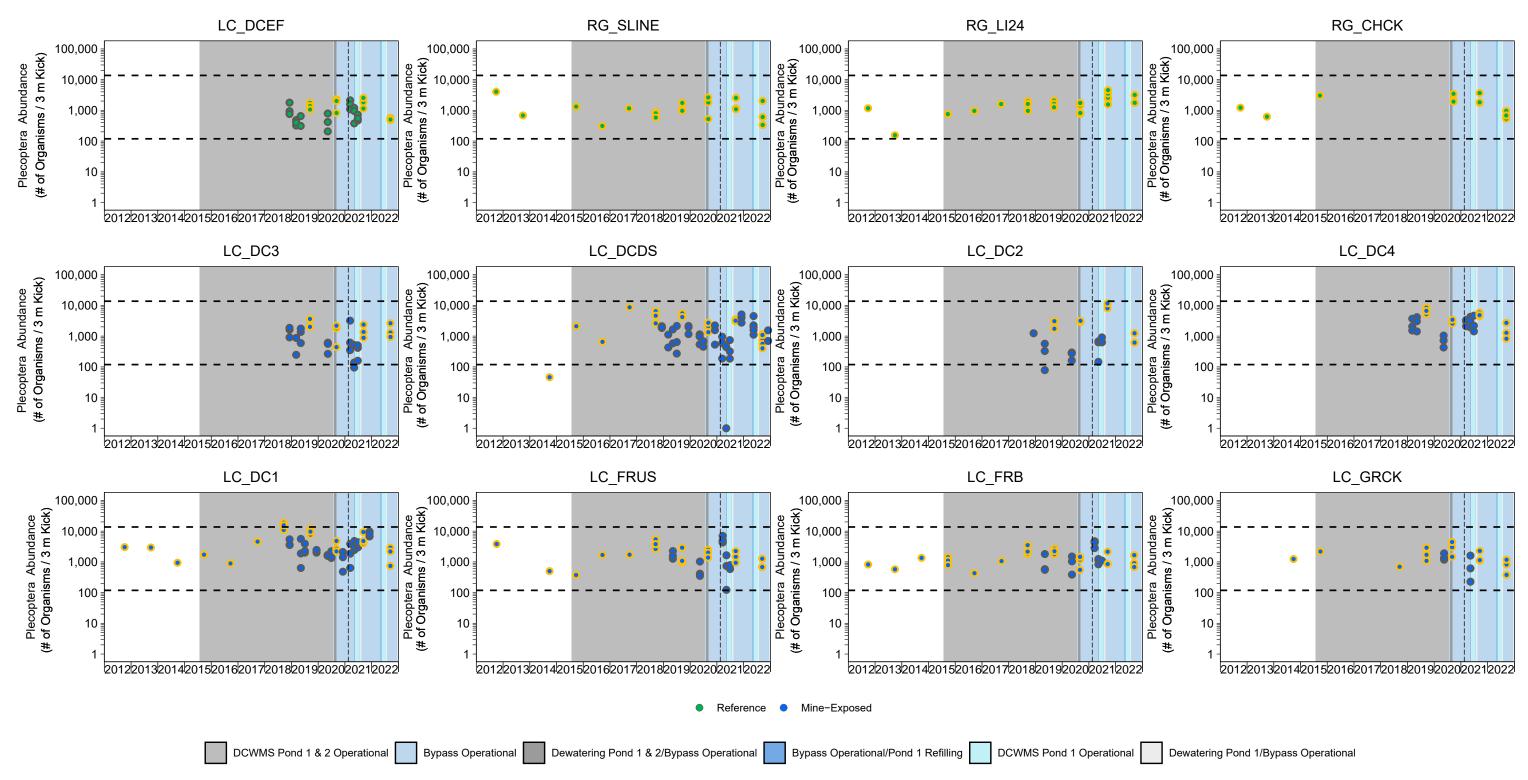


Figure E.6: Benthic Invertebrate Community Plecoptera Abundance from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

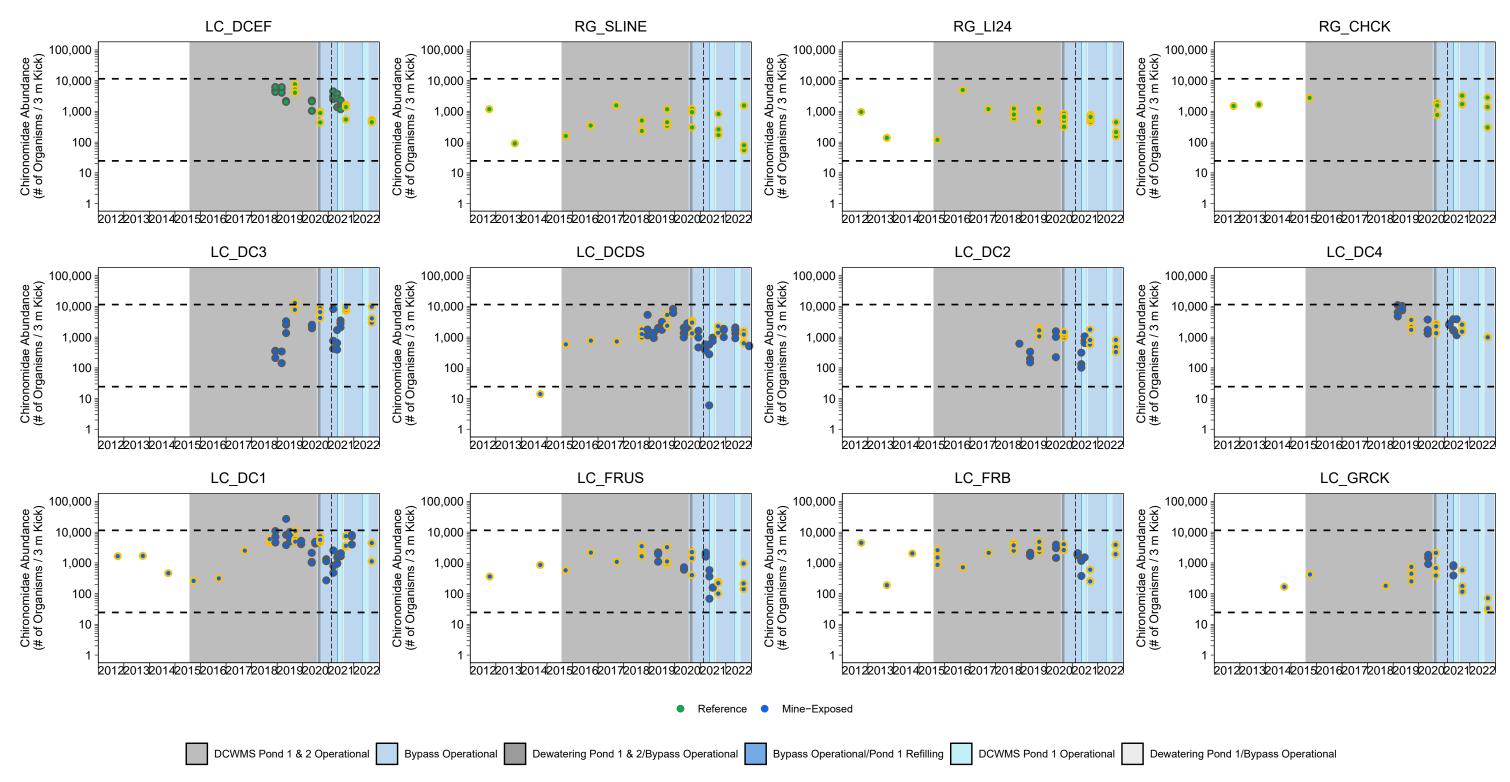


Figure E.7: Benthic Invertebrate Community Chironomidae Abundance (# of Organisms / 3 m Kick) from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

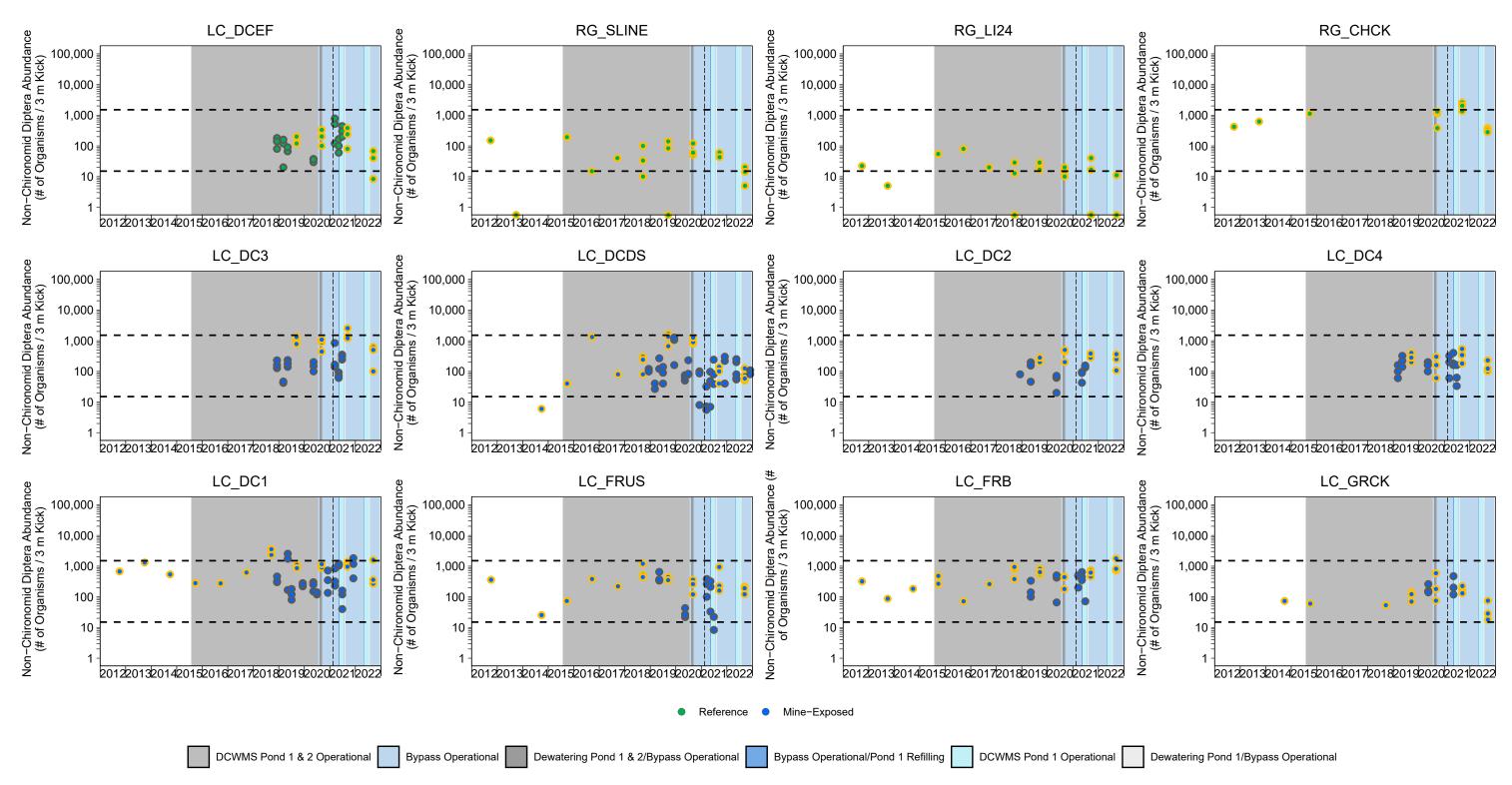


Figure E.8: Benthic Invertebrate Community Non-Chironomid Diptera Abundance (# of Organisms / 3 m Kick) from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DCDS, LC\_DC2, LC\_DC4, and LC\_DC1).

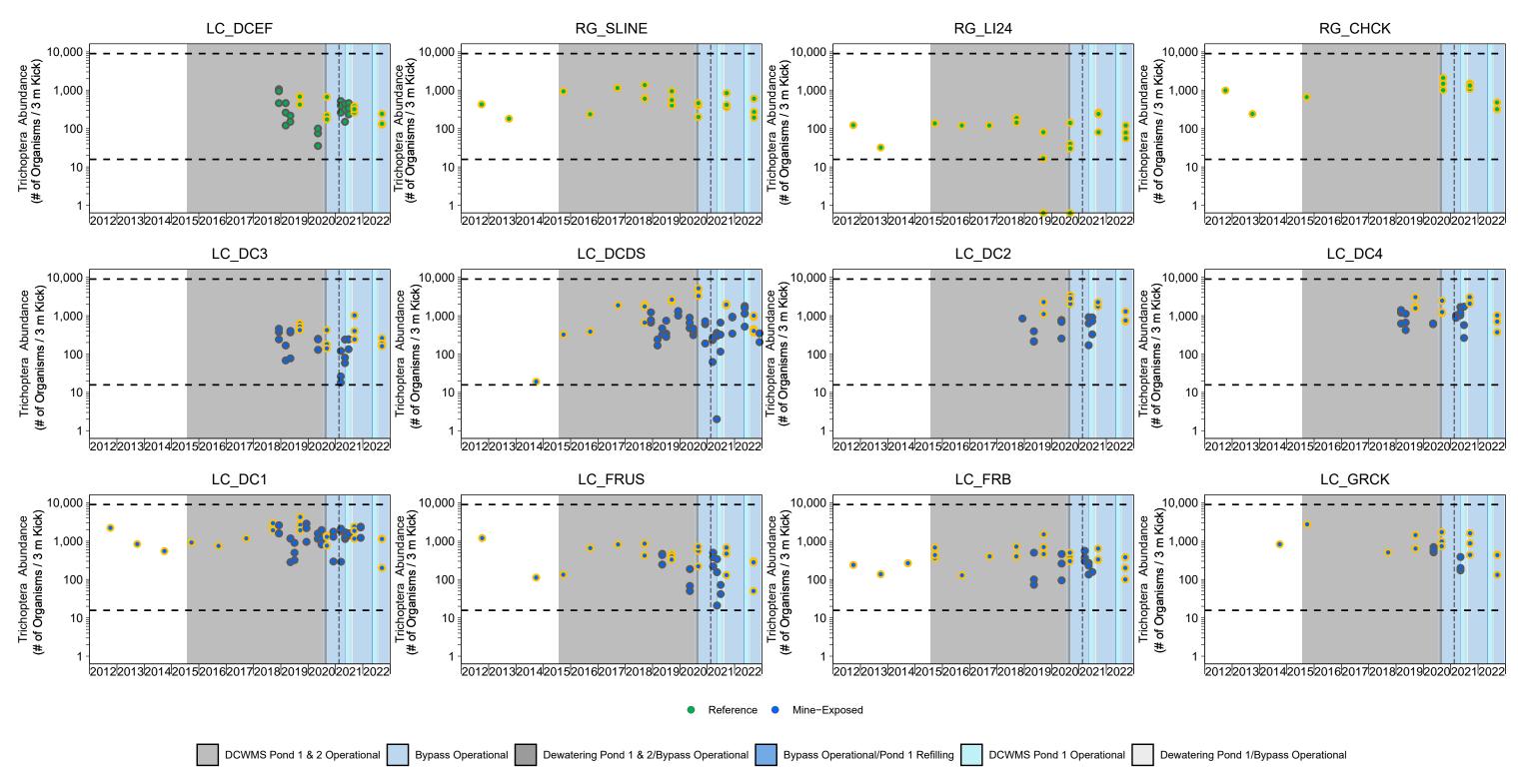


Figure E.9: Benthic Invertebrate Community Trichoptera Abundance from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

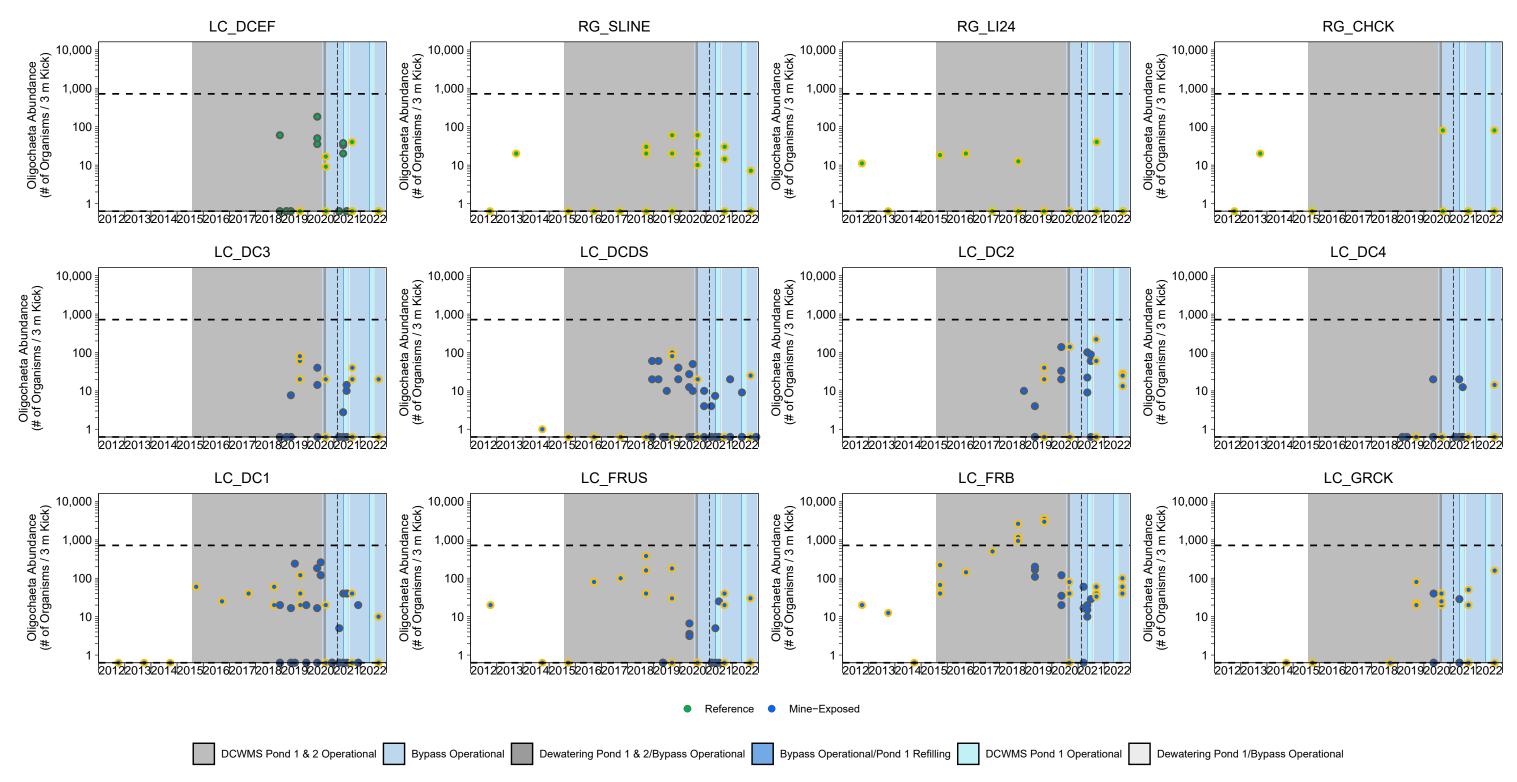


Figure E.10: Benthic Invertebrate Community Oligochaeta Abundance (# of Organisms / 3 m Kick) from Dry Creek LAEMP Sampling Areas, 2012 to 2022

Notes: Normal ranges using percentiles of reference areas from 2012 to 2019 shown as dashed horizontal lines. Orange outline indicates September sampling. Dashed vertical line indicates the Burnt Ridge North spoil failure. Dry Creek Water Management System (DCWMS) operational timelines are displayed for each monitoring area to provide context, but only applies to Dry Creek areas downstream of the DCWMS (LC\_SPDC, LC\_DC2, LC\_DC4, and LC\_DC1).

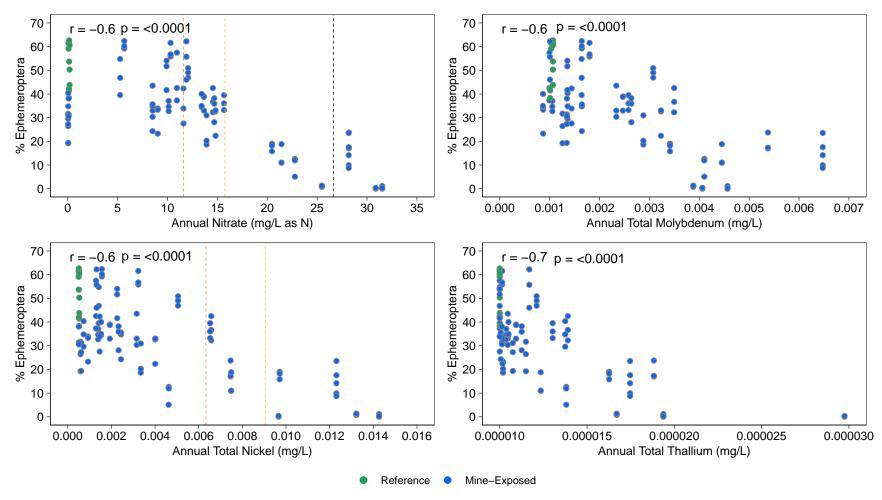


Figure E.11: Scatterplots of Spearman's Correlation Relationships (r > 0.6 or r < -0.6) Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, Dry Creek, 2019 to 2022

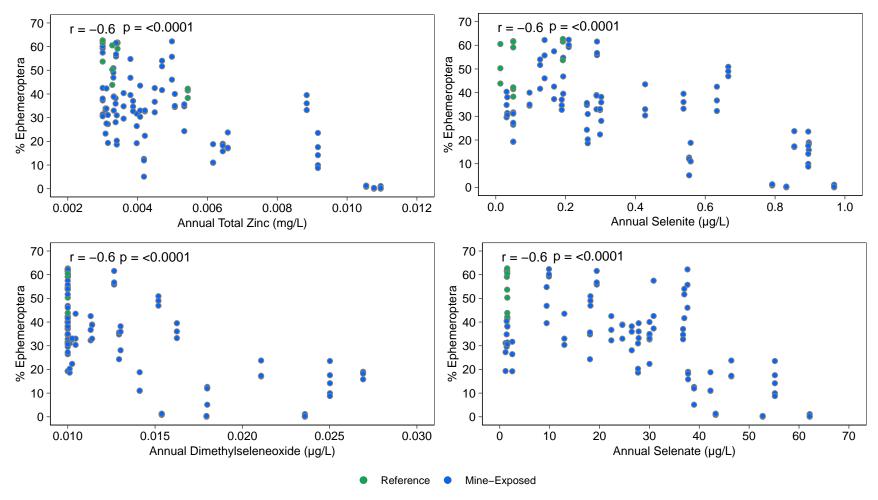


Figure E.11: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, Dry Creek, 2019 to 2022

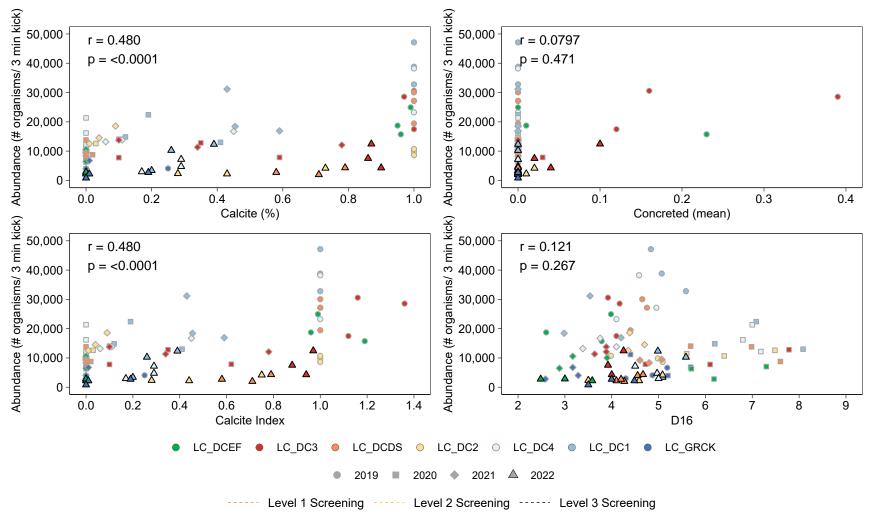


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

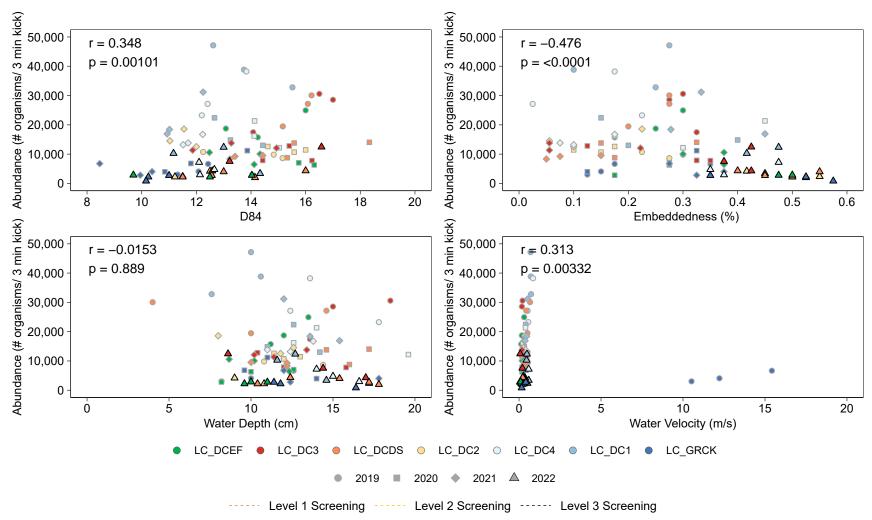


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

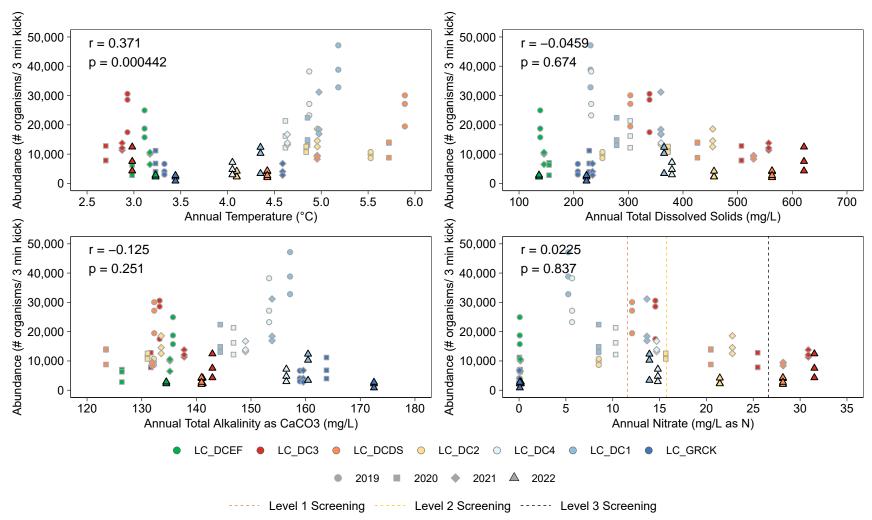


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

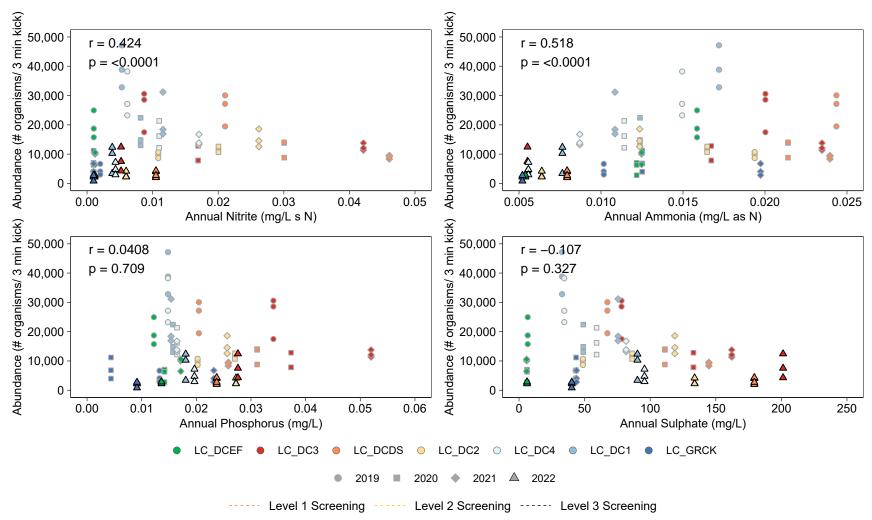


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

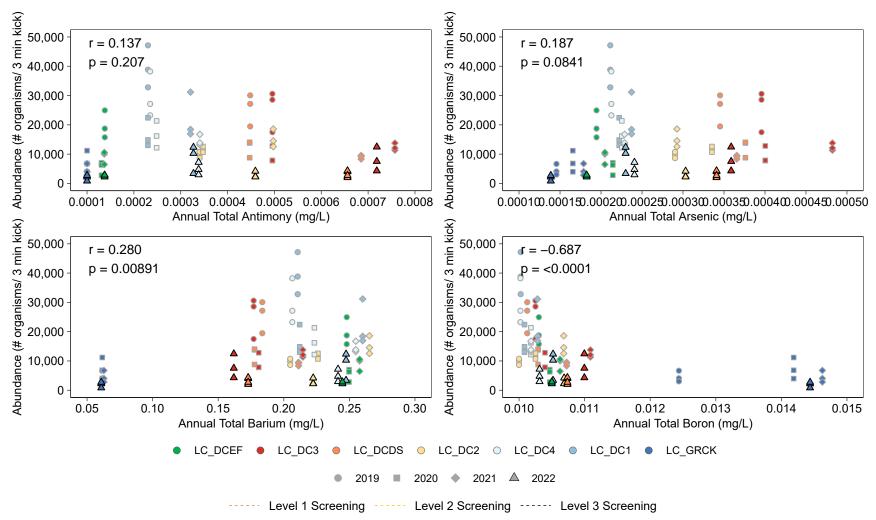


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

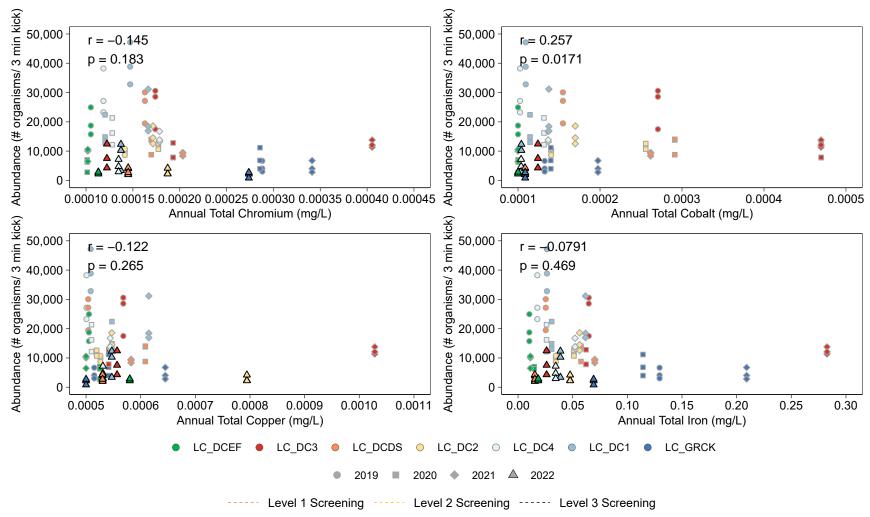


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

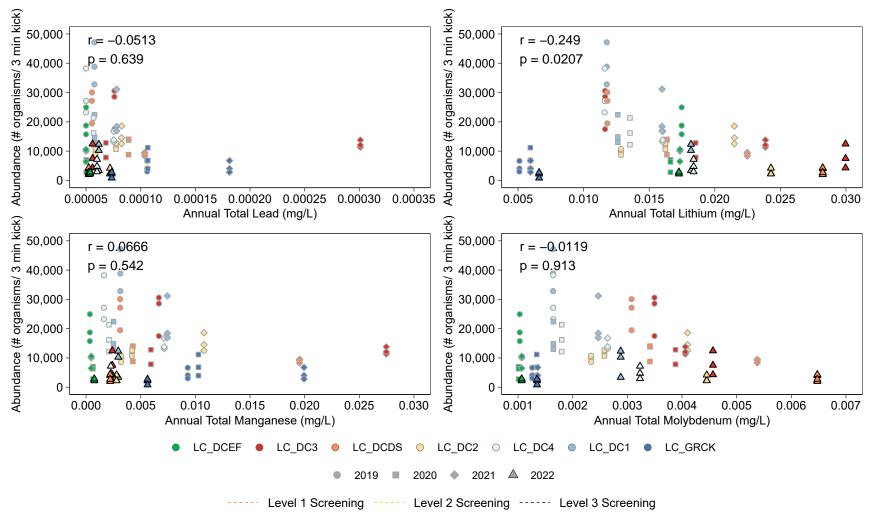


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

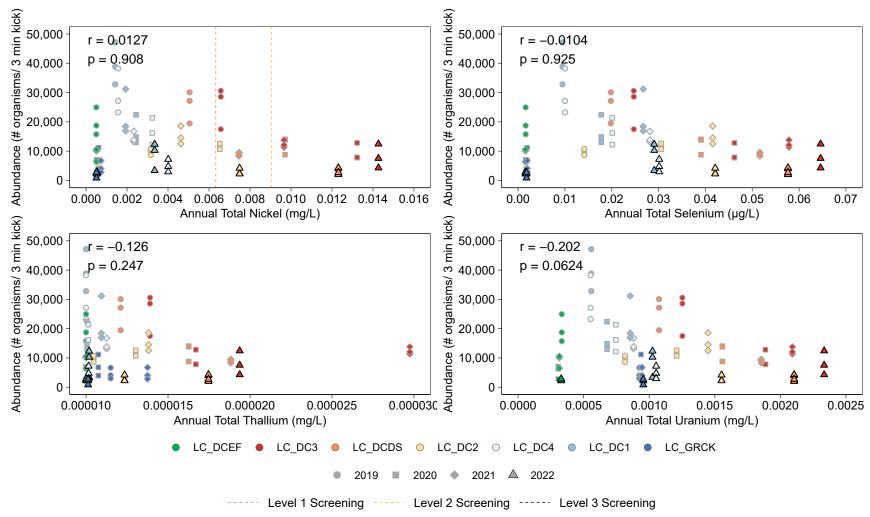


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

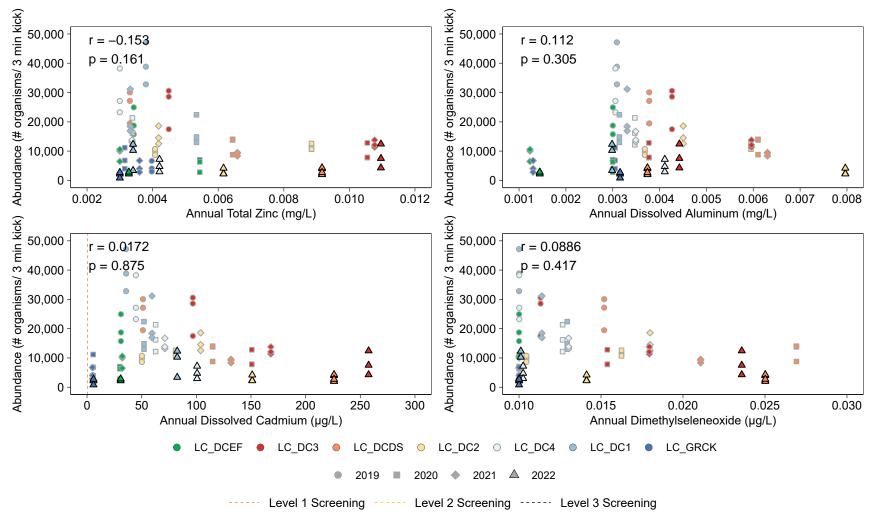


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

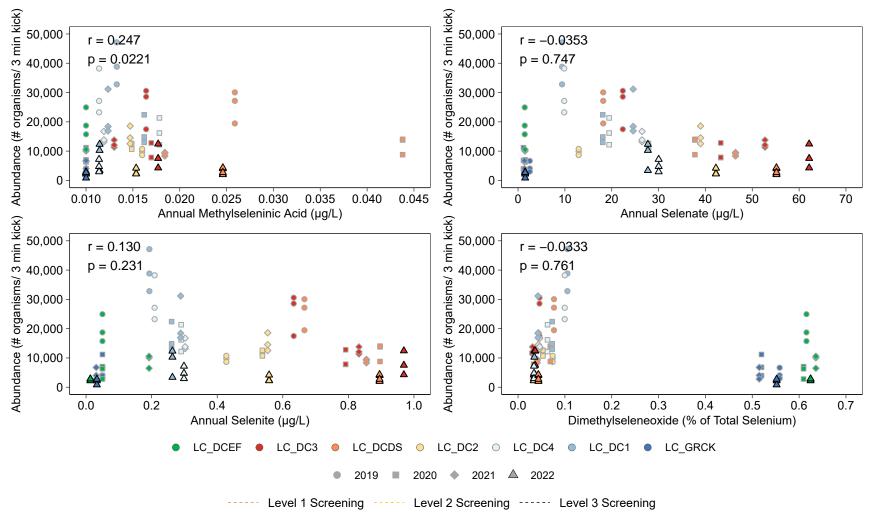


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

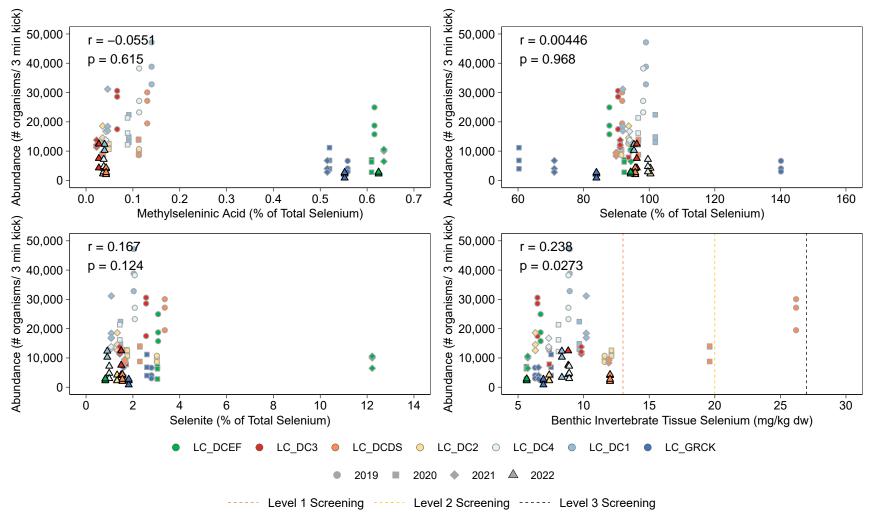


Figure E.12: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, LC\_DC3, LC\_DCDS, LC\_DC2, LC\_DC4, LC\_DCDS and LC\_DCEF, 2019 to 2022

Table E.1: Summary of Benthic Invertebrate Endpoints Collected by 3-Minute Kick and Sweep Sampling at Dry Creek, Fording River, and Grace Creek, 2022

|           |                  |                         |           |           |                        | LPL      | EI                     | РТ                           | Epheme                 | eroptera                     | Chiron                 | omidae                       | Non-Chire<br>Dip       |                              | Oligo                  | chaeta                       | Tricho                 | optera                       | Pleco                  | ptera                        |
|-----------|------------------|-------------------------|-----------|-----------|------------------------|----------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|
| Area      |                  | Biological<br>Area Code | Station   | Month     | Abundance <sup>a</sup> | Richness | Abundance <sup>a</sup> | Relative<br>Abundance<br>(%) |
|           |                  | LC_DCDS                 | LC_DCDS-1 |           | 8,700                  | 33       | 7,200                  | 0.828                        | 940                    | 0.108                        | 1,300                  | 0.149                        | 200                    | 0.0230                       | 0                      | 0                            | 1,780                  | 0.205                        | 4,480                  | 0.515                        |
|           |                  | LC_DCDS                 | LC_DCDS-2 |           | 5,933                  | 31       | 3,917                  | 0.660                        | 833                    | 0.140                        | 1,750                  | 0.295                        | 250                    | 0.0421                       | 0                      | 0                            | 1,150                  | 0.194                        | 1,933                  | 0.326                        |
|           | Mine-<br>Exposed | LC_DCDS                 | LC_DCDS-3 | May       | 3,282                  | 31       | 2,300                  | 0.701                        | 673                    | 0.205                        | 918                    | 0.280                        | 54.5                   | 0.0166                       | 9.09                   | 0.00277                      | 518                    | 0.158                        | 1,109                  | 0.338                        |
|           | ·                | LC_DCDS                 | LC_DCDS-4 |           | 7,280                  | 26       | 5,140                  | 0.706                        | 1,780                  | 0.245                        | 2,060                  | 0.283                        | 60.0                   | 0.00824                      | 0                      | 0                            | 1,120                  | 0.154                        | 2,240                  | 0.308                        |
|           |                  | LC_DCDS                 | LC_DCDS-5 |           | 7,020                  | 29       | 5,240                  | 0.746                        | 2,100                  | 0.299                        | 1,700                  | 0.242                        | 80.0                   | 0.0114                       | 0                      | 0                            | 1,580                  | 0.225                        | 1,560                  | 0.222                        |
|           |                  | LC_DCEF                 | LC_DCEF-1 |           | 2,783                  | 37       | 2,208                  | 0.793                        | 1,400                  | 0.503                        | 449                    | 0.161                        | 67.8                   | 0.0243                       | 0                      | 0                            | 242                    | 0.0868                       | 567                    | 0.204                        |
|           | Reference        | LC_DCEF                 | LC_DCEF-2 |           | 2,220                  | 42       | 1,580                  | 0.712                        | 973                    | 0.438                        | 527                    | 0.237                        | 40.0                   | 0.0180                       | 0                      | 0                            | 127                    | 0.0571                       | 480                    | 0.216                        |
|           |                  | LC_DCEF                 | LC_DCEF-3 |           | 2,850                  | 31       | 2,358                  | 0.827                        | 1,725                  | 0.605                        | 442                    | 0.155                        | 8.33                   | 0.00292                      | 0                      | 0                            | 133                    | 0.0468                       | 500                    | 0.175                        |
|           |                  | LC_DC3                  | LC_DC3-1  |           | 12,440                 | 31       | 1,700                  | 0.137                        | 140                    | 0.0113                       | 9,800                  | 0.788                        | 620                    | 0.0498                       | 20.0                   | 0.00161                      | 260                    | 0.0209                       | 1,300                  | 0.105                        |
|           |                  | LC_DC3                  | LC_DC3-2  |           | 4,288                  | 27       | 1,125                  | 0.262                        | 0                      | 0                            | 2,950                  | 0.688                        | 100                    | 0.0233                       | 0                      | 0                            | 188                    | 0.0437                       | 938                    | 0.219                        |
|           |                  | LC_DC3                  | LC_DC3-3  |           | 7,520                  | 32       | 2,800                  | 0.372                        | 20.0                   | 0.00266                      | 4,060                  | 0.540                        | 500                    | 0.0665                       | 0                      | 0                            | 160                    | 0.0213                       | 2,620                  | 0.348                        |
|           |                  | LC_DCDS                 | LC_DCDS-1 |           | 2,213                  | 40       | 1,407                  | 0.636                        | 220                    | 0.0994                       | 667                    | 0.301                        | 127                    | 0.0572                       | 0                      | 0                            | 447                    | 0.202                        | 740                    | 0.334                        |
| Dry Creek |                  | LC_DCDS                 | LC_DCDS-2 |           | 4,000                  | 38       | 2,425                  | 0.606                        | 350                    | 0.0875                       | 1,450                  | 0.362                        | 125                    | 0.0312                       | 0                      | 0                            | 925                    | 0.231                        | 1,150                  | 0.288                        |
|           |                  | LC_DCDS                 | LC_DCDS-3 |           | 1,994                  | 40       | 1,275                  | 0.639                        | 350                    | 0.176                        | 631                    | 0.317                        | 75.0                   | 0.0376                       | 0                      | 0                            | 362                    | 0.182                        | 562                    | 0.282                        |
|           |                  | LC_DCDS                 | LC_DCDS-4 |           | 4,325                  | 41       | 2,700                  | 0.624                        | 613                    | 0.142                        | 1,538                  | 0.355                        | 50.0                   | 0.0116                       | 25.0                   | 0.00578                      | 1,000                  | 0.231                        | 1,088                  | 0.251                        |
|           |                  | LC_DCDS                 | LC_DCDS-5 | September | 2,725                  | 34       | 1,442                  | 0.529                        | 642                    | 0.235                        | 1,225                  | 0.450                        | 58.3                   | 0.0214                       | 0                      | 0                            | 400                    | 0.147                        | 400                    | 0.147                        |
|           | Mine-<br>Exposed | LC_DC2                  | LC_DC2-1  |           | 2,350                  | 40       | 1,571                  | 0.669                        | 257                    | 0.109                        | 471                    | 0.201                        | 250                    | 0.106                        | 28.6                   | 0.0122                       | 707                    | 0.301                        | 607                    | 0.258                        |
|           | '                | LC_DC2                  | LC_DC2-2  |           | 2,233                  | 32       | 1,780                  | 0.797                        | 420                    | 0.188                        | 327                    | 0.146                        | 107                    | 0.0478                       | 13.3                   | 0.00597                      | 747                    | 0.334                        | 613                    | 0.275                        |
|           |                  | LC_DC2                  | LC_DC2-3  |           | 4,188                  | 38       | 2,988                  | 0.713                        | 463                    | 0.110                        | 813                    | 0.194                        | 362                    | 0.0866                       | 25.0                   | 0.00597                      | 1,288                  | 0.307                        | 1,238                  | 0.296                        |
|           |                  | LC_DC4                  | LC_DC4-1  |           | 4,771                  | 40       | 3,529                  | 0.740                        | 1,557                  | 0.326                        | 1,000                  | 0.210                        | 229                    | 0.0479                       | 14.3                   | 0.00299                      | 700                    | 0.147                        | 1,271                  | 0.266                        |
|           |                  | LC_DC4                  | LC_DC4-2  |           | 7,200                  | 37       | 6,100                  | 0.847                        | 2,380                  | 0.331                        | 1,000                  | 0.139                        | 100                    | 0.0139                       | 0                      | 0                            | 1,020                  | 0.142                        | 2,700                  | 0.375                        |
|           |                  | LC_DC4                  | LC_DC4-3  |           | 2,962                  | 39       | 1,854                  | 0.626                        | 662                    | 0.223                        | 985                    | 0.332                        | 123                    | 0.0416                       | 0                      | 0                            | 369                    | 0.125                        | 823                    | 0.278                        |
|           |                  | LC_DC1                  | LC_DC1-1  |           | 12,340                 | 35       | 6,360                  | 0.515                        | 2,300                  | 0.186                        | 4,340                  | 0.352                        | 1,600                  | 0.130                        | 0                      | 0                            | 1,160                  | 0.0940                       | 2,900                  | 0.235                        |
|           |                  | LC_DC1                  | LC_DC1-2  |           | 3,390                  | 33       | 1,990                  | 0.587                        | 1,050                  | 0.310                        | 1,120                  | 0.330                        | 270                    | 0.0796                       | 10.00                  | 0.00295                      | 200                    | 0.0590                       | 740                    | 0.218                        |
|           |                  | LC_DC1                  | LC_DC1-3  |           | 10,260                 | 36       | 5,400                  | 0.526                        | 2,080                  | 0.203                        | 4,460                  | 0.435                        | 360                    | 0.0351                       | 0                      | 0                            | 1,140                  | 0.111                        | 2,180                  | 0.212                        |

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

<sup>&</sup>lt;sup>a</sup> Units for abundance are number of organisms per 3-minute kick (org/ 3-min kick).

Table E.1: Summary of Benthic Invertebrate Endpoints Collected by 3-Minute Kick and Sweep Sampling at Dry Creek, Fording River, and Grace Creek, 2022

|                |                  |                         |           |            |                        | LPL      | EP                     | т                            | Ephem                  | eroptera                     | Chiron                 | omidae                       | Non-Chird              |                              | Oligo                  | chaeta                       | Trich                  | optera                       | Pleco                  | optera                       |
|----------------|------------------|-------------------------|-----------|------------|------------------------|----------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|------------------------------|
| Area           |                  | Biological<br>Area Code | Station   | Month      | Abundance <sup>a</sup> | Richness | Abundance <sup>a</sup> | Relative<br>Abundance<br>(%) |
|                |                  | LC_GRCK                 | LC_GRCK-1 |            | 2,214                  | 32       | 2,114                  | 0.955                        | 843                    | 0.381                        | 71.4                   | 0.0323                       | 28.6                   | 0.0129                       | 0                      | 0                            | 450                    | 0.203                        | 821                    | 0.371                        |
| Grace<br>Creek | Mine-<br>Exposed | LC_GRCK                 | LC_GRCK-2 |            | 822                    | 40       | 768                    | 0.934                        | 258                    | 0.314                        | 30.0                   | 0.0365                       | 18.0                   | 0.0219                       | 0                      | 0                            | 132                    | 0.161                        | 378                    | 0.460                        |
|                |                  | LC_GRCK                 | LC_GRCK-3 |            | 2,725                  | 37       | 2,442                  | 0.896                        | 833                    | 0.306                        | 33.3                   | 0.0122                       | 75.0                   | 0.0275                       | 158                    | 0.0581                       | 433                    | 0.159                        | 1,175                  | 0.431                        |
|                |                  | LC_FRUS                 | LC_FRUS-1 |            | 5,043                  | 37       | 3,671                  | 0.728                        | 2,100                  | 0.416                        | 957                    | 0.190                        | 214                    | 0.0425                       | 0                      | 0                            | 300                    | 0.0595                       | 1,271                  | 0.252                        |
|                |                  | LC_FRUS                 | LC_FRUS-2 | September  | 3,290                  | 36       | 2,660                  | 0.809                        | 1,700                  | 0.517                        | 140                    | 0.0426                       | 190                    | 0.0578                       | 30.0                   | 0.00912                      | 280                    | 0.0851                       | 680                    | 0.207                        |
| Fording        | Mine-            | LC_FRUS                 | LC_FRUS-3 | -          | 2,486                  | 35       | 2,071                  | 0.833                        | 1,343                  | 0.540                        | 214                    | 0.0862                       | 121                    | 0.0489                       | 0                      | 0                            | 50.0                   | 0.0201                       | 679                    | 0.273                        |
| River          | Exposed          | LC_FRB                  | LC_FRB-1  | -          | 10,300                 | 40       | 6,400                  | 0.621                        | 4,360                  | 0.423                        | 1,920                  | 0.186                        | 1,780                  | 0.173                        | 40.0                   | 0.00388                      | 380                    | 0.0369                       | 1,660                  | 0.161                        |
|                |                  | LC_FRB                  | LC_FRB-2  | -          | 8,860                  | 39       | 4,100                  | 0.463                        | 3,000                  | 0.339                        | 3,760                  | 0.424                        | 720                    | 0.0813                       | 60.0                   | 0.00677                      | 200                    | 0.0226                       | 900                    | 0.102                        |
|                |                  | LC_FRB                  | LC_FRB-3  | -          | 7,840                  | 35       | 2,940                  | 0.375                        | 2,160                  | 0.276                        | 3,880                  | 0.495                        | 820                    | 0.105                        | 100.0                  | 0.0128                       | 100.0                  | 0.0128                       | 680                    | 0.0867                       |
| Dm. Crasl      | Mine-            | LC_DCDS                 | LC_DCDS-1 | November   | 1,557                  | 36       | 957                    | 0.615                        | 57.1                   | 0.0367                       | 505                    | 0.324                        | 81.0                   | 0.0520                       | 0                      | 0                            | 205                    | 0.131                        | 695                    | 0.446                        |
| Dry Creek      | Exposed          | LC_DCDS                 | LC_DCDS-2 | November - | 2,531                  | 31       | 1,892                  | 0.748                        | 7.69                   | 0.00304                      | 523                    | 0.207                        | 108                    | 0.0426                       | 0                      | 0                            | 346                    | 0.137                        | 1,538                  | 0.608                        |

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

 $<sup>^{\</sup>rm a}$  Units for abundance are number of organisms per 3-minute kick (org/ 3-min kick).

Table E.2: Preliminary Statistical Comparison of Benthic Invertebrate Community Endpoints in Dry Creek, September 2019 to 2022

| Endpoint         | Transformation | Year          | Area   | Year:Area               | Statio       | on      |      |      | Do endpoints | s differ between | years for each stat | ion? <sup>a</sup> |              | Do endpoint | s for exposed ar<br>area within |      | the reference |
|------------------|----------------|---------------|--------|-------------------------|--------------|---------|------|------|--------------|------------------|---------------------|-------------------|--------------|-------------|---------------------------------|------|---------------|
|                  |                |               |        |                         |              |         | 2019 | 2020 | 2021         | 2022             | 2019 vs 2020        | 2019 vs 2021      | 2019 vs 2022 | 2019        | 2020                            | 2021 | 2022          |
|                  |                |               |        |                         | Reference    | LC_DCEF | Α    | В    | В            | С                | -5.9                | -3.4              | -8.7         | nc          | nc                              | nc   | nc            |
|                  |                |               |        |                         |              | LC_DC3  | Α    | В    | В            | В                | -3.2                | -2.3              | -4.0         | ns          | ns                              | ns   | 7.6           |
| Abundance        | log10          | <0.001        | <0.001 | 0.002                   |              | LC_DCDS | Α    | В    | В            | С                | -3.3                | -4.5              | -9.5         | ns          | 1.7                             | ns   | ns            |
| Abundance        | 10910          | <0.001        | <0.001 | 0.002                   | Mine-Exposed | LC_DC2  | Α    | Α    | Α            | В                | ns                  | ns                | -11          | -3.0        | 1.7                             | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC4  | Α    | AB   | В            | С                | ns                  | -2.7              | -7.2         | ns          | 2.3                             | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC1  | Α    | В    | В            | С                | -4.8                | -3.3              | -9.1         | 3.0         | 2.4                             | 3.3  | 7.7           |
|                  |                |               |        |                         | Reference    | LC_DCEF | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | nc          | nc                              | nc   | nc            |
|                  |                |               |        |                         |              | LC_DC3  | Α    | В    | В            | В                | -11                 | -11               | -19          | 5.2         | ns                              | ns   | ns            |
| LPL Richness     | log10          | 0.011         | 0.191  | 0.012                   |              | LC_DCDS | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | ns          | ns                              | ns   | ns            |
| LFL NICIIIIess   | 10910          | 0.011         | 0.191  | 0.012                   | Mine-Exposed | LC_DC2  | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | ns          | ns                              | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC4  | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | ns          | ns                              | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC1  | AB   | AB   | Α            | В                | ns                  | ns                | ns           | ns          | ns                              | ns   | ns            |
|                  |                |               |        |                         | Reference    | LC_DCEF | В    | AB   | Α            | AB               | ns                  | 6.4               | ns           | nc          | nc                              | nc   | nc            |
|                  |                |               |        |                         |              | LC_DC3  | Α    | В    | В            | В                | -17                 | -19               | -13          | -11         | -14                             | -33  | -8.7          |
| % EPT            | none           | <0.001        | <0.001 | <0.001                  |              | LC_DCDS | Α    | AB   | Α            | В                | ns                  | ns                | -3.4         | ns          | ns                              | ns   | -2.9          |
| 70 EPT           | none           | <0.001        | <0.001 | <0.001                  | Mine-Exposed | LC_DC2  | AB   | Α    | Α            | В                | ns                  | ns                | ns           | ns          | ns                              | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC4  | Α    | Α    | Α            | В                | ns                  | ns                | -9.5         | 10          | ns                              | ns   | ns            |
|                  |                |               |        |                         |              | LC_DC1  | Α    | В    | Α            | В                | -4.0                | ns                | -4.6         | ns          | -4.9                            | ns   | -3.9          |
|                  |                |               |        |                         | Reference    | LC_DCEF | Α    | В    | Α            | Α                | -15                 | ns                | ns           | nc          | nc                              | nc   | nc            |
|                  |                |               |        |                         |              | LC_DC3  | Α    | В    | В            | В                | -8.1                | -8.4              | -8.3         | -17         | -22                             | -15  | -7.4          |
| % Ephemeroptera  | log10          | <0.001        | <0.001 | <0.001                  |              | LC_DCDS | Α    | В    | В            | В                | -18                 | -17               | -19          | ns          | -12                             | -9.3 | -5.0          |
| % Epitemeropiera | 10910          | <0.001        | <0.001 | <0.001                  | Mine-Exposed | LC_DC2  | Α    | Α    | В            | В                | ns                  | -4.1              | -3.5         | -19         | ns                              | -12  | -5.2          |
|                  |                |               |        |                         |              | LC_DC4  | Α    | Α    | В            | В                | ns                  | -18               | -22          | ns          | 7.9                             | -5.6 | -2.9          |
|                  |                |               |        |                         |              | LC_DC1  | Α    | BC   | В            | С                | -2.1                | -1.4              | -3.4         | -9.9        | ns                              | -4.9 | -3.7          |
|                  |                |               |        |                         | Reference    | LC_DCEF | С    | Α    | В            | BC               | 62                  | 32                | ns           | nc          | nc                              | nc   | nc            |
| 1                |                |               |        |                         |              | LC_DC3  | В    | AB   | В            | А                | ns                  | ns                | 129          | ns          | -15                             | ns   | ns            |
| % Placenters     | ronk           | <0.001        | <0.001 | <0.001                  |              | LC_DCDS | С    | С    | Α            | В                | ns                  | 107               | 58           | ns          | -17                             | 17   | ns            |
| % Plecoptera     | rank           | <0.001        | V0.001 | <b>\(\text{0.001}\)</b> | Mine-Exposed | LC_DC2  | В    | В    | Α            | AB               | ns                  | 17                | ns           | 60          | ns                              | 42   | 3.8           |
| 1                |                |               |        |                         |              | LC_DC4  | ВС   | С    | А            | AB               | ns                  | 28                | ns           | 43          | -10                             | 15   | 4.0           |
|                  |                |               |        |                         |              | LC_DC1  | AB   | В    | Α            | AB               | ns                  | ns                | ns           | 50          | -14                             | ns   | ns            |
|                  |                |               |        |                         | Reference    | LC_DCEF | В    | Α    | AB           | Α                | 2.0                 | ns                | 2.1          | nc          | nc                              | nc   | nc            |
|                  |                |               |        |                         |              | LC_DC3  | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | ns          | -1.8                            | ns   | -2.6          |
| 0/ Trick antons  | la #10         | <b>-0.004</b> | z0.001 | 0.014                   |              | LC_DCDS | С    | Α    | AB           | В                | 4.7                 | 2.8               | 2.5          | 3.5         | 3.6                             | 5.6  | 3.7           |
| % Trichoptera    | log10          | <0.001        | <0.001 | 0.014                   | Mine-Exposed | LC_DC2  | AB   | AB   | В            | Α                | ns                  | ns                | ns           | 5.4         | 2.7                             | 4.0  | 5.2           |
| 1                |                |               |        |                         |              | LC_DC4  | В    | AB   | А            | А                | ns                  | 5.2               | 4.1          | 2.5         | ns                              | 4.7  | 2.5           |
|                  |                |               |        |                         |              | LC_DC1  | Α    | Α    | Α            | Α                | ns                  | ns                | ns           | 2.6         | ns                              | 2.5  | ns            |

P-value < 0.1 MOD > 2 MOD < -2

Notes: "nc" = no relevant comparison; "ns" = not significant.

<sup>&</sup>lt;sup>a</sup> MOD = MCT<sub>year/</sub>-MCT<sub>year/</sub>/SD<sub>year1</sub> where MCT is the median for rank transformed data and the back-transformed estimated marginal means for others. Median Absolute Deviation (MAD) was used instead of standard deviation for rank-transformed data.

b MOD = MCT<sub>stn</sub>-MCT<sub>LC\_DCEF</sub>/SD<sub>LC\_DCEF</sub> where MCT is the median for rank transformed data and the back-transformed estimated marginal means for others. Median Absolute Deviation (MAD) was used instead of standard deviation for rank-transformed data.

Table E.2: Preliminary Statistical Comparison of Benthic Invertebrate Community Endpoints in Dry Creek, September 2019 to 2022

| Endpoint        | Transformation | Year   | Area   | Year:Area | Static       | on      |      |      | Do endpoints | differ between | years for each stat | ion? <sup>a</sup> |              | Do endpoints | s for exposed ar<br>area within |      | the reference |
|-----------------|----------------|--------|--------|-----------|--------------|---------|------|------|--------------|----------------|---------------------|-------------------|--------------|--------------|---------------------------------|------|---------------|
|                 |                |        |        |           |              |         | 2019 | 2020 | 2021         | 2022           | 2019 vs 2020        | 2019 vs 2021      | 2019 vs 2022 | 2019         | 2020                            | 2021 | 2022          |
|                 |                |        |        |           | Reference    | LC DCEF |      |      |              |                |                     |                   |              |              | n                               | С    |               |
|                 |                |        |        |           |              | LC_DC3  |      |      |              |                |                     |                   |              |              | n                               | S    |               |
| % Oligochaeta   | rank           | 0.648  | 0.009  | 0.264     |              | LC_DCDS | Α    | Α    | Α            | А              | ns                  | no                | no           |              | n                               | S    |               |
| % Oligochaeta   | Tank           | 0.046  | 0.009  | 0.204     | Mine-Exposed | LC_DC2  | A    | A    | A            | A              | 115                 | ns                | ns           |              | n                               | S    |               |
|                 |                |        |        |           |              | LC_DC4  |      |      |              |                |                     |                   |              |              | n                               | S    |               |
|                 |                |        |        |           |              | LC_DC1  |      |      |              |                |                     |                   |              |              | n                               | s    |               |
|                 |                |        |        |           | Reference    | LC_DCEF | Α    | В    | В            | AB             | -7.7                | -9.8              | ns           | nc           | nc                              | nc   | nc            |
|                 |                |        |        |           |              | LC_DC3  | Α    | Α    | Α            | Α              | ns                  | ns                | ns           | ns           | 13                              | 5.0  | 5.5           |
| % Chironomidae  | log10          | <0.001 | <0.001 | <0.001    |              | LC_DCDS | В    | В    | В            | Α              | ns                  | ns                | 3.1          | -6.4         | ns                              | 1.6  | 2.8           |
| 70 Officialidad | 10910          | 40.001 | 40.001 | 40.001    | Mine-Exposed | LC_DC2  | AB   | В    | С            | Α              | ns                  | -2.9              | ns           | -6.9         | ns                              | -2.0 | ns            |
|                 |                |        |        |           |              | LC_DC4  | В    | В    | В            | Α              | ns                  | ns                | 4.3          | -14          | ns                              | ns   | ns            |
|                 |                |        |        |           |              | LC_DC1  | В    | Α    | В            | Α              | 2.3                 | ns                | 2.4          | ns           | 7.8                             | 1.7  | 3.0           |
|                 |                |        |        |           | Reference    | LC_DCEF | С    | Α    | AB           | ВС             | 4.1                 | 2.8               | ns           | nc           | nc                              | nc   | nc            |
| % Non-          |                |        |        |           |              | LC_DC3  | В    | AB   | Α            | В              | ns                  | 3.1               | ns           | 4.3          | ns                              | 2.0  | 1.2           |
| Chironomidae    | log10          | 0.007  | <0.001 | <0.001    |              | LC_DCDS | AB   | Α    | С            | В              | ns                  | -5.4              | ns           | 4.6          | ns                              | ns   | ns            |
| Diptera         | 1.59.10        | 0.00.  | 0.00.  | 0.001     | Mine-Exposed | LC_DC2  | В    | AB   | В            | Α              | ns                  | ns                | 3.9          | 3.1          | ns                              | ns   | 1.7           |
| '               |                |        |        |           |              | LC_DC4  | В    | В    | AB           | Α              | ns                  | ns                | 10           | ns           | -1.9                            | ns   | ns            |
|                 |                |        |        |           |              | LC_DC1  | Α    | Α    | A            | Α              | ns                  | ns                | ns           | 3.2          | ns                              | ns   | 1.6           |
|                 |                |        |        |           | Reference    | LC_DCEF | Α    | BC   | AB           | С              | -6.1                | ns                | -9.3         | nc           | nc                              | nc   | nc            |
|                 |                |        |        |           |              | LC_DC3  | Α    | В    | В            | В              | -6.1                | -5.5              | -5.7         | ns           | -1.6                            | -5.5 | ns            |
| EPT Abundance   | log10          | <0.001 | <0.001 | <0.001    |              | LC_DCDS | Α    | В    | В            | С              | -4.8                | -6.0              | -14          | ns           | ns                              | ns   | ns            |
|                 | 3 -            |        |        |           | Mine-Exposed | LC_DC2  | Α    | Α    | Α            | В              | ns                  | ns                | -9.2         | ns           | 1.7                             | ns   | ns            |
|                 |                |        |        |           |              | LC_DC4  | Α    | AB   | В            | С              | ns                  | -3.0              | -8.2         | ns           | 2.3                             | ns   | ns            |
|                 |                |        |        |           |              | LC_DC1  | Α    | В    | AB           | С              | -7.5                | ns                | -13          | 3.9          | 1.6                             | ns   | ns            |
|                 |                |        |        |           | Reference    | LC_DCEF | Α    | С    | В            | С              | -3.2                | -2.1              | -3.6         | nc           | nc                              | nc   | nc            |
|                 |                |        |        |           |              | LC_DC3  | Α    | В    | В            | В              | -8.2                | -8.2              | -8.2         | ns           | -6.7                            | -7.6 | -2.9          |
| Ephemeroptera   | rank           | <0.001 | <0.001 | <0.001    | l            | LC_DCDS | Α    | В    | В            | С              | -2.8                | -2.9              | -3.3         | ns           | ns                              | -5.5 | -2.2          |
| Abundance       |                |        |        |           | Mine-Exposed | LC_DC2  | Α    | Α    | В            | С              | ns                  | -57               | -96          | -3.0         | 4.1                             | -5.5 | ns            |
|                 |                |        |        |           |              | LC_DC4  | Α    | В    | С            | D              | -1.8                | -2.8              | -3.5         | ns           | 17                              | ns   | ns            |
|                 |                |        |        |           |              | LC_DC1  | Α    | В    | В            | С              | -3.5                | -3.0              | -4.3         | ns           | 6.6                             | ns   | ns            |

P-value < 0.1 MOD > 2 MOD < -2

Notes: "nc" = no relevant comparison; "ns" = not significant.

<sup>&</sup>lt;sup>a</sup> MOD = MCT<sub>year/</sub>-MCT<sub>year/</sub>/SD<sub>year1</sub> where MCT is the median for rank transformed data and the back-transformed estimated marginal means for others. Median Absolute Deviation (MAD) was used instead of standard deviation for rank-transformed data.

b MOD = MCT<sub>stn</sub>-MCT<sub>LC\_DCEF</sub>/SD<sub>LC\_DCEF</sub> where MCT is the median for rank transformed data and the back-transformed estimated marginal means for others. Median Absolute Deviation (MAD) was used instead of standard deviation for rank-transformed data.

Table E.3: Statistical Comparison of Benthic Invertebrate Community Endpoints in Fording River, September 2018 to 2022

| Endpoint           | Transformation | Year          | Area          | Year:Area | Statio       | n       |       |      | Do endp | oints diff | fer betwe | en years fo     | r each statio   | on? <sup>a</sup> |                 | Do e | -    | s differ fi<br>hin a yea |      | FRUS |
|--------------------|----------------|---------------|---------------|-----------|--------------|---------|-------|------|---------|------------|-----------|-----------------|-----------------|------------------|-----------------|------|------|--------------------------|------|------|
| ·                  |                |               |               |           |              |         | 2018  | 2019 | 2020    | 2021       | 2022      | 2018 vs<br>2019 | 2018 vs<br>2020 | 2018 vs<br>2021  | 2018 vs<br>2022 | 2018 | 2019 | 2020                     | 2021 | 2022 |
| Abundance          | log10          | <0.001        | <0.001        | 0.034     | Reference    | LC_FRUS | Α     | AB   | AB      | ВС         | С         | ns              | ns              | -2.7             | -3.4            | nc   | nc   | nc                       | nc   | nc   |
| Abundance          | 10910          | <b>\0.001</b> | <b>\0.001</b> | 0.054     | Mine-Exposed | LC_FRB  | AB    | Α    | BC      | С          | ABC       | ns              | ns              | -3.3             | ns              | ns   | 2.9  | ns                       | ns   | 2.7  |
| LPL Richness       | log10          | 0.038         | 0.917         | 0.732     | Reference    | LC_FRUS | Α     | AB   | AB      | В          | В         | ns              | ns              | -1.4             | -1.4            |      |      | nc                       |      |      |
|                    | 10910          | 0.000         | 0.017         | 0.7 02    | Mine-Exposed | LC_FRB  |       |      | ,       |            |           | 110             | 110             | •••              | •••             |      | T    | ns                       | T    |      |
| % EPT              | none           | <0.001        | <0.001        | 0.004     | Reference    | LC_FRUS | AB    | В    | Α       | Α          | Α         | ns              | ns              | ns               | ns              | nc   | nc   | nc                       | nc   | nc   |
|                    |                |               | 0.00.         | 0.00      | Mine-Exposed | LC_FRB  | В     | В    | В       | Α          | В         | ns              | ns              | 3.7              | ns              | -2.2 | -1.8 | -3.0                     | ns   | -5.5 |
| % Ephemeroptera    | none           | 0.001         | 0.785         | 0.005     | Reference    | LC_FRUS | В     | В    | Α       | AB         | Α         | ns              | 7.0             | ns               | 8.3             | nc   | nc   | nc                       | nc   | nc   |
|                    |                |               |               | 0.000     | Mine-Exposed | LC_FRB  | В     | В    | В       | Α          | В         | ns              | ns              | 4.1              | ns              | ns   | ns   | -1.0                     | 5.9  | -2.2 |
| % Plecoptera       | none           | 0.001         | <0.001        | 0.681     | Reference    | LC_FRUS | Α     | В    | В       | Α          | В         | -0.91           | -0.94           | ns               | -0.90           | nc   | nc   | nc                       | nc   | nc   |
|                    |                |               |               |           | Mine-Exposed | LC_FRB  |       |      |         |            |           |                 |                 |                  |                 |      |      | -2.1                     |      |      |
| % Trichoptera      | log10          | 0.069         | 0.032         | 0.713     | Reference    | LC_FRUS | AB    | AB   | AB      | Α          | В         | ns              | ns              | ns               | ns              |      |      | nc                       |      |      |
| 70 Thomoptora      | 10910          |               | 0.002         | 0.7 10    | Mine-Exposed | LC_FRB  |       |      | 7.05    |            |           | 110             | 110             | 110              | 110             |      |      | -0.83                    |      |      |
| % Oligochaeta      | rank           | <0.001        | 0.002         | 0.466     | Reference    | LC_FRUS | Α     | AB   | С       | ВС         | С         | ns              | -1.0            | -0.90            | -0.91           |      |      | nc                       |      |      |
| 70 Oligoonadia     | Tariit         | -0.001        | 0.002         | 0.100     | Mine-Exposed | LC_FRB  | , · · | 7.6  |         |            |           | 110             | 1.0             |                  | 0.01            |      |      | 0.69                     |      |      |
| % Chironomidae     | log10          | <0.001        | 0.005         | 0.080     | Reference    | LC_FRUS | Α     | Α    | Α       | В          | AB        | ns              | ns              | -7.9             | ns              | nc   | nc   | nc                       | nc   | nc   |
| 70 Chilomornidae   | 10910          | ·0.001        | 0.000         | 0.000     | Mine-Exposed | LC_FRB  | Α     | Α    | Α       | В          | Α         | ns              | ns              | -7.8             | ns              | ns   | ns   | 1.6                      | ns   | 1.8  |
| % Non-Chironomidae | log10          | <0.001        | 0.081         | 0.018     | Reference    | LC_FRUS | Α     | Α    | В       | Α          | AB        | ns              | -2.5            | ns               | ns              | nc   | nc   | nc                       | nc   | nc   |
| Diptera            | 10910          |               | 0.001         | 0.010     | Mine-Exposed | LC_FRB  | ВС    | С    | С       | AB         | Α         | ns              | ns              | ns               | 2.8             | ns   | ns   | ns                       | ns   | 5.4  |

P-value < 0.1 MOD > 2 MOD < -2

Notes: "nc" = no relevant comparison; "ns" = not significant.

<sup>&</sup>lt;sup>a</sup> MOD =  $MCT_{year2}$ - $MCT_{year1}$ / $SD_{year1}$  where Measure of Central Tendency (MCT) is the median for rank transformed data and the back-transformed data and the back-transformed data.

b MOD = MCT<sub>stn</sub>-MCT<sub>LC\_FRUS</sub>/SD<sub>LC\_FRUS</sub> where Measure of Central Tendency (MCT) is the median for rank transformed data and the back-transformed estimated marginal means for others. Median Absolute Deviation (MAD) was used instead of standard deviation for rank-transformed data.

## APPENDIX F BENTHIC INVERTEBRATE TISSUE CHEMISTRY

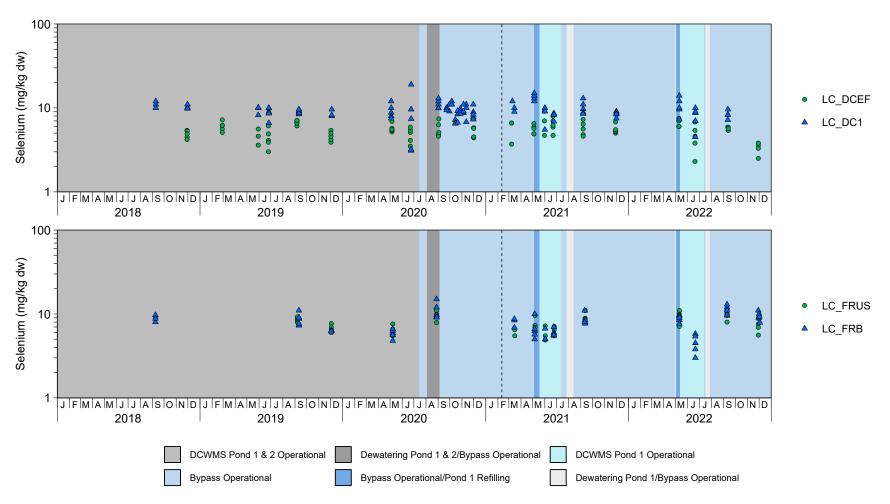


Figure F.1: Benthic Invertebrate Selenium Concentrations, for LC\_DC1 (Mine-exposed Areas) Relative to LC\_DCEF (Reference Area) and for LC\_FRB (Downstream) Relative to LC\_FRUS (Upstream), 2018 to 2022

Notes: mg/kg dw = milligrams per kilogram dry weight. Dashed black vertical line indicates the Burnt Ridge North spoil failure. Only data collected simultaneously at both stations are displayed.

Table F.1: Selenium Benchmarks for Benthic Invertebrates in the Elk Valley

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

<sup>&</sup>lt;sup>a</sup> BC guidelines were not used in assessment of benthic invertebrate and fish tissue selenium concentrations. Assessment was completed relative to site-specific benchmarks only.

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

Table F.2: Selenium Concentrations in Benthic Invertebrate Composite-Taxa and Taxon-Specific Samples Collected from Dry Creek, Fording River, and Grace Creek, Dry Creek LAEMP, January to December 2022

|           |         | Sample      |         | Sample   | Sample                 |                  | Seler     | nium Conc      | entration (m    | g/kg dw)        | Area                  |
|-----------|---------|-------------|---------|--|------------------------|------------------|-----------|----------------|-----------------|-----------------|-----------------------|
| Water     | body    | Туре        | Area    | Code   | Date                   | Sample<br>Result | Area Mean | Area<br>Median | Area<br>Minimum | Area<br>Maximum | Standard<br>Deviation |
|           |         |             |         | LC_DC3_INV-1_2022-05_NP                                  | 10-May-22              | 7.20<br>4.70     |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-2_2022-05_NP<br>LC_DC3_INV-3_2022-05_NP       | 10-May-22<br>10-May-22 | 7.60             | 6.68      | 7.20           | 4.70            | 8.20            | 1.44                  |
|           |         |             |         | LC_DC3_INV-4_2022-05_NP                                  | 10-May-22              | 8.20             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-5_2022-05_NP                                  | 10-May-22              | 5.70             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-1_2022-06_NP<br>LC_DC3_INV-2_2022-06_NP       | 20-Jun-22<br>20-Jun-22 | 5.90<br>3.40     | -         |                |                 |                 |                       |
|           |         |             |         | LC DC3 INV-3 2022-06 NP                                  | 20-Jun-22              | 5.10             | 5.96      | 5.90           | 3.40            | 7.80            | 1.83                  |
|           |         |             |         | LC_DC3_INV-4_2022-06_NP                                  | 20-Jun-22              | 7.80             | -         |                |                 |                 |                       |
|           |         |             | LC DC3  | LC_DC3_INV-5_2022-06_NP                                  | 20-Jun-22              | 7.60             |           |                |                 |                 |                       |
|           |         |             | _       | LC_DC3_INV-1_2022-09-13_N<br>LC_DC3_INV-2_2022-09-13_N   | 13-Sep-22<br>13-Sep-22 | 7.70<br>9.40     | -         |                |                 |                 |                       |
|           |         |             |         | LC DC3 INV-3 2022-09-13 N                                | 13-Sep-22              | 9.90             | 9.16      | 9.40           | 7.70            | 10.0            | 0.945                 |
|           |         |             |         | LC_DC3_INV-4_2022-09-13_N                                | 13-Sep-22              | 8.80             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-5_2022-09-13_N                                | 13-Sep-22              | 10.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-1_2022-11_N<br>LC_DC3_INV-2_2022-11_N         | 29-Nov-22<br>29-Nov-22 | 6.90<br>5.30     | -         |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-3_2022-11_N                                   | 29-Nov-22              | 4.40             | 6.44      | 6.90           | 4.40            | 8.50            | 1.61                  |
|           |         |             |         | LC_DC3_INV-4_2022-11_N                                   | 29-Nov-22              | 8.50             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC3_INV-5_2022-11_N                                   | 29-Nov-22              | 7.10             |           |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-1_2022-05_NP<br>LC_DCDS_INV-2_2022-05_NP     | 10-May-22<br>10-May-22 | 11.0<br>12.0     | -         |                |                 |                 |                       |
|           |         |             |         | LC DCDS INV-3 2022-05 NP                                 | 10-May-22              | 9.90             | 10.2      | 10.0           | 8.10            | 12.0            | 1.45                  |
|           |         |             |         | LC_DCDS_INV-4_2022-05_NP                                 | 10-May-22              | 10.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-5_2022-05_NP                                 | 10-May-22              | 8.10             |           |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-1_2022-06_NP<br>LC_DCDS_INV-2_2022-06_NP     | 20-Jun-22<br>20-Jun-22 | 5.40<br>6.20     | -         |                |                 |                 |                       |
|           |         | Composite   |         | LC DCDS_INV-2_2022-00_NP                                 | 20-Jun-22              | 5.10             | 6.40      | 6.20           | 5.10            | 9.10            | 1.59                  |
|           |         |             |         | LC_DCDS_INV-4_2022-06_NP                                 | 20-Jun-22              | 9.10             | -         |                |                 |                 |                       |
|           |         |             | LC DCDS | LC_DCDS_INV-5_2022-06_NP                                 | 20-Jun-22              | 6.20             |           |                |                 |                 |                       |
|           |         |             | _       | LC_DCDS_INV-1_2022-09-13_N<br>LC_DCDS_INV-2_2022-09-13_N | 13-Sep-22<br>13-Sep-22 | 15.0<br>10.0     | -         |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-2_2022-09-13_N  LC_DCDS_INV-3_2022-09-13_N   | 13-Sep-22<br>13-Sep-22 | 12.0             | 12.1      | 12.0           | 8.30            | 15.0            | 2.99                  |
|           |         |             |         | LC_DCDS_INV-4_2022-09-13_N                               | 13-Sep-22              | 8.30             | -         |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-5_2022-09-13_N                               | 13-Sep-22              | 15.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-1_2022-11_N<br>LC_DCDS_INV-2_2022-11_N       | 30-Nov-22              | 15.0             | -         |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-2_2022-11_N<br>LC_DCDS_INV-3_2022-11_N       | 30-Nov-22<br>30-Nov-22 | 12.0<br>12.0     | 12.2      | 12.0           | 10.0            | 15.0            | 1.79                  |
|           |         |             |         | LC_DCDS_INV-4_2022-11_N                                  | 30-Nov-22              | 10.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DCDS_INV-5_2022-11_N                                  | 30-Nov-22              | 12.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC4_INV-1_2022-05_NP                                  | 11-May-22              | 10.0             | -         |                |                 |                 |                       |
|           |         |             |         | LC_DC4_INV-2_2022-05_NP<br>LC_DC4_INV-3_2022-05_NP       | 11-May-22<br>11-May-22 | 9.88<br>9.00     | 9.16      | 9.00           | 8.30            | 10.0            | 0.759                 |
|           |         |             |         | LC DC4 INV-4 2022-05 NP                                  | 11-May-22              | 8.60             |           | 0.00           | 0.00            | 10.0            | 0.700                 |
|           | Mine-   |             |         | LC_DC4_INV-5_2022-05_NP                                  | 11-May-22              | 8.30             |           |                |                 |                 |                       |
| Dry Creek | Exposed |             |         | LC_DC4_INV-1_2022-06_NP                                  | 21-Jun-22              | 3.70             | -         |                |                 |                 |                       |
|           |         |             |         | LC_DC4_INV-2_2022-06_NP<br>LC_DC4_INV-3_2022-06_NP       | 21-Jun-22<br>21-Jun-22 | 5.30<br>5.80     | 5.16      | 5.30           | 3.70            | 5.90            | 0.882                 |
|           |         |             |         | LC_DC4_INV-4_2022-06_NP                                  | 21-Jun-22              | 5.90             | -         | 0.00           | 00              | 0.00            | 0.002                 |
|           |         |             |         | LC_DC4_INV-5_2022-06_NP                                  | 21-Jun-22              | 5.10             |           |                |                 |                 |                       |
|           |         |             | LC_DC4  | LC_DC4_COMPNOLI-1_2022-09-12_N                           | 12-Sep-22              | 7.00             | -         |                |                 |                 |                       |
|           |         |             |         | LC_DC4_INV-2_2022-09-12_N<br>LC_DC4_INV-3_2022-09-12_N   | 12-Sep-22<br>12-Sep-22 | 10.0<br>9.10     | 8.52      | 8.80           | 7.00            | 10.0            | 1.18                  |
|           |         |             |         | LC DC4 INV-4 2022-09-12 N                                | 12-Sep-22              | 8.80             | 0.02      | 0.00           | 7.00            | 10.0            | 1.10                  |
|           |         |             |         | LC_DC4_INV-5_2022-09-12_N                                | 12-Sep-22              | 7.70             |           |                |                 |                 |                       |
|           |         | Oligochaeta | -       | LC_DC4_INVOLI-1_2022-09-12_N                             | 12-Sep-22              | 7.50             | 7.50      | 7.50           | 7.50            | 7.50            | -                     |
|           |         |             |         | LC_DC4_INV-1_2022-11_N<br>LC_DC4_INV-2_2022-11_N         | 29-Nov-22<br>29-Nov-22 | 3.10<br>7.60     | -         |                |                 |                 |                       |
|           |         |             |         | LC DC4 INV-3 2022-11 N                                   | 29-Nov-22              | 6.90             | 5.76      | 5.70           | 3.10            | 7.60            | 1.72                  |
|           |         |             |         | LC_DC4_INV-4_2022-11_N                                   | 29-Nov-22              | 5.50             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC4_INV-5_2022-11_N                                   | 29-Nov-22              | 5.70             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-1_2022-05_NP<br>LC_DC2_INV-2_2022-05_NP       | 10-May-22<br>10-May-22 | 11.0<br>11.0     | -         |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-3_2022-05_NP                                  | 10-May-22              | 13.0             | 11.8      | 11.0           | 11.0            | 13.0            | 1.10                  |
|           |         |             |         | LC_DC2_INV-4_2022-05_NP                                  | 10-May-22              | 13.0             | ]         |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-5_2022-05_NP                                  | 10-May-22              | 11.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-1_2022-06_NP<br>LC_DC2_INV-2_2022-06_NP       | 21-Jun-22<br>21-Jun-22 | 5.40<br>3.30     | -         |                |                 |                 |                       |
|           |         |             | LC DC2  | LC_DC2_INV-3_2022-06_NP                                  | 21-Jun-22              | 6.90             | 5.86      | 6.30           | 3.30            | 7.40            | 1.61                  |
|           |         |             | _       | LC_DC2_INV-4_2022-06_NP                                  | 21-Jun-22              | 7.40             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-5_2022-06_NP                                  | 21-Jun-22              | 6.30             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-1_2022-09-14_N<br>LC_DC2_INV-2_2022-09-14_N   | 14-Sep-22<br>14-Sep-22 | 7.40<br>7.90     | -         |                |                 |                 |                       |
|           |         | Composite   |         | LC DC2 INV-3 2022-09-14 N                                | 14-Sep-22              | 6.60             | 7.38      | 7.40           | 6.10            | 8.88            | 1.09                  |
|           |         |             |         | LC_DC2_INV-4_2022-09-14_N                                | 14-Sep-22              | 8.88             | ]         |                |                 |                 |                       |
|           |         |             |         | LC_DC2_INV-5_2022-09-14_N                                | 14-Sep-22              | 6.10             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC1_INV-1_2022-05_NP                                  | 11-May-22              | 7.30             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC1_INV-2_2022-05_NP<br>LC_DC1_INV-3_2022-05_NP       | 11-May-22<br>11-May-22 | 14.0<br>12.0     | 10.6      | 10.0           | 7.30            | 14.0            | 2.54                  |
|           |         |             |         | LC_DC1_INV-3_2022-05_NP                                  | 11-May-22              |                  |           | 10.0           | 7.50            | 70              | 2.04                  |
|           |         |             |         | LC_DC1_INV-5_2022-05_NP                                  | 11-May-22              | 10.0             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC1_INV-1_2022-06_NP                                  | 21-Jun-22              | 10.0             |           |                |                 |                 |                       |
|           |         |             | LC_DC1  | LC_DC1_INV-2_2022-06_NP<br>LC_DC1_INV-3_2022-06_NP       | 21-Jun-22<br>21-Jun-22 | 8.70<br>7.00     | 7.84      | 8.70           | 4.50            | 10.0            | 2.16                  |
|           |         |             |         | LC_DC1_INV-3_2022-06_NP<br>LC_DC1_INV-4_2022-06_NP       | 21-Jun-22<br>21-Jun-22 | 9.00             | 1.04      | 0.70           | 4.50            | 10.0            | 2.10                  |
|           |         |             |         | LC_DC1_INV-5_2022-06_NP                                  | 21-Jun-22              | 4.50             |           |                | <u> </u>        |                 | <u> </u>              |
|           |         |             |         | LC_DC1_INV-1_2022-09-12_N                                | 12-Sep-22              | 8.30             |           |                |                 |                 |                       |
|           |         |             |         | LC_DC1_INV-2_2022-09-12_N                                | 12-Sep-22              | 7.20             | 8.34      | 8.30           | 7.20            | 9.60            | 0.850                 |
|           |         |             |         | LC_DC1_INV-3_2022-09-12_N<br>LC_DC1_INV-4_2022-09-12_N   | 12-Sep-22<br>12-Sep-22 | 8.30<br>8.30     | 0.34      | 0.30           | 1.20            | 9.00            | U.00U                 |
|           |         | ĺ           | ĺ       | LC DC1 INV-5 2022-09-12 N                                | 12-Sep-22              | 9.60             | 1         |                |                 |                 |                       |

Notes: June sample at LC\_FRUS were not collected due to high water levels. November samples for LC\_DC1 and LC\_DC2 samples were not collected due to ice conditions.

Table F.2: Selenium Concentrations in Benthic Invertebrate Composite-Taxa and Taxon-Specific Samples Collected from Dry Creek, Fording River, and Grace Creek, Dry Creek LAEMP, January to December 2022

|           |           |                |         |  |                        |                  | Seler     | nium Conce     | entration (m    | g/kg dw)        |                               |
|-----------|-----------|----------------|---------|--|------------------------|------------------|-----------|----------------|-----------------|-----------------|-------------------------------|
| Water     | rbody     | Sample<br>Type | Area    | Sample<br>Code   | Sample<br>Date         | Sample<br>Result | Area Mean | Area<br>Median | Area<br>Minimum | Area<br>Maximum | Area<br>Standard<br>Deviation |
|           |           |                |         | LC_FRUS_INV-1_2022-05_NP<br>LC_FRUS_INV-2_2022-05_NP           | 11-May-22<br>11-May-22 | 9.20<br>7.10     |           |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-3_2022-05_NP                                       | 11-May-22              | 10.0             | 9.26      | 9.20           | 7.10            | 11.0            | 1.44                          |
|           |           |                |         | LC_FRUS_INV-4_2022-05_NP                                       | 11-May-22              | 9.00             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-5_2022-05_NP                                       | 11-May-22              | 11.0             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-1_2022-09-10_N<br>LC_FRUS_INV-2_2022-09-10_N       | 10-Sep-22<br>10-Sep-22 | 11.0<br>9.60     |           |                |                 |                 |                               |
|           |           |                | LC FRUS | LC_FRUS_INV-2_2022-09-10_N  LC_FRUS_INV-3_2022-09-10_N         | 10-Sep-22<br>10-Sep-22 | 8.00             | 9.70      | 9.90           | 8.00            | 11.0            | 1.09                          |
|           |           |                | _       | LC_FRUS_INV-4_2022-09-10_N                                     | 10-Sep-22              | 10.0             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-5_2022-09-10_N                                     | 10-Sep-22              | 9.90             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-1_2022-11_N  | 29-Nov-22              | 7.60             | _         |                |                 |                 |                               |
|           |           |                |         | LC_FRUS_INV-2_2022-11_N<br>LC_FRUS_INV-3_2022-11_N             | 29-Nov-22<br>29-Nov-22 | 6.90<br>8.90     | 7.58      | 7.60           | 5.60            | 8.90            | 1.40                          |
|           |           |                |         | LC FRUS INV-4 2022-11 N  | 29-Nov-22              | 8.90             |           |                | 0.00            | 0.00            |                               |
|           |           |                |         | LC_FRUS_INV-5_2022-11_N  | 29-Nov-22              | 5.60             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-1_2022-05_NP  | 11-May-22              | 9.69             |           |                |                 |                 |                               |
| Fording   | Mine-     |                |         | LC_FRB_INV-2_2022-05_NP  | 11-May-22              | 9.40             | 0.06      | 0.00           | 7 70            | 0.60            | 0.786                         |
| River     | Exposed   |                |         | LC_FRB_INV-3_2022-05_NP<br>LC_FRB_INV-4_2022-05_NP             | 11-May-22<br>11-May-22 | 8.50<br>9.00     | 8.86      | 9.00           | 7.70            | 9.69            | 0.786                         |
|           |           |                |         | LC_FRB_INV-5_2022-05_NP  | 11-May-22              | 7.70             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-1_2022-06_NP  | 21-Jun-22              | 3.80             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-2_2022-06_NP  | 21-Jun-22              | 5.80             | 4.50      | 4.50           |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-3_2022-06_NP  | 21-Jun-22              | 3.00<br>4.50     | 4.50      | 4.50           | 3.00            | 5.80            | 1.14                          |
|           |           |                |         | LC_FRB_INV-4_2022-06_NP<br>LC_FRB_INV-5_2022-06_NP             | 21-Jun-22<br>21-Jun-22 | 5.40             |           |                |                 |                 |                               |
|           |           |                | LC_FRB  | LC FRB INV-1 2022-09-10 N                                      | 10-Sep-22              | 12.0             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-2_2022-09-10_N                                      | 10-Sep-22              | 11.0             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-3_2022-09-10_N                                      | 10-Sep-22              | 9.60             | 11.1      | 11.0           | 9.60            | 13.0            | 1.47                          |
|           |           |                |         | LC_FRB_INV-4_2022-09-10_N                                      | 10-Sep-22              | 9.70             |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-5_2022-09-10_N<br>LC_FRB_INV-1_2022-11_N            | 10-Sep-22<br>29-Nov-22 | 13.0<br>11.0     |           |                |                 |                 |                               |
|           |           |                |         | LC_FRB_INV-1_2022-11_N<br>LC_FRB_INV-2_2022-11_N               | 30-Nov-22              | 8.90             |           |                |                 |                 |                               |
|           |           |                |         | LC FRB INV-3 2022-11 N   | 01-Dec-22              | 10.0             | 9.42      | 9.30           | 7.90            | 11.0            | 1.16                          |
|           |           |                |         | LC_FRB_INV-4_2022-11_N   | 02-Dec-22              | 9.30             |           |                |                 |                 |                               |
|           |           | Composite      |         | LC_FRB_INV-5_2022-11_N   | 03-Dec-22              | 7.90             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-1_2022-05_NP                                       | 10-May-22              | 6.00             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-2_2022-05_NP<br>LC_DCEF_INV-3_2022-05_NP           | 10-May-22<br>10-May-22 | 6.00<br>7.40     | 6.78      | 7.00           | 6.00            | 7.50            | 0.736                         |
|           |           |                |         | LC DCEF INV-4 2022-05 NP                                       | 10-May-22              | 7.00             | - 0.70    | 7.00           | 0.00            | 7.00            | 0.700                         |
|           |           |                |         | LC_DCEF_INV-5_2022-05_NP                                       | 10-May-22              | 7.50             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-1_2022-06_NP                                       | 20-Jun-22              | 2.30             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-2_2022-06_NP                                       | 20-Jun-22              | 4.60             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-3_2022-06_NP                                       | 20-Jun-22              | 6.80             | 4.58      | 4.60           | 2.30            | 6.80            | 1.69                          |
| Dry Creek |           |                |         | LC_DCEF_INV-4_2022-06_NP<br>LC_DCEF_INV-5_2022-06_NP           | 20-Jun-22<br>20-Jun-22 | 3.80<br>5.40     | _         |                |                 |                 |                               |
| East      | Reference |                | LC_DCEF | LC DCEF INV-1 2022-09-12 N                                     | 12-Sep-22              | 5.90             |           |                |                 |                 |                               |
| Tributary |           |                |         | LC_DCEF_INV-2_2022-09-13_N                                     | 13-Sep-22              | 5.90             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-3_2022-09-13_N                                     | 13-Sep-22              | 5.40             | 5.66      | 5.70           | 5.40            | 5.90            | 0.251                         |
|           |           |                |         | LC_DCEF_INV-4_2022-09-13_N                                     | 13-Sep-22              | 5.40             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-5_2022-09-13_N                                     | 13-Sep-22              | 5.70             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-1_2022-11_N<br>LC_DCEF_INV-2_2022-11_N             | 29-Nov-22<br>29-Nov-22 | 2.50<br>3.80     |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-3_2022-11_N  | 29-Nov-22              | 3.55             | 3.39      | 3.55           | 2.50            | 3.80            | 0.539                         |
|           |           |                |         | LC_DCEF_INV-4_2022-11_N  | 29-Nov-22              | 3.80             |           |                |                 |                 |                               |
|           |           |                |         | LC_DCEF_INV-5_2022-11_N  | 29-Nov-22              | 3.30             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-1_2022-05_NP                                       | 11-May-22              | 7.90             | 4         |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-2_2022-05_NP<br>LC_GRCK_INV-3_2022-05_NP           | 11-May-22<br>11-May-22 | 7.90<br>6.80     | 6.84      | 6.80           | 5.60            | 7.90            | 1.06                          |
|           |           |                |         | LC_GRCK_INV-3_2022-05_NP                                       | 11-May-22              | 6.00             | 0.04      | 0.00           | 0.00            | 7.50            | 1.00                          |
|           |           |                |         | LC_GRCK_INV-5_2022-05_NP                                       | 11-May-22              | 5.60             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-1_2022-06_NP                                       | 22-Jun-22              | 7.60             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-2_2022-06_NP                                       | 22-Jun-22              | 6.40             |           | 0.0-           | 2.25            |                 | 0.05:                         |
|           |           |                |         | LC_GRCK_INV-3_2022-06_NP                                       | 22-Jun-22              | 6.20             | 6.94      | 6.80           | 6.20            | 7.70            | 0.684                         |
|           |           |                |         | LC_GRCK_INV-4_2022-06_NP<br>LC_GRCK_INV-5_2022-06_NP           | 22-Jun-22<br>22-Jun-22 | 7.70<br>6.80     |           |                |                 |                 |                               |
| Grace     | Mine-     |                | 10.055  | LC GRCK COMPNOLI-1 2022-09-14 N                                | 14-Sep-22              | 7.30             |           |                |                 |                 |                               |
| Creek     | Exposed   |                | LC_GRCK | LC_GRCK_COMPNOLI-2_2022-09-14_N                                | 14-Sep-22              | 7.80             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-3_2022-09-14_N                                     | 14-Sep-22              | 4.80             | 7.18      | 7.30           | 4.80            | 8.70            | 1.45                          |
|           |           |                |         | LC_GRCK_INV-4_2022-09-14_N                                     | 14-Sep-22              | 8.70             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-5_2022-09-14_N                                     | 14-Sep-22              | 7.30             |           |                |                 |                 |                               |
|           |           | Oligochaeta    |         | LC_GRCK_INVOLI-1_2022-09-14_N<br>LC_GRCK_INVOLI-2_2022-09-14_N | 14-Sep-22<br>14-Sep-22 | 6.60<br>3.60     | 5.10      | 5.10           | 3.60            | 6.60            | 2.12                          |
|           |           |                |         | LC_GRCK_INV-1_2022-11_N  | 30-Nov-22              | 5.30             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-2_2022-11_N  | 30-Nov-22              | 8.90             |           |                |                 |                 |                               |
|           |           | Composite      |         | LC_GRCK_INV-3_2022-11_N  | 30-Nov-22              | 7.80             | 7.70      | 7.80           | 5.30            | 9.60            | 1.69                          |
|           |           |                |         | LC_GRCK_INV-4_2022-11_N  | 30-Nov-22              | 9.60             |           |                |                 |                 |                               |
|           |           |                |         | LC_GRCK_INV-5_2022-11_N  | 30-Nov-22              | 6.90             |           |                |                 |                 |                               |

 $Notes: \ \, \text{June sample at LC\_FRUS were not collected due to high water levels.} \ \, \text{November samples for LC\_DC1 and LC\_DC2} \ \, \text{samples were not collected due to ice conditions.} \\$ 

Table F.3: Selenium Species Bioaccumulation Tool<sup>a</sup> Predicted Benthic Invertebrate Tissue Selenium Concentrations Compared to Measured Values, Dry Creek, 2022

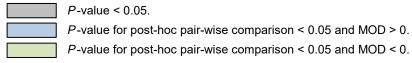
|                              |         | B-        | tool Prediction <sup>a</sup>                                       | Fie       | ld Measurements   |
|------------------------------|---------|-----------|--|-----------|---|
| Waterbody                    | Area    | Date      | Predicted Benthic<br>Invertebrate Tissue<br>Selenium Concentration | Date      | Mean Benthic Invertebrate<br>Tissue Selenium<br>Concentration |
|                              |         |           | μg/g dw  |           | μg/g dw   |
| Dry Creek East               |         | 3-May-22  | 10.2   | 10-May-22 | 6.78  |
| Tributary                    | LC_DCEF | 12-Sep-22 | 9.54   | 13-Sep-22 | 5.66  |
| (Reference)                  |         | 29-Nov-22 | 9.37   | 29-Nov-22 | 3.39  |
| Grace Creek                  |         | 11-May-22 | 5.43   | 11-May-22 | 6.84  |
| (Reference)                  | LC_GRCK | 14-Sep-22 | 5.50   | 14-Sep-22 | 7.18  |
| (rtererenee)                 |         | 30-Nov-22 | 5.60   | 30-Nov-22 | 7.70  |
|                              |         | 11-May-22 | 12.8   | 10-May-22 | 6.68  |
|                              | LC DC3  | 21-Jun-22 | 10.2   | 20-Jun-22 | 5.96  |
|                              | LO_DO3  | 13-Sep-22 | 12.4   | 13-Sep-22 | 9.16  |
|                              |         | 29-Nov-22 | 10.7   | 29-Nov-22 | 6.44  |
|                              |         | 11-May-22 | 12.6   | 10-May-22 | 10.2  |
|                              | LC DCDS | 21-Jun-22 | 10.4   | 20-Jun-22 | 6.40  |
|                              |         | 13-Sep-22 | 13.9   | 13-Sep-22 | 12.1  |
|                              |         | 29-Nov-22 | 11.2   | 30-Nov-22 | 12.2  |
| Dry Creek                    |         | 11-May-22 | 9.55   | 11-May-22 | 9.16  |
| (Mine-Exposed)               | LC DC4  | 21-Jun-22 | 9.15   | 21-Jun-22 | 5.16  |
|                              | LO_DO4  | 13-Sep-22 | 8.22   | 12-Sep-22 | 8.52  |
|                              |         | 29-Nov-22 | 7.76   | 29-Nov-22 | 5.76  |
|                              |         | 11-May-22 | 10.8   | 10-May-22 | 11.8  |
|                              | LC_DC2  | 21-Jun-22 | 9.08   | 21-Jun-22 | 5.86  |
|                              |         | 13-Sep-22 | 12.8   | 14-Sep-22 | 7.38  |
|                              |         | 12-May-22 | 8.53   | 11-May-22 | 10.6  |
|                              | LC_DC1  | 21-Jun-22 | 9.11   | 21-Jun-22 | 7.84  |
|                              |         | 13-Sep-22 | 10.2   | 12-Sep-22 | 8.34  |
|                              |         | 11-May-22 | 7.25   | 11-May-22 | 9.26  |
| E a Pa a Dia                 | LC_FRUS | 10-Sep-22 | 8.08   | 10-Sep-22 | 9.70  |
| Fording River (Mine-Exposed) |         | 29-Nov-22 | 6.89   | 29-Nov-22 | 7.58  |
| (IVIIIIe-Exposed)            | LC EDD  | 10-Sep-22 | 7.71   | 10-Sep-22 | 11.1  |
|                              | LC_FRB  | 30-Nov-22 | 6.99   | 29-Nov-22 | 9.42  |

Note: LC\_FRB had no May Se speciation samples and therefore could not be included. LC\_DCEF, LC\_GRCK, and LC\_FRUS had no June Se speciation samples and therefore could not be include. LC\_DC2 and LC\_DC1 had no June Se speciation samples and therefore could not be include.

<sup>&</sup>lt;sup>a</sup> Values derived from de Bruyn and Luoma (2021) using selenium speciation data and sulphate concentrations for each area on each date to predict benthic invertebrate tissue selenium concentrations. Five days range was used to match dates between selenium speciation and sulphate data.

Table F.4: Spatial and Temporal Comparisons of Benthic Invertebrate Tissue Selenium Concentration Among Months, Dry Creek Sampling Areas, 2022

|                | ANOVA N | Model <sup>a</sup> |              | ٨         | rea     | Month     | Do concentra | tions differ ame<br>each areas? <sup>b</sup> | ong months for |       |      | ween reference (<br>within months? |          |
|----------------|---------|--------------------|--------------|-----------|---------|-----------|--------------|--|----------------|-------|------|------------------------------------|----------|
| Transformation | Area    | Month              | Month x Area | Α'        | Ca      | Wonth     | May          | June   | September      | May   | June | September                          | November |
|                |         |                    |              |           |         | May       | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              | Reference | LC-DCEF | June      | ns           | nc   | nc             | no    | no   | no                                 | no       |
|                |         |                    |              | Reference | LC-DCEF | September | ns           | ns   | nc             | nc    | nc   | nc                                 | nc       |
|                |         |                    |              |           |         | November  | -50          | ns   | ns             |       |      |                                    |          |
|                |         |                    |              |           |         | May       | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              |           | LC_DC3  | June      | ns           | nc   | nc             | ne    | ne   | 62                                 | 90       |
|                |         |                    |              |           | LC_DC3  | September | ns           | 54   | nc             | - ns  | ns   | 02                                 | 90       |
|                |         |                    |              |           |         | November  | ns           | ns   | -30            |       |      |                                    |          |
|                |         |                    |              |           |         | May       | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              |           | LC_DCDS | June      | -37          | nc   | nc             | 50    | ns   | 113                                | 260      |
|                |         |                    |              |           |         | September | ns           | 88   | nc             | 30    | 113  | 113                                | 200      |
| none           | <0.001  | <0.001             | <0.001       |           |         | November  | ns           | 91   | ns             |       |      |                                    |          |
| Hone           | 40.001  | 40.001             | 10.001       |           |         | May       | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              | Exposed   | LC_DC2  | June      | -50          | nc   | nc             | - 74  | ns   | ns                                 | _        |
|                |         |                    |              | Ехрозец   | 20_502  | September | -38          | ns   | nc             | - 7-7 | 110  | 110                                |          |
|                |         |                    |              |           |         | November  | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              |           |         | May       | nc           | nc   | nc             | _     |      |                                    |          |
|                |         |                    |              |           | LC_DC4  | June      | -44          | nc   | nc             | ns    | ns   | ns                                 | ns       |
|                |         |                    |              |           | 20_201  | September | ns           | 62   | nc             |       | 110  |                                    | 110      |
|                |         |                    |              |           |         | November  | -37          | ns   | -31            |       |      |                                    |          |
|                |         |                    |              |           |         | May       | nc           | nc   | nc             |       |      |                                    |          |
|                |         |                    |              |           | LC_DC1  | June      | -26          | nc   | nc             | 56    | 71   | ns                                 | _        |
|                |         |                    |              |           |         | September | ns           | ns   | nc             | - 30  |      |                                    |          |
|                |         |                    |              |           |         | November  | nc           | nc   | nc             |       |      |                                    |          |



Notes: "nc" = not comparable; "-" = no data for comparison.

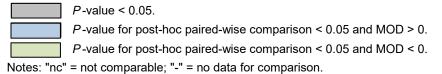
<sup>&</sup>lt;sup>a</sup> *P*-values from Analysis of Variance (ANOVA) including the terms Area, Month and Area x Month.

<sup>&</sup>lt;sup>b</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>month2</sub> - MCT<sub>month1</sub>)/MCT<sub>month1</sub> \*100 using the measure of central tendency (MCT; mean).

<sup>&</sup>lt;sup>c</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>exp</sub> - MCT<sub>ref</sub>)/MCT<sub>ref</sub> \*100 using the measure of central tendency (MCT; mean).

Table F.5: Spatial and Temporal Comparisons of Benthic Invertebrate Tissue Selenium Concentration Among Months, Fording River Sampling Areas, 2022

|                | ANOVA | <b>Model</b> <sup>a</sup> |              | Month     |     |      | ns differ among<br>each areas? <sup>b</sup> | Do cond | and e | ns differ betwe<br>exposed areas<br>RUS vs LC_FF | ? <sup>c</sup> |
|----------------|-------|---------------------------|--------------|-----------|-----|------|---|---------|-------|--|----------------|
| Transformation | Area  | Month                     | Month x Area |           | May | June | September                                   | Мау     | June  | September  | November       |
|                |       |                           |              | May       | nc  | nc   | nc  |         | ·     | l  |                |
| log10          | 0.090 | <0.001                    | 0.215        | June      | -54 | nc   | nc  | ]       |       | ne   |                |
| 10910          | 0.090 | <b>\0.001</b>             | 0.215        | September | ns  | 148  | nc  |         |       | ns   |                |
|                |       |                           |              | November  | ns  | 101  | -19   |         |       |  |                |



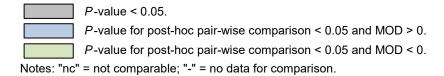
<sup>&</sup>lt;sup>a</sup> *P*-values from Analysis of Variance (ANOVA) including the terms Station, Month and Station x Month.

<sup>&</sup>lt;sup>b</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>month2</sub> - MCT<sub>month1</sub>)/MCT<sub>month1</sub> \*100 using the measure of central tendency (MCT; geometric mean due to log<sub>10</sub> transformation).

<sup>&</sup>lt;sup>c</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>LC\_FRB</sub> - MCT<sub>LC\_FRUS</sub>)/MCT<sub>LC\_FRUS</sub>\*100 using the measure of central tendency (geometric mean due to log10 transformation).

Table F.6: Spatial and Temporal Comparisons of Benthic Invertebrate Tissue Selenium Concentration Among Years, Dry Creek Sampling Areas, 2020 to 2022

|                | ANOVA Model <sup>a</sup> |        |             | Δr        | ·02     | Year | Do concentrations differ among years for each areas? <sup>b</sup> |      | Do concentrations differ between reference (LC_DCEF) and exposed areas within years? <sup>c</sup> |      |      |
|----------------|--------------------------|--------|-------------|-----------|---------|------|---|------|---|------|------|
| Transformation | Area                     | Year   | Year x Area | Area      |         | rear | 2020  | 2021 | 2020  | 2021 | 2022 |
|                |                          |        |             |           |         | 2020 | nc  | nc   |   |      |      |
|                |                          |        |             | Reference | LC-DCEF | 2021 | ns  | nc   | nc  | nc   | nc   |
|                |                          |        |             |           |         | 2022 | ns  | ns   |   |      |      |
|                |                          |        |             |           |         | 2020 | nc  | nc   |   |      |      |
|                |                          |        |             |           | LC_DC3  | 2021 | 33  | nc   | ns  | 73   | 61   |
|                |                          |        |             |           |         | 2022 | ns  | ns   |   |      |      |
|                |                          |        |             |           |         | 2020 | nc  | nc   |   |      |      |
|                |                          |        |             |           | LC_DCDS | 2021 | -46   | nc   | 290   | 108  | 108  |
| log10          | <0.001                   | <0.001 | <0.001      |           |         | 2022 | -46   | ns   |   |      |      |
|                |                          |        |             |           |         | 2020 | nc  | nc   |   |      |      |
|                |                          |        |             | Exposed   | LC_DC2  | 2021 | -53   | nc   | 134   | ns   | ns   |
|                |                          |        |             |           |         | 2022 | -44   | ns   |   |      |      |
|                |                          |        |             |           |         | 2020 | nc  | nc   |   |      |      |
|                |                          |        |             |           | LC_DC4  | 2021 | ns  | nc   | 59  | ns   | 50   |
|                |                          |        |             |           |         | 2022 | ns  | ns   |   |      |      |
|                |                          |        |             |           | 10.004  | 2020 | nc  | nc   | 00  | 70   | 47   |
|                |                          |        |             |           | LC_DC1  | 2021 | ns  | nc   | 90  | 78 4 | 47   |
|                |                          |        |             |           |         | 2022 | ns  | ns   |   |      |      |



 $<sup>^{\</sup>mathrm{a}}$  *P*-values from Analysis of Variance (ANOVA) including the terms Area, Year and Area x Year.

<sup>&</sup>lt;sup>b</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>year2</sub> - MCT<sub>year1</sub>)/MCT<sub>year1</sub> \*100 using the measure of central tendency (MCT; mean).

<sup>&</sup>lt;sup>c</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>exp</sub> - MCT<sub>ref</sub>)/MCT<sub>ref</sub> \*100 using the measure of central tendency (MCT; mean).

Table F.7: Spatial and Temporal Comparisons of Benthic Invertebrate Tissue Selenium Concentration Among Years, Fording River Sampling Areas, 2020 to 2022

|                | ANOVA Model <sup>a</sup> |       |             |      | Do conce<br>differ amo<br>for each | ong years |      |      |      |  |  |
|----------------|--------------------------|-------|-------------|------|------------------------------------|-----------|------|------|------|--|--|
| Transformation | Area                     | Year  | Year x Area |      | 2020                               | 2021      | 2020 | 2021 | 2022 |  |  |
|                |                          |       |             | 2020 | nc                                 | nc        |      |      |      |  |  |
| log10          | 0.391                    | 0.123 | 0.133       | 2021 | ns                                 | nc        | ns   |      |      |  |  |
|                |                          |       |             | 2022 | ns                                 | ns        |      |      |      |  |  |

*P*-value < 0.05.

P-value for post-hoc paired-wise comparison < 0.05 and MOD > 0.

P-value for post-hoc paired-wise comparison < 0.05 and MOD < 0.

Notes: "nc" = not comparable; "ns" = not significante; "-" = no data for comparison.

<sup>&</sup>lt;sup>a</sup> *P*-values from Analysis of Variance (ANOVA) including the terms Area, Year and Area x Year.

<sup>&</sup>lt;sup>b</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>year2</sub> - MCT<sub>year1</sub>)/MCT<sub>year1</sub> \*100 using the measure of central tendency (MCT; geometric mean due to log<sub>10</sub> transformation).

<sup>&</sup>lt;sup>c</sup> Magnitude of Difference (MOD) was calculated as (MCT<sub>LC\_FRB</sub> - MCT<sub>LC\_FRUS</sub>)/MCT<sub>LC\_FRUS</sub>\*100 using the measure of central tendency (geometric mean due to log10 transformation).

# APPENDIX G FISH HABITAT

Table G.1: Monthly Mean Dissolved Oxygen Concentrations (mg/L) in Dry Creek, 2012 to 2022

| Year | Month                | LC_DCEF      | LC_SPDC      | LC_DCDS      | LC_DC2       | LC_DC4 | LC_DC1       |
|------|----------------------|--------------|--------------|--------------|--------------|--------|--------------|
|      | January              | 11.9         | -            | -            | -            | -      | 13.8         |
|      | February             | -            | -            | -            | -            | -      | -            |
|      | March                | 12.5         | -            | -            | -            | -      | -            |
|      | April                | 13.8         | -            | -            | -            | -      | 16.6         |
|      | May                  | 11.7         | -            | -            | 12.1         | -      | 12.4         |
| 2012 | June<br>July         | 11.8<br>10.7 | -            | -            | 11.4<br>10.1 | -      | 11.8<br>10.4 |
|      | August               | 10.7         | -            | -            | 9.8          | -      | 9.5          |
|      | September            | 10.0         | -            | -            | 10.0         | -      | 10.6         |
|      | October              | 10.7         | _            | _            | 11.3         | _      | 11.8         |
|      | November             | 9.9          | _            | -            | 11.4         | -      | 11.3         |
|      | December             | 10.2         | -            | -            | -            | -      | 12.2         |
|      | January              | 11.2         | -            | -            | -            | -      | 11.4         |
|      | February             | 10.6         | -            | -            | -            | -      | -            |
|      | March                | 11.2         | -            | -            | -            | -      | -            |
|      | April                | 10.7         | -            | -            | 11.8         | -      | 11.8         |
|      | May                  | 12.7         | -            | -            | 12.8         | -      | 13.3         |
| 2013 | June                 | 10.8         | -            | -            | 10.6         | -      | 10.9         |
|      | July                 | 10.9         | -            | -            | 10.1         | -      | 10.2         |
|      | August<br>September  | 10.4<br>9.9  | -            | -            | 9.8<br>9.5   | -      | 9.9          |
|      | October              | 9.9          | -            | -            | 9.5          | -      | 10.3         |
|      | November             | 10.0         |              | 11.9         | 11.3         | -      | 11.6         |
|      | December             | 10.8         | -            | 12.0         | -            | -      | 12.2         |
|      | January              | 9.6          | -            | 11.2         | -            | -      | -            |
|      | February             | 10.5         | -            | -            | -            | -      | -            |
|      | March                | 8.2          | -            | 12.2         | -            | -      | 12.4         |
|      | April                | 8.7          | -            | 11.5         | -            | -      | 11.2         |
|      | May                  | 12.4         | -            | 12.7         | -            | -      | 12.9         |
| 2014 | June                 | 11.3         | -            | 10.8         | -            | -      | 10.8         |
| 2011 | July                 | 9.6          | -            | 10.5         | -            | -      | 10.2         |
|      | August               | 10.8         | -            | 10.1         | -            | -      | 10.1         |
|      | September            | 11.5         | -            | 12.1         | -            | -      | 11.9         |
|      | October<br>November  | 10.1<br>9.8  | 12.6         | 10.8<br>11.4 | -            | -      | 10.9<br>11.5 |
|      | December             | 1.6          | 7.0          | 5.9          | -            | -      | -            |
|      | January              | 11.3         | -            | 12.1         | -            | -      | -            |
|      | February             | 10.0         | 11.0         | -            | _            | -      | _            |
|      | March                | 9.4          | 11.8         | 11.7         | -            | -      | 13.2         |
|      | April                | 12.5         | 12.2         | 12.3         | -            | -      | 12.3         |
|      | May                  | 10.7         | 10.9         | 10.6         | -            | -      | 11.4         |
| 2015 | June                 | 11.2         | 9.9          | 9.7          | -            | -      | 10.3         |
| 2010 | July                 | 11.6         | 8.5          | 9.0          | -            | -      | 10.0         |
|      | August               | 10.1         | 7.3          | 8.4          | -            | -      | 9.7          |
|      | September            | 10.6         | 9.9          | 9.9          | -            | -      | 10.7         |
|      | October              | 10.4         | 9.7          | 10.4         | -            | -      | 10.4         |
|      | November<br>December | 10.5<br>10.2 | 10.8<br>11.7 | 11.0<br>11.5 | -            | -      | 12.0<br>11.6 |
|      | January              | 9.9          | 11.7         | 11.5         | -            | -      | 11.1         |
|      | February             | 10.1         | 10.7         | 9.3          | -            | -      | 8.2          |
|      | March                | 13.0         | 12.6         | 12.9         | -            | -      | 12.4         |
|      | April                | 12.3         | 11.3         | 11.2         | -            | -      | 11.4         |
|      | May                  | 11.9         | 10.8         | 11.0         | -            | -      | 11.3         |
| 2016 | June                 | 11.1         | 9.4          | 9.6          | -            | -      | 10.8         |
| 2010 | July                 | 11.1         | 8.6          | 9.3          | -            | -      | 10.5         |
|      | August               | 10.2         | 7.5          | 7.9          | -            | -      | 10.1         |
|      | September            | 10.9         | 8.7          | 8.7          | -            | -      | 10.5         |
|      | October              | 9.5          | 9.8          | 10.2         | -            | -      | 11.0         |
|      | November<br>December | 10.0<br>11.6 | 11.2<br>10.3 | 10.8<br>11.9 | -            | -      | 11.0<br>13.1 |
|      | January              | 11.0         | 10.3         | 12.3         | -            | -      | 12.4         |
|      | February             | 11.1         | 13.6         | 12.6         | -            | -      | 12.4         |
|      | March                | 11.3         | 10.4         | 10.5         | -            | -      | 11.5         |
|      | April                | 12.6         | 12.3         | 12.4         | -            | -      | 11.9         |
|      | May                  | 11.6         | 11.4         | 11.4         | -            | -      | 11.4         |
| 2047 | June                 | 10.4         | 11.4         | 10.1         | -            | -      | 10.3         |
| 2017 | July                 | 8.9          | 8.2          | 8.1          | -            | -      | 9.8          |
|      | August               | 10.5         | 7.9          | 8.5          | -            | -      | 10.1         |
|      | September            | 10.5         | 9.1          | 9.8          | -            | -      | 12.0         |
|      | October              | 10.0         | 10.7         | 10.8         | -            | -      | 11.7         |
|      | November             | 10.1         | 12.2         | 12.3         | -            | -      | 12.0         |
|      | December             | 10.5         | 10.9         | 11.4         | -            | -      | 12.2         |

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

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

Table G.1: Monthly Mean Dissolved Oxygen Concentrations (mg/L) in Dry Creek, 2012 to 2022

| Year | Month     | LC_DCEF | LC_SPDC | LC_DCDS | LC_DC2 | LC_DC4 | LC_DC1 |
|------|-----------|---------|---------|---------|--------|--------|--------|
|      | January   | 10.1    | 10.0    | 9.8     | -      | -      | 9.7    |
|      | February  | 10.6    | 11.5    | 11.6    | -      | -      | 11.8   |
|      | March     | 10.3    | 11.6    | 11.6    | -      | -      | 11.6   |
|      | April     | 11.4    | 12.3    | 12.1    | -      | -      | 12.2   |
|      | May       | 11.9    | 10.2    | 11.2    | -      | -      | 11.4   |
| 2018 | June      | 10.5    | 9.2     | 9.5     | -      | -      | 10.4   |
| 2010 | July      | 11.6    | 9.1     | 9.4     | -      | -      | 11.0   |
|      | August    | 10.4    | 8.6     | 8.9     | -      | -      | 10.6   |
|      | September | 10.4    | 9.3     | 9.3     | -      | -      | 10.8   |
|      | October   | 10.9    | 11.4    | 11.4    | -      | -      | 11.9   |
|      | November  | 10.3    | 11.3    | 11.6    | 11.8   | 11.0   | 11.7   |
|      | December  | 10.5    | 12.1    | 12.1    | -      | 11.2   | 12.6   |
|      | January   | 10.4    | 10.5    | 12.8    | 7.5    | 11.4   | 12.1   |
|      | February  | 11.7    | 10.9    | 12.0    | 8.0    | 11.4   | 13.2   |
|      | March     | 14.3    | 14.3    | 17.5    | 16.1   | 15.5   | 15.9   |
|      | April     | 11.3    | 11.7    | 11.9    | 11.9   | 11.7   | 11.9   |
|      | May       | 10.2    | 10.5    | 11.4    | 10.9   | 11.1   | 11.0   |
| 2019 | June      | 11.1    | 10.1    | 10.5    | 10.7   | 10.8   | 10.7   |
| 2019 | July      | 10.3    | 9.4     | 9.7     | 10.2   | 10.2   | 10.3   |
|      | August    | 10.4    | 8.9     | 9.0     | 9.6    | 10.5   | 10.6   |
|      | September | 10.5    | 9.3     | 9.4     | 10.0   | 10.4   | 11.0   |
|      | October   | 10.5    | 11.2    | 11.3    | 11.3   | 11.3   | 11.9   |
|      | November  | 10.5    | 11.8    | 11.7    | 11.6   | 11.3   | 12.3   |
|      | December  | 10.9    | 13.1    | 12.7    | 13.3   | 12.4   | 13.2   |
|      | January   | 10.8    | 11.7    | 11.8    | 11.9   | 11.7   | 12.1   |
|      | February  | 11.1    | 11.8    | 12.2    | -      | -      | 12.3   |
|      | March     | 11.1    | 12.0    | 12.1    | 12.1   | 11.5   | 12.1   |
|      | April     | 10.7    | 11.8    | 11.9    | 11.7   | 11.6   | 11.7   |
|      | May       | 11.9    | 11.1    | 10.9    | 11.8   | 11.3   | 11.3   |
| 2020 | June      | 11.1    | 10.4    | 10.4    | 11.0   | 10.8   | 10.7   |
| 2020 | July      | 10.7    | 10.1    | 10.4    | 10.5   | 10.8   | 10.7   |
|      | August    | 10.5    | 9.1     | 9.0     | 9.2    | 9.8    | 10.1   |
|      | September | 10.1    | 10.7    | 10.8    | 10.3   | 10.6   | 11.0   |
|      | October   | 10.6    | 11.5    | 11.6    | 11.6   | 11.2   | 11.8   |
|      | November  | 10.5    | 12.3    | 11.9    | 11.9   | 11.2   | 11.8   |
|      | December  | 10.9    | 12.1    | 12.1    | 12.0   | 11.4   | 12.0   |
|      | January   | 10.8    | 12.0    | 12.1    | 11.8   | 11.5   | 12.2   |
|      | February  | 10.7    | 11.9    | 12.4    | 12.0   | 11.5   | 12.0   |
|      | March     | 11.1    | 11.3    | 11.4    | 11.2   | 10.6   | 11.3   |
|      | April     | 10.3    | 11.3    | 11.8    | 11.7   | 11.6   | 11.6   |
|      | May       | 10.6    | 10.7    | 10.9    | 11.2   | 11.0   | 11.0   |
| 0004 | June      | 10.3    | 9.8     | 9.8     | 9.7    | 10.0   | 9.8    |
| 2021 | July      | 10.0    | 9.2     | 9.2     | 9.4    | 9.9    | 9.8    |
|      | August    | 10.2    | 9.8     | 9.9     | 10.0   | 10.1   | 10.2   |
|      | September | 10.3    | 10.6    | 10.8    | 10.8   | 10.6   | 10.8   |
|      | October   | 10.6    | 11.2    | 11.4    | 11.6   | 11.1   | 11.4   |
|      | November  | 10.8    | 11.7    | 11.7    | 11.9   | 11.3   | 11.8   |
|      | December  | 10.6    | 11.5    | 11.6    | 11.5   | 11.3   | 11.8   |
|      | January   | 10.5    | 11.7    | 11.8    | 11.7   | 12.0   | 11.6   |
|      | February  | 11.1    | 12.0    | 11.9    | 12.1   | 11.7   | 12.0   |
|      | March     | 11.0    | 12.0    | 12.0    | 12.0   | 11.7   | 12.0   |
|      | April     | 11.8    | 12.1    | 12.1    | 12.0   | 12.2   | 12.1   |
|      | May       | 10.5    | 11.0    | 10.7    | 11.1   | 11.0   | 11.2   |
| _    | June      | 11.2    | 10.9    | 10.9    | 11.0   | 10.9   | 11.0   |
| 2022 | July      | 10.9    | 9.9     | 9.9     | 10.2   | 10.2   | 10.2   |
|      | August    | 10.4    | 10.2    | 10.1    | 10.3   | 10.3   | 10.4   |
|      | September | 10.6    | 10.5    | 10.6    | 10.6   | 10.7   | 10.4   |
|      | October   | 10.6    | 11.1    | 11.1    | 11.1   | 10.7   | 11.2   |
|      | November  | 11.4    | 12.0    | 12.2    | 12.3   | 12.0   | 12.4   |
|      | December  | 11.4    | 12.3    | 12.2    | 12.5   | 12.0   | 12.4   |
|      | December  | 11.1    | 12.3    | 12.2    | 12.0   | IZ.U   | 12.1   |

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

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

# APPENDIX H BIOTRIGGERS

#### **BIOLOGICAL TRIGGERS APPENDIX H**

| H1.  | INTRODUCTION                                  | 1 |
|------|---|---|
| H1.1 | Background                                    | 1 |
| H2.1 | METHODS  Overview  Percent EPT                | 3 |
|      | Benthic Invertebrate Tissue Selenium (BIT Se) |   |
| H3.1 | Percent EPT                                   | 6 |
| H4.  | SUMMARY                                       | 7 |
| H5.  | REFERENCES                                    | 8 |

# **H1 INTRODUCTION**

#### H1.1 Background

Biological triggers were developed and implemented to assist with identifying and communicating unexpected and potentially important changes in aquatic ecosystem conditions and are required as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Biological triggers were developed in consultation with the Environmental Monitoring Committee (EMC) for a subset of the biological monitoring endpoints that are effective indicators of changes at the ecosystem level. The purpose of the biological triggers is to quickly identify biological monitoring areas where unexpected biological conditions may be occurring that may require management action. Additionally, information provided from the analysis of biological triggers may lead to responses under the AMP response framework.

Draft biological triggers were developed in the 2018 AMP (Teck 2018) under Management Question 5, with these initially reported on in 2021 in the 2020 Local Aquatic Effects Monitoring Program (LAEMP) reports and Regional Aquatic Effects Monitoring Program (RAEMP) data package, and summarized in the 2020 Annual AMP Report (Teck 2021a). When the 2018 AMP was approved, there was an expectation that the 2018 AMP draft/interim biological triggers would be finalized, through engagement with the EMC, prior to December 15, 2021 AMP Update. The biological triggers were finalized in 2021 (Teck 2021b) and the methods applied in this report reflect the finalized biological triggers (Teck 2021b). It is important to note that the process and/or biological triggers may adjust over time as the purpose of the biological triggers is to be reflective of not only changes in the Elk Valley, but also the current state of knowledge in the area.

The finalized biological triggers (Teck 2021b) include three measurement endpoints:

- Percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera) based on travelling kick samples (Canadian Aquatic Biomonitoring Network (CABIN) protocol.
- Benthic invertebrate tissue selenium (BIT Se) generally several replicates collected per location per sampling event, where each replicate is a composite sample of invertebrates (i.e. composite-taxa sample).
- Westslope cutthroat trout muscle tissue selenium (WCT Se) generally eight samples collected per location per sampling event, where each sample is taken from a single fish.

Evaluation of these three biological trigger endpoints is complementary to the fulsome evaluation of biological endpoints that is integrated into the LAEMP and the RAEMP data

evaluations. The fulsome evaluation of biological endpoints is used to support answering the specific LAEMP and RAEMP study questions through the consideration of not only the endpoints used in the biological trigger evaluation, but also a full suite of additional biological, chemical, and physical endpoints. Biological triggers do not provide information on cause and effect, report on trends, or feed directly into decision-making processes. Instead, the biological triggers act to flag areas for further evaluation, which would then take place under existing monitoring programs, through the development of supporting studies or through the response framework, as necessary.

Biological monitoring data are compared to triggers annually, and summaries of the LAEMP and RAEMP trigger evaluations and responses are summarized within annual AMP reports.

## **H2 METHODS**

#### H2.1 Overview

As outlined in Section H1.1, analyses for biological triggers are meant to be complementary to other analyses conducted in the LAEMPs and RAEMP. For the 2022 LCO Dry Creek LAEMP, biological trigger analyses only included two of the three measurement endpoints (%EPT and BIT Se).

For the purpose of application of the biological triggers, expectations for the endpoints evaluated (%EPT and BIT Se) were based on projected water quality, not on measured water quality. Thus, the triggers should detect biological results that were unexpected, regardless of whether those results were due to unexpected water quality or due to unexpected relationships between water quality and biological endpoints. Biological triggers were therefore only applied at locations where water quality projections were available, which for this study were mine-exposed areas LC\_DCDS and LC\_DC1. Although data for other areas studied under the LCO Dry Creek LAEMP (i.e., LC\_DCEF, LC\_DC3, LC\_DC2, LC\_DC4, LC\_FRUS, LC\_FRB, and LC\_GRCK) were not evaluated relative to biological triggers, they were assessed as part of the main LCO Dry Creek LAEMP report.

Detailed methods associated with the evaluation of data associated with each of the applicable biological triggers are provided below.

#### H2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of the habitat-adjusted normal range (2.5th percentile). Up-to-date limits for normal ranges¹ are provided in the RAEMP and LAEMPs, where they are recalculated when new data become available (Teck 2019). The derivation of habitat-adjusted normal ranges is described in Appendix J of the 2020 RAEMP, and was based on consideration of more than 30 habitat, (geographic information system) GIS, and land cover variables (Minnow 2020).
- Expectations: The lower limit of the range of %EPT corresponds to the predicted Aquatic Data Integration Tool (ADIT) score. The predicted ADIT scores correspond to potential effects on benthic invertebrate community (BIC) endpoints, based on relationships between water quality projections (for nitrate, sulphate and cadmium)<sup>2</sup>

<sup>&</sup>lt;sup>2</sup> Selenium was not included because selenium effects on BIC endpoints are not expected. Projections were based on the highest maximum monthly mean across all flow scenarios (low, average, and high).



<sup>&</sup>lt;sup>1</sup> The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021).

and invertebrate toxicity endpoints originally developed for the Elk Valley Water Quality Plan (EVWQP: Teck 2014; Golder 2020a). A predicted ADIT score of 3 corresponds to 50% or greater effects to reproduction of the water flea Ceriodaphnia dubia. 2 corresponds to effects in 20 to 50% of organisms, 1 corresponds to effects in 10 to 20% of organisms, and 0 corresponds to effects in 10% or fewer organisms. Once %EPT is actually measured, the measured results are converted to an ADIT score in relation to the habitat adjusted normal range as follows: an ADIT score of 0 corresponds to expected %EPT ≥ the 10th percentile of the habitat-adjusted normal range; an ADIT score of 1 corresponds to expected %EPT between the 10th percentile and the 2.5th percentile of the habitat-adjusted normal range (and is therefore identical in application to the lower limit of normal range); an ADIT score of 2 corresponds to expected %EPT between the 2.5th percentile and half of the 2.5th percentile of the habitat-adjusted normal range; and finally, an ADIT score of 3 corresponds to expected %EPT ≤ half of the 2.5th percentile and ≥ 0. Individual replicate habitat-adjusted normal ranges were used at each location for establishing the %EPT limits associated with each ADIT score (replicates were evaluated individually). In summary, this component of the biological trigger for %EPT asks whether the ADIT score - calculated based on measured %EPT relative to normal ranges – is greater than the ADIT score that was predicted based on water quality projections.

Benthic invertebrate community data for %EPT collected in the fall (September) for the 2022 LCO Dry Creek LAEMP were included in the biological trigger analysis.

#### H2.3 Benthic Invertebrate Tissue Selenium (BIT Se)

Data for BIT Se were compared to:

- Normal range: The upper limit of the regional normal range (97.5th percentile) for individual replicates. Up-to-date limits of normal ranges<sup>3</sup> are provided in the RAEMP and LAEMPs, where they are recalculated when new data become available (Teck 2019).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT Se bioaccumulation model for lotic environments. The model originally developed in the EVWQP (Golder 2014) was updated (Golder 2020b) and the updated data set was used to calculate prediction intervals for individual replicates. Methods for estimating the upper limit of the 95% prediction for BIT Se (given any projected value of aqueous selenium) are discussed further in the Biological Trigger Development for the Elk Valley Adaptive Management Plan (Azimuth 2021).

<sup>&</sup>lt;sup>3</sup> The normal range will be updated as part of the three-year reporting cycle of the RAEMP (Minnow 2021).



Benthic invertebrate tissue selenium data from sampling events completed throughout 2022 for the LCO Dry Creek LAEMP (May, June, September, November) were included in the biological trigger analysis although normal range information is based on fall (September) information.

Although EVWQP effects benchmarks are not part of the trigger, they are relevant for interpreting potential significance and responses. Consequently, the level 1, 2 and 3 EVWQP benchmarks for the most sensitive receptor (juvenile fish via dietary exposure) are included in benthic invertebrate tissue plots (11, 18 and 26 mg/kg respectively).

# H3 RESULTS

#### H3.1 Percent EPT

Individual replicates for the %EPT endpoint for both mine-exposed areas (LC\_DCDS and LC\_DC1) evaluated in the LCO Dry Creek LAEMP were assessed against their respective biological trigger values for the September sampling period (Table H.1, Figure H.1). Each replicate evaluated from LC\_DCDS (n=5) and LC\_DC1 (n=3) was below the biological trigger values (Table H.1, Figure H.1).

#### H3.2 Benthic Invertebrate Tissue Selenium (BIT Se)

Benthic invertebrate tissue selenium concentrations at LC\_DCDS and LC\_DC1 were assessed against their respective biological triggers for individual replicates from each of the sampling events, (May, June, September, and November [only LC\_DCDS]; Table H.2, Figure H.2). two replicates in May at LC\_DC1 exceeded the biological trigger for BIT Se. Of the 20 samples evaluated in 2022 at LC\_DCDS, three exceeded the biological trigger (12.1 mg/kg dw) with BIT Se concentrations of 15 mg/kg dw (two replicates in September and one in November). Of the 15 samples evaluated in 2022 at LC\_DC1, two exceeded the biological trigger (12.0 mg/kg dw) in May, with BIT Se concentrations ranging from 12 to 14 mg/kg dw (Table H.2, Figure H.2).

## **H4 SUMMARY**

All the benthic invertebrate community samples from LC\_DC1 and LC\_DCDS were below the biological trigger values for %EPT. Previously, all %EPT samples were above the biological trigger value (2021 Dry Creek LAEMP; Minnow 2022); the Dry Creek LAEMP will continue monitoring at these sites, with the support of the results of this biological triggers analysis. Efforts to resolve uncertainty around the combined and individual effects of water quality, habitat, and other mine-related stressors on benthic invertebrate communities in lotic areas in the Elk River watershed are underway as Minnow is developing a predictive model for benthic invertebrate community endpoints. Uncertainties are expected to be reduced through these efforts, and additional monitoring or potential management responses will continue to be assessed through the adaptive management process.

Two replicates in September and one replicate in November at LC\_DCDS and two replicates from May from LC\_DC1 exceeded the biological trigger for benthic invertebrate tissue selenium concentrations. The higher frequency and magnitude of exceedances at LC\_DCDS are likely related to its proximity to the DCWMS discharge, while further downstream at LC\_DC1 benthic invertebrate tissue selenium concentrations exceeded the biological trigger values slightly less frequently and at a lower magnitude. The biological trigger exceedance for benthic invertebrate tissue selenium concentrations at these areas is likely the result of enhanced selenium bioaccumulation due to the generation of more bioavailable organoselenium in the DCWMS sedimentation ponds (see main report). Mitigation steps were implemented in 2022 to address the elevated benthic invertebrate tissue selenium concentrations observed in the LCO Dry Creek LAEMP. These measures appear to have helped reduce the overall number of biological trigger exceedances in both of these areas in 2022 compared to 2021 (Minnow 2022). Overall, current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, and no additional triggers are recommended at this time.

## **H5 REFERENCES**

- Azimuth (Azimuth Consulting Group Inc). 2021. Development of biological triggers for the Elk Valley Adaptive Management Plan.
- Golder (Golder Associates). 2014. Benchmark Derivation Report for Selenium. Annex E of the Elk Valley Water Quality Plan. Prepared for Teck Coal Limited. July.
- Golder. 2020a. User's Manual Aquatic Data Integration Tool (ADIT) for the Elk Valley. Prepared for Teck Coal Ltd. 15 September 2020.
- Golder. 2020b. Updates to the lotic and lentic statistical bioaccumulation models for selenium in the Elk Valley. Technical memorandum to Teck Coal Limited. 27 November 2020.
- Minnow (Minnow Environmental Inc). 2020. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2017 to 2019. Prepared for Teck Coal Limited, Sparwood, BC. November. Project 187202.0011.
- Minnow. 2021. Study Design for the Regional Aquatic Effects Monitoring Program, 2021 to 2023. Prepared for Teck Coal Limited, Sparwood, BC. March. Project 207202.0006.
- Minnow. 2022. Line Creek Operation's Local Aquatic Effects Monitoring Program (LAEMP) Report for Dry Creek, 2021. Prepared for Teck Coal Ltd., Sparwood, BC. Project #217202.0035. May 2022
- Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.
- Teck. 2018. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. December 21, 2018.
- Teck. 2019. Elk Valley Water Quality Plan 2019 Implementation Plan Adjustment. July 2019.
- Teck. 2021a. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley 2021 Update. Prepared by Teck Coal Limited. December 15, 2021.
- Teck. 2021b. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley 2020 Annual Report. Prepared by Teck Coal Limited. July 31, 2021.

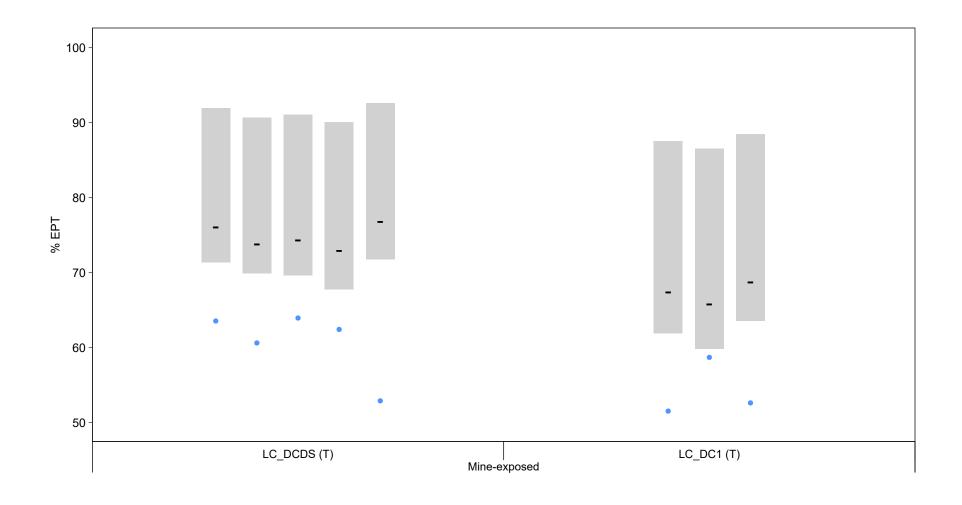


Figure H.1: Biological Trigger Analysis for % EPT Compared to Predicted Values, Dry Creek LAEMP, September 2022

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

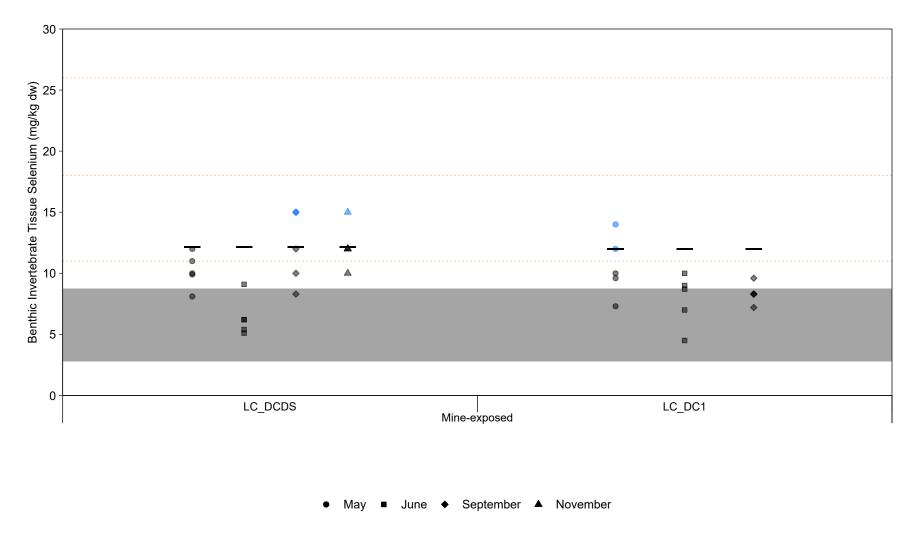


Figure H.2: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples Compared to Predicted Values, Dry Creek LAEMP, 2022

Notes: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Blue dots represent values exceeding the trigger (above the 97.5th percentile of normal range and above upper 95% prediction interval). Dotted lines indicate EVWQP benchmarks (11, 18, and 26 mg/kg respectively) for juvenile fish. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Samples were not collected from LC\_DC1 in November due to ice conditions.

Table H.1: Biological Trigger Analysis for %EPT in Dry Creek, September 2022

| Waterbody | Exposure | Туре | Area    | Replicate | Reported<br>Value | ADIT<br>Value | Lower 2.5th<br>Percentile of the<br>Habitat Adjusted<br>Normal Range |
|-----------|----------|------|---------|-----------|-------------------|---------------|--|
|           |          |      |         | 1         | 63.5              | 76.0          | 71.4   |
|           |          |      |         | 2         | 60.6              | 73.8          | 69.9   |
|           |          |      | LC_DCDS | 3         | 64.0              | 74.3          | 69.6   |
| Dry Crook | Mine-    | Т    |         | 4         | 62.4              | 72.9          | 67.8   |
| Dry Creek | exposed  | I    |         | 5         | 52.9              | 76.8          | 71.8   |
|           |          |      |         | 1         | 51.5              | 67.4          | 61.9   |
|           |          |      | LC_DC1  | 2         | 58.7              | 65.8          | 59.8   |
|           |          |      |         | 3         | 52.6              | 68.7          | 63.5   |

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

Note: T = Tributary.

Table H.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples in Dry Creek, May to November 2022

|           |                  |                |         |           |   | Benthic In                                  | vertebrate Selenii  | um Tissue  |
|-----------|------------------|----------------|---------|-----------|---|---|---|--|
| Wate      | rbody            | Stream<br>Type | Area    | Date      | Predicted Selenium<br>Water Concentration<br>(mg/L) | Upper 95%<br>Prediction Limit<br>(mg/kg dw) | Upper 97.5th<br>Percentile of<br>Normal Range<br>(mg/kg dw)   | Reported<br>Concentration<br>(mg/kg dw)  |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 11.0   |
|           |                  |                |         |           | 7.03  | 12.1  | Percentile of Normal Range (mg/kg dw)   | 12.0   |
|           |                  |                |         | 10-May-22 | 7.03  | 12.1  | 8.74  | 9.90   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 10.0   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 8.10   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | Reported Concentration (mg/kg dw)  11.0 12.0 9.90 10.0 8.10 5.40 6.20 5.10 9.10 6.20 15.0 10.0 12.0 8.30 15.0 12.0 12.0 12.0 12.0 12.0 12.0 10.0 12.0 12   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74     5.10       8.74     9.10       8.74     6.20       8.74     15.0       8.74     10.0       8.74     12.0   | 6.20   |
|           |                  |                |         | 20-Jun-22 | 7.03  | 12.1  | 8.74  | 5.10   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 9.10   |
|           |                  |                | LC_DCDS |           | 7.03  | 12.1  | 8.74  | 6.20   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 15.0   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 10.0   |
|           |                  |                |         | 13-Sep-22 | 7.03  | 12.1  | 2.1     8.74     5.10       2.1     8.74     9.10       2.1     8.74     6.20       2.1     8.74     15.0       2.1     8.74     10.0       2.1     8.74     12.0       2.1     8.74     8.30       2.1     8.74     15.0       2.1     8.74     15.0       2.1     8.74     12.0       2.1     8.74     12.0       2.1     8.74     10.0       2.1     8.74     10.0       2.1     8.74     12.0 |  |
|           |                  |                |         |           | 7.03  | 12.1  |   |  |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 15.0   |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  | 15.0   |
|           | N. Albara        |                |         |           | 7.03  | 12.1  | 8.74  | 12.0   |
| Dry Creek | Mine-<br>Exposed | Т              |         | 30-Nov-22 | 7.03  | 12.1  | 8.74  | 12.0   |
|           | Lxposed          |                |         |           | 7.03  | 12.1  | 8.74  | Reported Concentration (mg/kg dw)  8.74  |
|           |                  |                |         |           | 7.03  | 12.1  | 8.74  |  |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  |  |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 14.0   |
|           |                  |                |         | 11-May-22 | 5.86  | 12.0  | 8.74  | 12.0   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | Concentration (mg/kg dw)   11.0   12.0   9.90   10.0   8.10   5.40   6.20   5.10   9.10   6.20   15.0   10.0   12.0   8.30   15.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   12.0   10.0   12.0   7.30   14.0   12.0   9.60   10.0   10.0   8.70   7.00   9.00   4.50   8.30   7.20   8.30   8 |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 10.0   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | (mg/kg dw)  11.0  12.0  9.90  10.0  8.10  5.40  6.20  5.10  9.10  6.20  15.0  10.0  12.0  8.30  15.0  12.0  12.0  12.0  12.0  10.0  12.0  7.30  14.0  12.0  9.60  10.0  10.0  8.70  7.00  9.00  4.50  8.30  7.20  8.30  8.30   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 8.70   |
|           |                  |                | LC_DC1  | 21-Jun-22 | 5.86  | 12.0  | 8.74  | 7.00   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 9.00   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 4.50   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 8.30   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 7.20   |
|           |                  |                |         | 12-Sep-22 | 5.86  | 12.0  | 8.74  | 8.30   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 8.30   |
|           |                  |                |         |           | 5.86  | 12.0  | 8.74  | 9.60   |

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

Note: T = Tributary. Samples were not collected from LC\_DC1 in November due to ice conditions.

# APPENDIX I SUPPORTING INFORMATION

Table I.1: Visual Periphyton Coverage Scores from Dry Creek, Fording River, and Grace Creek, 2022

|              |               | Dielogical              |           |   |   | Station |   |   |        |                                 |   |   |   |   |   |   |   |
|--------------|---------------|-------------------------|-----------|---|---|---------|---|---|--------|---------------------------------|---|---|---|---|---|---|---|
| Aı           | rea           | Biological<br>Area Code | Date      | 1 | 2 | 3       | 4 | 5 | Mean   | Standard Deviation              |   |   |   |   |   |   |   |
| Reference    | Dry Creek     | LC_DCEF                 | 13-Sep-22 | 3 | 3 | 3       | - | - | 3      | 0                               |   |   |   |   |   |   |   |
|              |               | LC_DC3                  | 13-Sep-22 | 2 | 2 | 2       | - | - | 2      | 0                               |   |   |   |   |   |   |   |
|              |               | LC DCDS                 | 10-May-22 | 2 | 2 | 2       | 2 | 2 | 2      | 0                               |   |   |   |   |   |   |   |
|              | Dry Crook     | LC_DCD3                 | 13-Sep-22 | 2 | 2 | 2       | 2 | 2 | 2      | 0                               |   |   |   |   |   |   |   |
|              | Dry Creek     | LC_DC4                  | 12-Sep-02 | 3 | 3 | 3       | - | - | 3      | 0<br>0<br>0<br>0<br>0<br>0<br>0 |   |   |   |   |   |   |   |
| Mine-exposed |               |                         |           |   |   |         |   |   | LC_DC2 | 14-Sep-22                       | 3 | 3 | 3 | - | - | 3 | 0 |
|              |               | LC_DC1                  | 12-Sep-22 | 3 | 3 | 3       | - | - | 3      | 0                               |   |   |   |   |   |   |   |
|              | Fording Divor | LC_FRUS                 | 10-Sep-22 | 2 | 2 | 2       | - | - | 2      | 0                               |   |   |   |   |   |   |   |
|              | Fording River | LC_FRB                  | 10-Sep-22 | 2 | 2 | 2       | - | - | 2      | 0                               |   |   |   |   |   |   |   |
|              | Grace Creek   | LC_GRCK                 | 14-Sep-22 | 2 | 2 | 2       | - | - | 2      | 0                               |   |   |   |   |   |   |   |

Note: "-" indicates data not collected.

Periphyton Coverage Scores (Environment Canada, 2012):

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

Table I.2: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling, 2022

|         |                 | Replicate |                            | 1     | 2     | 3        | 4      | 5            | Mean   |
|---------|-----------------|-----------|----------------------------|-------|-------|----------|--------|--------------|--------|
|         | Date            | LC_[      |                            |       |       | ·        | ·<br>I |              | 1      |
|         |                 |           | Depth (cm)                 | 24    | 26    | 21       | 20     | 14           | 21     |
|         |                 | _         |                            | 0.21  | 1.084 |          | 0.149  | 0.145        | 0.3356 |
|         | Date   LC_CCCS  | 1         | , ,                        |       |       |          |        |              | -      |
|         |                 |           | . ,                        |       |       |          |        |              | -      |
|         |                 |           | ,                          | 47    | 05.5  |          | 0.5    | 00.5         | -      |
|         |                 |           | 32.5                       | 28.7  |       |          |        |              |        |
|         |                 | 0.651     | 0.845                      |       |       |          |        |              |        |
|         |                 | 2         | ` ,                        |       |       |          |        |              | -      |
|         |                 |           | · /                        |       |       |          |        |              | -      |
| g       |                 |           | . , ,                      | 17    | 30    |          | 41     | 37           | 31     |
| ose     | -22             |           | ,                          |       |       |          |        | 0.142        | 0.5984 |
| d<br>X: | lay             | 3         | - ' '                      | 0.0   | 0.00. |          |        | <b>311.1</b> | -      |
| e-E     |                 |           | , ,                        |       |       | 2.8      |        |              | -      |
| Mir     | ~               |           | Bankfull-Wetted Depth (cm) |       |       | -        |        |              | -      |
|         |                 |           | Depth (cm)                 | 24.5  | 22.6  | 20.8     | 29     | 18.7         | 23.12  |
|         |                 |           | - ' '                      | 0.633 | 1.005 |          | 0.987  | 0.057        | 0.6758 |
|         |                 | 4         | , ,                        |       |       |          |        |              | -      |
|         |                 |           | . ,                        |       |       | 3.6      |        |              | -      |
|         |                 |           | . , ,                      |       |       |          |        |              | -      |
|         |                 |           | . , ,                      |       |       |          |        | 27           | 26.8   |
|         |                 | E         | - ' '                      | 0.895 | 1.424 |          | 1.046  | 0.753        | 0.8904 |
|         |                 | 5         | , ,                        |       |       |          |        |              | -      |
|         |                 |           |                            |       |       |          |        |              | -      |
|         |                 | 10        |                            |       |       | -        |        |              | -      |
|         |                 |           | _                          | 17    | 15    | 14.5     | 10     | 7            | 12.7   |
|         |                 |           |                            |       |       |          |        | 0.508        | 0.4776 |
|         |                 | 1         | - ' '                      |       |       |          |        |              | -      |
|         |                 |           | · ,                        |       |       | 3.6      |        |              | -      |
| 70      | - l             |           | Bankfull-Wetted Depth (cm) |       |       | 20       |        |              | -      |
| se      | 22              |           | Depth (cm)                 | 9     | 21    | 13       | 13     | 17           | 14.6   |
| λpc     | ,-de            |           |                            | 0.275 | 0.472 |          | 1.476  | 0.014        | 0.5886 |
| Щ<br>К  | Ϋ́              | 2         | Bankfull Width (m)         |       |       |          |        |              | -      |
| ¶in€    | 12              |           | . ,                        |       |       | 3.4      |        |              | -      |
|         |                 |           |                            |       |       | -        |        |              | -      |
|         |                 |           | . , ,                      |       |       |          |        | 9            | 11.6   |
|         |                 | 2         | - ' '                      | 0.39  | 0.469 |          | 0.551  | 0.61         | 0.4554 |
|         |                 | 3         | ` '                        |       |       |          |        |              | -      |
|         |                 |           | ` '                        |       |       |          |        |              | -      |
| -       |                 | IC        |                            |       |       |          |        |              | _      |
|         |                 |           |                            | 12    | 9     | 25       | 23     | 17           | 17.2   |
|         |                 |           | • • •                      |       |       |          |        | 0.425        | 0.5134 |
|         |                 | 1         | - ' '                      |       |       |          |        |              | -      |
|         |                 |           |                            |       |       | -        |        |              | -      |
| р       |                 |           | Bankfull-Wetted Depth (cm) |       |       | -        |        |              | -      |
| ose     | 22              |           | . , ,                      |       |       |          |        | 9            | 10.8   |
| xpc     | de<br>de        |           | - ' '                      | 0.463 | 0.081 |          | 0.316  | 0.019        | 0.3024 |
| e-E     | <del>1</del> -S | 2         | ` '                        |       |       |          |        |              | -      |
| ۸in     | 1,              |           |                            |       |       |          |        |              | -      |
|         |                 |           |                            |       | _     |          |        | 4.0          | -      |
|         |                 |           | . , ,                      |       |       |          |        | 18           | 9      |
|         |                 | 2         | - ' '                      | 0.032 | 0.136 |          | 0.881  | 0.226        | 0.2776 |
|         |                 | 3         | ` '                        |       |       |          |        |              | -      |
|         |                 |           |                            |       |       | J.1<br>- |        |              | _      |
|         |                 | I.C.      |                            |       |       | -        |        |              |        |
|         |                 |           |                            | 10    | 6     | 7        | 16     | 4            | 8.6    |
|         |                 |           | • • •                      |       |       |          |        | 0.291        | 0.0724 |
|         |                 | 1         | - ' '                      |       |       |          |        | 1            | -      |
|         |                 |           | ` '                        |       |       |          |        |              | -      |
| р       |                 |           | ` '                        |       |       | 12       |        |              | -      |
| ose     | 22              |           | . , ,                      |       |       |          |        | 16           | 17     |
| хdх     | -də             |           | -                          | 0.08  | 0.02  |          | 0.566  | 0.756        | 0.361  |
| e-E     | 3-8             | 2         | ` ,                        |       |       |          |        |              | -      |
| ۸in     | 7               |           | ` '                        |       |       |          |        |              | -      |
|         |                 |           | • • • • • •                | 40    | 4.0   |          | 40     |              | -      |
|         |                 |           |                            |       |       |          |        | 9            | 14.4   |
|         |                 | 2         |                            | 0.019 | 0.183 |          | 0.539  | 0.243        | 0.204  |
|         |                 | 3         | ` '                        |       |       |          |        |              | -      |
|         |                 |           | Bankfull-Wetted Depth (cm) |       |       | -<br>-   |        |              | -      |
|         |                 |           | Dankiuii-wetted Depth (CM) |       |       | -        |        |              | -      |

Table I.2: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling, 2022

|              |              | Replicate  |   | 1          | 2          | 3            | 4           | 5           | Mean      |
|--------------|--------------|--|---|------------|------------|--------------|-------------|-------------|-----------|
|              |              | LC_  |   |            |            |              |             |             |           |
|              |              |  | Depth (cm)                                  | 11         | 14         | 23           | 17          | 10          | 15        |
|              |              |  | Velocity (m/s)                              | 0.011      | 0.224      | 0.413        | 0.171       | 0.498       | 0.2634    |
|              |              | 1  | Bankfull Width (m)                          |            |            | 5.5          |             |             | -         |
|              |              | CC_DC4   Dep   Vel     Recompose   Per   Per   Per     Recompose   Per   Per   Per   Per   Per   Per     Recompose   Per   P | Wetted Width (m)                            |            |            | 3.7<br>26    |             |             | -         |
| eq           | ٥.           |  | Bankfull-Wetted Depth (cm)                  | 11         | 10         |              | 1.1         | 17          | -<br>14   |
| Mine-Exposed | )-2%         |  | Depth (cm)<br>Velocity (m/s)                | 11<br>0.75 | 12<br>0.55 | 16<br>0.562  | 14<br>0.436 | 17<br>0.637 | 0.587     |
| EX           | Sep          | 2  | Bankfull Width (m)                          | 0.75       | 0.55       | 10.1         | 0.430       | 0.037       | 0.567     |
| Je-          | 12-6         | _  | Wetted Width (m)                            |            |            | 3.9          |             |             |           |
| ≅            | •            |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | _         |
|              |              |  | Depth (cm)                                  | 13         | 13         | 24           | 21          | 12          | 16.6      |
|              |              |  | Velocity (m/s)                              | 0.196      | 0.107      | 0.427        | 0.299       | 0.316       | 0.269     |
|              |              | 3  | Bankfull Width (m)                          |            |            | 6.7          |             |             | -         |
|              |              |  | Wetted Width (m)                            |            |            | 5.2          |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              | LC_D   |   |            |            |              |             |             |           |
|              |              |  | Depth (cm)                                  | 9          | 16         | 18           | 5           | 4           | 10.4      |
|              |              |  | Velocity (m/s)                              | 0.054      | 0.471      | 0.322        | 0.046       | 0.042       | 0.187     |
|              |              | 1  | Bankfull Width (m)                          |            |            | 4.2          |             |             | -         |
|              |              |  | Wetted Width (m)                            |            |            | 2.9          |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  | 4 4        | 40         | 30           | 40          | 4.4         | -<br>4E 4 |
|              |              |  | Depth (cm)                                  | 14         | 13         | 20           | 16          | 14          | 15.4      |
|              |              | 2  | Velocity (m/s)                              | 0.166      | 0.382      | 0.272<br>5.5 | 0.347       | 0.275       | 0.2884    |
|              |              | 2  | Bankfull Width (m)                          |            |            | 2.3          |             |             | -         |
|              |              |  | Wetted Width (m) Bankfull-Wetted Depth (cm) |            |            | -<br>-       |             |             | -         |
| Mine-Exposed | 2            |  | Depth (cm)                                  | 10         | 23         | 21           | 19          | 16          | -<br>17.8 |
| ő            | 0-2          |  | Velocity (m/s)                              | 0.184      | 0.219      | 0.021        | 0.319       | 0.223       | 0.1932    |
| Ϋ́           | Sep          | 3  | Bankfull Width (m)                          | 0.104      | 0.210      | 3.9          | 0.010       | 0.220       | -         |
| nė           | 13-          | Ŭ  | Wetted Width (m)                            |            |            | 2.55         |             |             | _         |
| ≅            | ,            |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | _         |
|              |              |  | Depth (cm)                                  | 19         | 18         | 12           | 7           | 6           | 12.4      |
|              |              |  | Velocity (m/s)                              | 0.579      | 0.076      | 0.323        | 0.08        | 0.09        | 0.2296    |
|              |              | 4  | Bankfull Width (m)                          |            | -1         | 4.9          | 1           | 1           | -         |
|              |              |  | Wetted Width (m)                            |            |            | 3.5          |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              |  | Depth (cm)                                  | 17         | 27         | 15           | 15          | 12          | 17.2      |
|              |              |  | Velocity (m/s)                              | 0.068      | 0.137      | 0.189        | 0.013       | 0.124       | 0.1062    |
|              |              | 5  | Bankfull Width (m)                          |            |            | 4.9          |             |             | -         |
|              |              |  | Wetted Width (m)                            |            |            | 3.1          |             |             | -         |
|              |              | 10.5   | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              | LC_L   |   | 14         | 19         | 10           | 7           | 5           | 11        |
|              |              |  | Depth (cm)<br>Velocity (m/s)                | 0.011      | 0.039      | 0.119        | 0.082       | 0.011       | 0.0524    |
|              |              | 1  | Bankfull Width (m)                          | 0.011      | 0.039      | 3.3          | 0.062       | 0.011       | 0.0524    |
|              |              | <u>'</u>   | Wetted Width (m)                            |            |            | 2            |             |             |           |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | 27           |             |             | _         |
| ρ̈́          | 2            |  | Depth (cm)                                  | 15         | 10         | 4            | 5           | 14          | 9.6       |
| oue          | р-2          |  | Velocity (m/s)                              | 0.015      | 0.249      | 0.126        | 0.022       | 0.277       | 0.1378    |
| Reference    | -Se          | 2  | Bankfull Width (m)                          |            | <u> </u>   | 4.4          | 1           | 1           | -         |
| Re           | 13.          |  | Wetted Width (m)                            |            |            | 2.2          |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              |  | Depth (cm)                                  | 11         | 8          | 13           | 7           | 11          | 10        |
|              |              |  | Velocity (m/s)                              | 0.094      | 0.046      | 0.05         | 0.224       | 0.082       | 0.0992    |
|              |              | 3  | Bankfull Width (m)                          |            |            | 3.1          |             |             | -         |
|              |              |  | Wetted Width (m)                            |            |            | 2.1          |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              | LC_  |   | 40         | 00         | 00           | 00          | 00          | 04.4      |
|              |              |  | Depth (cm)                                  | 16         | 22         | 20           | 20          | 29          | 21.4      |
|              |              | 4  | Velocity (m/s)                              | 0.276      | 0.157      | 0.216<br>17  | 0.582       | 0.461       | 0.3384    |
|              |              | '  | Bankfull Width (m) Wetted Width (m)         |            |            | 17           |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
| šed          | 2            |  | Depth (cm)                                  | 14         | 33         | 36           | 28          | 55          | 33.2      |
| Mine-Exposed | <b>)-2</b> ; |  | Velocity (m/s)                              | 0.25       | 0.036      | 1.355        | 2.708       | 0.916       | 1.053     |
| Ä            | Sep          | 2  | Bankfull Width (m)                          | 0.20       | 0.000      | 20           | 2.700       | 0.010       | -         |
| ne-          | 10-,         | _  | Wetted Width (m)                            |            |            | 15           |             |             | _         |
| Ξ            | •            |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              |  | Depth (cm)                                  | 17         | 32         | 21           | 20          | 37          | 25.4      |
|              |              |  | Velocity (m/s)                              | 0.984      | 0.367      | 0.468        | 1.712       | 2.001       | 1.1064    |
|              |              | 3  | Bankfull Width (m)                          |            | •          | 31           |             |             | -         |
|              |              |  | Wetted Width (m)                            |            |            | 28           |             |             | -         |
|              |              |  | Bankfull-Wetted Depth (cm)                  |            |            | -            |             |             | -         |
|              |              |  |   | _          |            |              |             |             |           |

Table I.2: Supporting Measures Associated with 3-Minute Kick and Sweep Benthic Invertebrate Community Sampling, 2022

|              |           | Replicate |                            | 1     | 2     | 3                                   | 4     | 5  | Mean   |
|--------------|-----------|-----------|----------------------------|-------|-------|-------------------------------------|-------|--|--------|
|              |           | LC_       | FRUS                       |       |       |                                     |       |  |        |
|              |           |           | Depth (cm)                 | 42    | 33    | 20                                  | 12    | 39   | 29.2   |
|              |           |           | Velocity (m/s)             | 0.014 | 0.481 | 0.271                               | 0.124 | 0.366  | 0.2512 |
|              |           | 1         | Bankfull Width (m)         |       |       | 18                                  |       |  | -      |
|              |           |           | Wetted Width (m)           |       |       | -                                   |       |  |        |
| 0            |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  |        |
| Mine-Exposed | 22        |           | Depth (cm)                 |       | 64    | 37                                  | 48    | 40   | 47.2   |
| ğ.           | )-de      |           | Velocity (m/s)             | 0.145 | 1.332 | 0.636                               | 1.266 | 0.482  | 0.7722 |
| Ω<br>A       | 10-Sep-22 | 2         | Bankfull Width (m)         |       |       | 20                                  |       |  | -      |
| <u>ii</u>    | 10        |           | Wetted Width (m)           |       |       | 17                                  |       |  | -      |
| 2            |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  | -      |
|              |           |           | Depth (cm)                 | 20    | 30    | 20                                  | 10    | 15   | 19     |
|              |           |           | Velocity (m/s)             | 0.145 | 0.265 | 0.147                               | 0.379 | 1.002  | 0.3876 |
|              |           | 3         | Bankfull Width (m)         |       |       | 20                                  |       |  | -      |
|              |           |           | Wetted Width (m)           |       |       | 17                                  |       |  | -      |
|              |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  | -      |
|              |           | LC_       | GRCK                       |       |       |                                     |       |  |        |
|              |           |           | Depth (cm)                 | 19    | 10    | 13                                  | 9     | 8  | 11.8   |
|              |           |           | Velocity (m/s)             | 0.057 | 0.307 | 0.719     0.199     0.166       6.3 |       |  | 0.2896 |
|              |           | 1         | Bankfull Width (m)         |       |       |                                     |       |  | -      |
|              |           |           | Wetted Width (m)           |       |       | 2.6                                 |       | 48       40       4         1.266       0.482       0.7         10       15       0.379       1.002       0.3         9       8       1       0.2       0.2         13       12       1       0.2       0.2         12       13       1       0.2       0.2         12       13       1       0.4       0.2         7       7       7       1       0.094       0.2         5       7       9       9       9       1       0.2       0.2         5       7       9       9       1       0.2 <td>-</td> | -      |
| ō            |           |           | Bankfull-Wetted Depth (cm) |       |       | 33                                  |       |  | -      |
| Mine-Exposed | 22        |           | Depth (cm)                 | 19    | 16    | 22                                  | 13    | 12   | 16.4   |
| ă<br>X       | -de       |           | Velocity (m/s)             | 0.223 | 0.198 | 0.103                               | 0.215 | 0.067  | 0.1612 |
| Щ            | 14-Sep-22 | 2         | Bankfull Width (m)         |       |       | 4.2                                 |       |  | -      |
| ¶iv          | 14        |           | Wetted Width (m)           |       |       | -                                   |       |  |        |
| 2            |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  | -      |
|              |           |           | Depth (cm)                 | 12    | 10    | 10                                  |       |  | 11.4   |
|              |           |           | Velocity (m/s)             | 0.026 | 0.659 | 0.674                               | 0.538 | 0.139  | 0.4072 |
|              |           | 3         | Bankfull Width (m)         |       |       | 3.6                                 |       |  | -      |
|              |           |           | Wetted Width (m)           |       |       | 1.8                                 |       |  | -      |
|              |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  | -      |
|              |           | LC_       | DCDS                       |       |       |                                     |       |  |        |
|              |           |           | Depth (cm)                 | 9     | 18    | 12                                  |       | 1  | 10.6   |
|              |           |           | Velocity (m/s)             | 0.379 | 0.043 | 0.426                               | 0.071 | 0.094  | 0.2026 |
| sed          | 7         | 1         | Bankfull Width (m)         |       |       | 6                                   |       |  | -      |
| pos          | V-2       |           | Wetted Width (m)           |       |       | 4.8                                 |       |  | -      |
| Mine-Exposed | 30-Nov-22 |           | Bankfull-Wetted Depth (cm) |       |       | 10                                  | T     | ı  | -      |
| je l         | 30-       |           | Depth (cm)                 | 10    | 17    | 10                                  |       | -  | 9.8    |
| Ξ            |           |           | Velocity (m/s)             | 0.068 | 0.117 | 0.094                               | 0.053 | 0.009  | 0.0682 |
|              |           | 2         | Bankfull Width (m)         | 4.9   |       |                                     |       |  | -      |
|              |           | W         | Wetted Width (m)           | 3.8   |       |                                     |       |  | -      |
|              |           |           | Bankfull-Wetted Depth (cm) |       |       | -                                   |       |  | -      |

Table I.3: In Situ Water Quality from Dry Creek, Fording River, and Grace Creek, 2022

| Sampling     | Station   | Field Parameters              | Reference |           | N         | line-exposed Dry Cre | ek        |           | Mine-exposed | l Fording River | Mine-exposed<br>Grace Creek |
|--------------|-----------|-------------------------------|-----------|-----------|-----------|----------------------|-----------|-----------|--------------|-----------------|-----------------------------|
| Event        | Otation   | Tiola Taramotoro              | LC_DCEF   | LC_DC3    | LC_DCDS   | LC_DC4               | LC_DC2    | LC_DC1    | LC_FRB       | LC_FRUS         | LC_GRCK                     |
|              |           | Date                          | 10-May-22 | 10-May-22 | 10-May-22 | 11-May-22            | 10-May-22 | 11-May-22 | 11-May-22    | 11-May-22       | 11-May-22                   |
|              |           | Temperature (°C)              | 2.00      | 1.8       | 2.6       | 1.5                  | 3.00      | 1.7       | 3.20         | 2.80            | 2.00                        |
|              | _         | Dissolved Oxygen (mg/L)       | 13.7      | 13.7      | 13.7      | 13.7                 | 13.4      | 14.3      | 15.1         | 13.6            | 14.2                        |
|              | Station   | Dissolved Oxygen (%)          | 98.9      | 99.1      | 101.1     | 98.6                 | 99.5      | 102.5     | 105.3        | 100.7           | 102.9                       |
|              | Sta       | Conductivity (µS/cm)          | 132.6     | 364.5     | 267.2     | 269.2                | 267       | 265.1     | 486.9        | 489.6           | 219                         |
|              |           | Specific Conductivity (µS/cm) | 236.1     | 645.0     | 466.5     | 488.7                | 460       | 478.5     | 835          | 850             | 389                         |
|              |           | pH                            | 8.47      | 8.45      | 8.54      | 8.28                 | 8.53      | 8.50      | 8.46         | 8.35            | 8.63                        |
|              |           | Date                          | -         | -         | 10-May-22 | -                    | -         | -         | -            | -               | -                           |
|              |           | Temperature (°C)              | -         | -         | 2.7       | -                    | -         | -         | -            | -               | -                           |
|              | 7         | Dissolved Oxygen (mg/L)       | -         | -         | 14.0      | -                    | -         | -         | -            | -               | -                           |
|              | tio       | Dissolved Oxygen (%)          | -         | -         | 100.9     | -                    | -         | -         | -            | -               | -                           |
|              | Station   | Conductivity (µS/cm)          | -         | -         | 277.5     | -                    | -         | -         | -            | -               | -                           |
|              |           | Specific Conductivity (µS/cm) | -         | -         | 483.4     | -                    | -         | -         | -            | -               | -                           |
|              |           | pH Hq                         | -         | -         | 8.52      | -                    | -         | -         | -            | -               | -                           |
|              |           | Date                          | -         | -         | 10-May-22 | -                    | -         | -         | -            | _               | -                           |
|              |           | Temperature (°C)              | -         | -         | 2.7       | -                    | -         | -         | -            | -               | -                           |
| <del>-</del> | က         | Dissolved Oxygen (mg/L)       | -         | -         | 13.7      | -                    | -         | -         | -            |                 | -                           |
| 10           | tio       | Dissolved Oxygen (%)          | -         | -         | 100.4     | -                    | -         | -         | -            | -               | -                           |
| Мау          | Station   | Conductivity (µS/cm)          | -         | -         | 293.5     | -                    | -         | -         | -            | -               | -                           |
| Σ            |           | Specific Conductivity (µS/cm) | -         | -         | 511.0     | -                    | -         | -         | -            | -               | -                           |
|              |           | pH                            | -         | -         | 8.49      | -                    | -         | -         | -            | -               | -                           |
|              |           | Date                          | -         | -         | 10-May-22 | -                    | -         | -         | -            | -               | -                           |
|              |           | Temperature (°C)              | -         | -         | 2.6       | -                    | -         | -         | -            | -               | -                           |
|              | 4         | Dissolved Oxygen (mg/L)       | -         | -         | 13.5      | -                    | -         | -         | -            | -               | -                           |
|              | Station   | Dissolved Oxygen (%)          | -         | -         | 99.6      | -                    | -         | -         | -            | -               | -                           |
|              | Sta       | Conductivity (µS/cm)          | -         | -         | 313.2     | -                    | -         | -         | -            | -               | -                           |
|              |           | Specific Conductivity (µS/cm) | -         | -         | 548.0     | -                    | -         | -         | -            | -               | -                           |
|              |           | pH                            | -         | -         | 8.46      | -                    | -         | -         | -            | -               | -                           |
|              |           | Date                          | -         | -         | 10-May-22 | -                    | -         | -         | -            | -               | -                           |
|              |           | Temperature (°C)              | -         | -         | 2.6       | -                    | -         | -         | -            | -               | -                           |
|              | 5 (       | Dissolved Oxygen (mg/L)       | -         | -         | 13.6      | -                    | -         | -         | -            | -               | -                           |
|              | Station   | Dissolved Oxygen (%)          | -         | -         | 100.4     | -                    | -         | -         | -            | -               | -                           |
|              | Sta       | Conductivity (µS/cm)          | -         | -         | 341.4     | -                    | -         | -         | -            | -               | -                           |
|              |           | Specific Conductivity (µS/cm) | -         | -         | 596.0     | -                    | -         | -         | -            | -               | -                           |
|              |           | pH                            | -         | -         | 8.45      | -                    | -         | -         | -            | -               | -                           |
|              |           | Date                          | 20-Jun-22 | 20-Jun-22 | 20-Jun-22 | 21-Jun-22            | 21-Jun-22 | 21-Jun-22 | 21-Jun-22    | 21-Jun-22       | 22-Jun-22                   |
| က            |           | Temperature (°C)              | 3.50      | 3.4       | 4.4       | 4.0                  | 3.70      | 4.8       | 5.90         | 5.50            | 4.00                        |
| - 23         | 1         | Dissolved Oxygen (mg/L)       | 13.5      | 13.3      | 13.3      | 13.4                 | 13.5      | 13.4      | 12.8         | 13.0            | 13.9                        |
| 72           | Station 1 | Dissolved Oxygen (%)          | 101.1     | 99.9      | 101.2     | 101.5                | 102.3     | 104.3     | 103.1        | 103.1           | 105.8                       |
| June         | Sta       | Conductivity (µS/cm)          | 113.5     | 302.1     | 272.9     | 203.7                | 204       | 208.2     | 305.4        | 304.8           | 184                         |
| ゔ            |           | Specific Conductivity (µS/cm) | 192.5     | 515.0     | 448.3     | 335.3                | 344       | 338.8     | 481          | 485             | 295                         |
|              |           | рН                            | 8.18      | 7.93      | 8.21      | 8.15                 | 8.22      | 8.29      | 8.17         | 8.15            | 8.41                        |

Table I.3: In Situ Water Quality from Dry Creek, Fording River, and Grace Creek, 2022

| Sampling | Station   | Field Parameters              | Reference |           | N         | line-exposed Dry Cre | ek        |           | Mine-exposed | l Fording River | Mine-exposed<br>Grace Creek |
|----------|-----------|-------------------------------|-----------|-----------|-----------|----------------------|-----------|-----------|--------------|-----------------|-----------------------------|
| Event    |           |                               | LC_DCEF   | LC_DC3    | LC_DCDS   | LC_DC4               | LC_DC2    | LC_DC1    | LC_FRB       | LC_FRUS         | LC_GRCK                     |
|          |           | Date                          | 13-Sep-22 | 13-Sep-22 | 13-Sep-22 | 12-Sep-22            | 14-Sep-22 | 12-Sep-22 | 10-Sep-22    | 10-Sep-22       | 14-Sep-22                   |
|          |           | Temperature (°C)              | 4.00      | 4.1       | 6.0       | 5.1                  | 6.00      | 4.7       | 7.00         | 5.00            | 5.90                        |
|          | 7         | Dissolved Oxygen (mg/L)       | 10.8      | 10.8      | 10.6      | 10.6                 | 10.6      | 11.2      | 11.0         | 10.4            | 10.6                        |
|          | Station   | Dissolved Oxygen (%)          | 101.0     | 102.0     | 105.0     | 100.0                | 104.0     | 104.0     | 108.0        | 97.0            | 102.0                       |
|          | Sta       | Conductivity (µS/cm)          | 180.0     | 769.0     | 740.0     | 527.0                | 710       | 503.0     | 579.0        | 544.0           | 277                         |
|          |           | Specific Conductivity (µS/cm) | 300.0     | 1282.0    | 1161.0    | 809.0                | 1,114     | 823.0     | 882          | 880             | 436                         |
|          |           | рН                            | 7.95      | 8.07      | 8.32      | 7.85                 | 8.26      | 8.28      | 8.32         | 8.18            | 8.35                        |
|          |           | Date                          | 13-Sep-22 | 13-Sep-22 | 13-Sep-22 | 12-Sep-22            | 13-Sep-22 | 12-Sep-22 | 10-Sep-22    | 10-Sep-22       | 14-Sep-22                   |
|          |           | Temperature (°C)              | 3.90      | 4.1       | 6.0       | 5.2                  | 5.90      | 4.9       | 7.40         | 5.00            | 5.70                        |
|          | n 2       | Dissolved Oxygen (mg/L)       | 107.0     | 10.8      | 10.6      | 10.6                 | 10.7      | 11.1      | 11.0         | 10.5            | 10.7                        |
|          | ţio       | Dissolved Oxygen (%)          | 100.0     | 102.0     | 104.0     | 100.0                | 105.0     | 103.0     | 109.0        | 98.0            | 102.0                       |
|          | Station   | Conductivity (µS/cm)          | 180.0     | 771.0     | 742.0     | 551.0                | 709       | 509.0     | 584.0        | 541.0           | 275                         |
|          |           | Specific Conductivity (µS/cm) | 301.0     | 1282.0    | 1164.0    | 847.0                | 116       | 822.0     | 881          | 88              | 435                         |
|          |           | рН                            | 7.96      | 8.14      | 8.34      | 7.87                 | 8.23      | 8.27      | 8.28         | 8.17            | 8.35                        |
| 15       |           | Date                          | 13-Sep-22 | 13-Sep-22 | 13-Sep-22 | 12-Sep-22            | 13-Sep-22 | 12-Sep-22 | 10-Sep-22    | 10-Sep-22       | 14-Sep-22                   |
|          |           | Temperature (°C)              | 3.90      | 4.1       | 5.8       | 5.3                  | 5.80      | 5.1       | 7.90         | 5.20            | 5.60                        |
| . 10     | 3         | Dissolved Oxygen (mg/L)       | 10.6      | 10.8      | 10.6      | 10.5                 | 10.7      | 11.1      | 10.8         | 10.5            | 107.0                       |
| ber      | Station   | Dissolved Oxygen (%)          | 98.0      | 102.0     | 104.0     | 100.0                | 104.0     | 104.0     | 108.0        | 99.0            | 102.0                       |
| em       | Sta       | Conductivity (µS/cm)          | 179.8     | 773.0     | 735.0     | 530.0                | 708       | 509.0     | 594.0        | 541.0           | 274                         |
| Septembe |           | Specific Conductivity (µS/cm) | 301.0     | 1286.0    | 1162.0    | 849.0                | 112       | 821.0     | 881          | 870             | 435                         |
| Ñ        |           | рН                            | 7.85      | 8.12      | 8.28      | 7.89                 | 8.19      | 8.25      | 8.30         | 8.19            | 8.40                        |
|          |           | Date                          | -         | -         | 13-Sep-22 | -                    | -         | -         | -            | -               | -                           |
|          |           | Temperature (°C)              | -         | -         | 5.7       | -                    | -         | -         | -            | -               | -                           |
|          | 4         | Dissolved Oxygen (mg/L)       | -         | -         | 10.6      | -                    | -         | -         | -            | -               | -                           |
|          | ţio       | Dissolved Oxygen (%)          | -         | -         | 104.0     | -                    | -         | -         | -            | -               | -                           |
|          | Station   | Conductivity (µS/cm)          | -         | -         | 726.0     | -                    | -         | -         | -            | -               | -                           |
|          |           | Specific Conductivity (µS/cm) | -         | -         | 1152.0    | -                    | -         | -         | -            | -               | -                           |
|          | Station 5 | рН                            | -         | -         | 8.29      | -                    | -         | -         | -            | -               | -                           |
|          |           | Date                          | -         | -         | 13-Sep-22 | -                    | -         | -         | -            | -               | -                           |
|          |           | Temperature (°C)              | -         | -         | 5.5       | -                    | -         | -         | -            | -               | -                           |
|          |           | Dissolved Oxygen (mg/L)       | -         | -         | 10.6      | -                    | -         | -         | -            | -               | -                           |
|          |           | Dissolved Oxygen (%)          | -         | -         | 103.0     | -                    | -         | -         | -            | -               | -                           |
|          |           | Conductivity (µS/cm)          | -         | -         | 739.0     | -                    | -         | -         | -            | -               | -                           |
|          |           | Specific Conductivity (µS/cm) | -         | -         | 1180.0    | -                    | -         | -         | -            | -               | -                           |
|          |           | рН                            | -         | -         | 8.23      | -                    | -         | -         | -            | -               | -                           |
| 30       |           | Date                          | 29-Nov-22 | 29-Nov-22 | 30-Nov-22 | 29-Nov-22            | -         | -         | 29-Nov-22    | 29-Nov-22       | 30-Nov-22                   |
|          |           | Temperature (°C)              | 2.00      | -0.1      | 0.2       | 0.7                  | -         | -         | 10           | .00             | 0.20                        |
| . 29     | _         | Dissolved Oxygen (mg/L)       | 11.1      | 12.0      | 12.3      | 12.1                 | -         | -         | 12.2         | 12.3            | 12.5                        |
| ber      | Station   | Dissolved Oxygen (%)          | 80.4      | 82.3      | 85.3      | 84.3                 | -         | -         | 83.9         | 84.2            | 85.7                        |
| embei    | Sta       | Conductivity (µS/cm)          | 222.9     | 969.0     | 967.0     | 565.0                | -         | -         | 665.0        | 618.0           | 295                         |
| Nove     |           | Specific Conductivity (µS/cm) | 397.6     | 1860.0    | 1838.0    | 1056.0               | -         | -         | 1,276        | 1,184           | 561                         |
| Z        |           | pH                            | 7.74      | 7.89      | 7.78      | 7.83                 | -         | -         | 7.77         | 7.74            | 8.19                        |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                   | LC_DCDS-1<br>10-May-22 |              |                                   | LC_DCDS-2<br>10-May-22 | !            |                                   | LC_DCDS-3<br>10-May-22 | 1            |                                   | LC_DCDS-4<br>10-May-22 |              |
|-----------------------------------|------------------------|--------------|-----------------------------------|------------------------|--------------|-----------------------------------|------------------------|--------------|-----------------------------------|------------------------|--------------|
| Pebble                            | Intermediate           | Embeddedness |
| 1                                 | <b>Axis (cm)</b> 5.1   | (%)          | 1                                 | Axis (cm)<br>12.5      | (%)<br>-     | Peddie<br>1                       | <b>Axis (cm)</b> 18.5  | (%)<br>-     | 1                                 | Axis (cm)<br>7.5       | (%)          |
| 2                                 | 6.8                    | -            | 2                                 | 8.1                    | -            | 2                                 | 7.7                    | -            | 2                                 | 10.1                   | -            |
| 3<br>4                            | 8.6<br>8.5             | -            | 3<br>4                            | 11.7<br>10.2           | -            | 3<br>4                            | 5.9<br>14.5            | -            | 3<br>4                            | 16.2<br>27             | -            |
| 5<br>6                            | 24.5<br>4.1            |              | 5<br>6                            | 7.2<br>13.2            |              | 5<br>6                            | 12.8<br>17             | -            | 5<br>6                            | 10.5<br>17             | -            |
| 7<br>8                            | 12.5<br>6.5            | -            | 7<br>8                            | 8.9<br>19              | -            | 7<br>8                            | 8.1<br>15.2            | -            | 7<br>8                            | 12.1<br>21.5           | -            |
| 9                                 | 5.4                    | -            | 9                                 | 5.2                    | -            | 9                                 | 10.3                   | -            | 9                                 | 9.8                    | -            |
| 10<br>11                          | 6.2<br>7.5             | 0.5          | 10<br>11                          | 13.3<br>8.4            | 0 -          | 10<br>11                          | 8.5<br>2.2             | 0 -          | 10<br>11                          | 27<br>15.2             | 0.5<br>-     |
| 12<br>13                          | 5.1<br>2.1             | -            | 12<br>13                          | 3.5<br>12.8            | -            | 12<br>13                          | 13.2<br>8.7            | -            | 12<br>13                          | 24<br>4.1              | -            |
| 14<br>15                          | 3.4<br>6.8             | -            | 14<br>15                          | 14.5<br>8.2            | -            | 14<br>15                          | 5.2<br>10.3            | -            | 14<br>15                          | 5.2<br>14.6            | -            |
| 16                                | 13                     | -            | 16                                | 5.6                    | -            | 16                                | 4.1                    | -            | 16                                | 4.3                    | -            |
| 17<br>18                          | 2.1<br>3.6             | -            | 17<br>18                          | 2.1                    | -            | 17<br>18                          | 9.2<br>1.3             | -            | 17<br>18                          | 8.8<br>3.1             | -            |
| 19<br>20                          | 4.5<br>5.5             | 0.5          | 19<br>20                          | 11.6<br>6.3            | -<br>0       | 19<br>20                          | 8.6<br>3.4             | -<br>0.25    | 19<br>20                          | 1.9<br>10.2            | 0.5          |
| 21<br>22                          | 3.8<br>11              | -            | 21<br>22                          | 3.1<br>4.5             | -            | 21<br>22                          | 9<br>13                | -            | 21<br>22                          | 7.3<br>24.5            | -            |
| 23                                | 13.5                   | -            | 23                                | 4.8                    | -            | 23                                | 6.7                    | -            | 23                                | 6.1                    | -            |
| 24<br>25                          | 3.5<br>6.5             | -            | 24<br>25                          | 6.4<br>3.2             | -            | 24<br>25                          | 13<br>8.6              | -            | 24<br>25                          | 4.2<br>10.5            | -            |
| 26<br>27                          | 8.2<br>3.8             | -            | 26<br>27                          | 8.3<br>1.9             | -            | 26<br>27                          | 5.1<br>4.7             | -            | 26<br>27                          | 5.3<br>5.4             | -            |
| 28                                | 3.5<br>6.8             | -            | 28<br>29                          | 9.5<br>9.7             | -            | 28<br>29                          | 14.6                   | -            | 28<br>29                          | 7.3<br>5.1             | -            |
| 29<br>30                          | 24                     | 0.25         | 30                                | 17.2                   | -            | 30                                | 19.3                   | 0.5          | 30                                | 7.3                    | 0            |
| 31<br>32                          | 16<br>8.5              | -            | 31<br>32                          | 14.1<br>7.3            | -            | 31<br>32                          | 12.2<br>17.5           | -            | 31<br>32                          | 21.2<br>4.5            | -            |
| 33<br>34                          | 27<br>12.8             | -            | 33<br>34                          | 7.6<br>15.7            | -            | 33<br>34                          | 7.4<br>4.9             | -            | 33<br>34                          | 2.5<br>25              | -            |
| 35                                | 5.4                    | -            | 35                                | =                      | -            | 35                                | 2.7                    | -            | 35                                | 10.3                   | -            |
| 36<br>37                          | 6.5<br>21              | -            | 36<br>37                          | 10.4<br>9.9            | -            | 36<br>37                          | 9<br>6.1               | -            | 36<br>37                          | 17.5<br>20.6           | -            |
| 38<br>39                          | 3.5<br>4.4             | -            | 38<br>39                          | 6.3<br>2.8             | -            | 38<br>39                          | 8.5<br>12.6            | -            | 38<br>39                          | 7.3<br>17.1            | -            |
| 40<br>41                          | 2 8.5                  | 0 -          | 40<br>41                          | 4 4.6                  | 0            | 40<br>41                          | 12.7                   | 0            | 40<br>41                          | 1.8                    | 0.5          |
| 42                                | 11                     | -            | 42                                | 7.1                    | -            | 42                                | 3.7                    | -            | 42                                | 5.2                    | -            |
| 43<br>44                          | 8.5                    | -            | 43<br>44                          | 3<br>16.5              | -            | 43<br>44                          | 5.5<br>9.7             | -            | 43<br>44                          | 11.1                   | -            |
| 45<br>46                          | 7.5<br>11.6            | -            | 45<br>46                          | 6.8<br>5               | -            | 45<br>46                          | 1.1<br>8.7             | -            | 45<br>46                          | 17.2<br>4.2            | -            |
| 47<br>48                          | 10.5                   | -            | 47<br>48                          | 6.2                    | -            | 47                                | 17.4                   | -            | 47                                | 7.6                    | -            |
| 49                                | 6.5<br>7.6             | -            | 49                                | 9.7<br>6.8             | -            | 48<br>49                          | 11.8<br>5.4            | -            | 48<br>49                          | 3.7<br>18.2            | -            |
| 50<br>51                          | 9.2<br>17.5            | 0 -          | 50<br>51                          | 2.1<br>4               | 0 -          | 50<br>51                          | 1.2<br>4.5             | 0.5          | 50<br>51                          | 4.3<br>13.1            | 0 -          |
| 52<br>53                          | 13.4<br>14.5           | -            | 52<br>53                          | 19.6<br>6.5            | -            | 52<br>53                          | 6.7<br>4.1             | -            | 52<br>53                          | 1.6<br>13.2            | -            |
| 54<br>55                          | 13                     | -            | 54<br>55                          | 5.8<br>7.5             | -            | 54<br>55                          | 10.6                   | -            | 54<br>55                          | 3.8<br>18.5            | -            |
| 56                                | 1                      | -            | 56                                | 13                     | -            | 56                                | 9.1                    | -            | 56                                | 11.2                   | -            |
| 57<br>58                          | 4<br>3                 | -            | 57<br>58                          | 7<br>12.5              | -            | 57<br>58                          | 3.2<br>9.7             | -            | 57<br>58                          | 13.5<br>4.4            | -            |
| 59<br>60                          | 14<br>13               | - 0          | 59<br>60                          | 12.8<br>18             | - 0          | 59<br>60                          | 1.6<br>3.3             | -<br>0.25    | 59<br>60                          | 5.5<br>3               | - 0          |
| 61<br>62                          | 12.5<br>4.5            | -            | 61<br>62                          | 11<br>12               | -            | 61<br>62                          | 4.9<br>13.5            | -            | 61<br>62                          | 16.1<br>0.5            | -            |
| 63                                | 10.5                   | -            | 63                                | 4.9                    | -            | 63                                | 12.5                   | -            | 63                                | 12.2                   | -            |
| 64<br>65                          | 3<br>9.5               | -            | 64<br>65                          | 7.6<br>5.1             | -            | 64<br>65                          | 10.5<br>9.2            | -            | 64<br>65                          | 5.7<br>9.6             | -            |
| 66<br>67                          | 12<br>7.8              | -            | 66<br>67                          | 4.5<br>6.2             | -            | 66<br>67                          | 6.4<br>15.3            | -            | 66<br>67                          | 11.7<br>15.1           | -            |
| 68                                | 6                      | -            | 68                                | =                      | -            | 68                                | 13.4                   | -            | 68                                | 6.1                    | -            |
| 69<br>70                          | 8<br>4                 | 0            | 69<br>70                          | 2.3<br>10.3            | 0.25         | 69<br>70                          | 8.7<br>8.8             | 0            | 69<br>70                          | 8.2<br>22.1            | 0.5          |
| 71<br>72                          | 4.2<br>11.5            | -            | 71<br>72                          | 10.5<br>11.4           | -            | 71<br>72                          | 10.4<br>3.3            | -            | 71<br>72                          | 10.5<br>20.3           | -            |
| 73<br>74                          | 3.3                    | -            | 73<br>74                          | 9 3.7                  | -            | 73<br>74                          | 5.1<br>6.2             | -            | 73<br>74                          | 2.6<br>16.2            | -            |
| 75                                | 10.2                   | -            | 75                                | 11                     | -            | 75                                | 9                      | -            | 75                                | 17                     | -            |
| 76<br>77                          | 7.5<br>8               | -            | 76<br>77                          | 7.5<br>6.2             | -            | 76<br>77                          | 10.5<br>6.7            | -            | 76<br>77                          | 6.1<br>12.6            | -            |
| 78<br>79                          | 17<br>8                | -            | 78<br>79                          | 7.2<br>9.5             | -            | 78<br>79                          | 19.3<br>14.2           | -            | 78<br>79                          | 11.7<br>10.5           | -            |
| 80<br>81                          | 10.5<br>9.8            | 0 -          | 80<br>81                          | 5.8<br>5.3             | 0.5          | 80<br>81                          | 4.3                    | 0.75         | 80<br>81                          | 15.8<br>5.2            | 0            |
| 82                                | 17                     | -            | 82                                | 6                      | -            | 82                                | 5.9                    | -            | 82                                | 16.2                   | -            |
| 83<br>84                          | 7.2<br>13.8            | -            | 83<br>84                          | 7.3<br>7.1             | -            | 83<br>84                          | 8.9<br>1.6             | -            | 83<br>84                          | 12.1<br>12.3           | -            |
| 85<br>86                          | 7.8<br>17              | -            | 85<br>86                          | -<br>6.4               | -            | 85<br>86                          | 5.5<br>7.7             | -            | 85<br>86                          | 25.2<br>12             | -            |
| 87<br>88                          | 8.5<br>5.2             | -            | 87<br>88                          | 9.4<br>15.5            | -            | 87<br>88                          | 6.3                    | -            | 87<br>88                          | 20.1                   | -            |
| 89                                | 6.1                    | -            | 89                                | 5.6                    | -            | 89                                | 2.6                    | -            | 89                                | 11.1                   | -            |
| 90<br>91                          | 8.6<br>3.8             | 0.25         | 90<br>91                          | 8.1<br>12.5            | 0.25<br>-    | 90<br>91                          | 16.5<br>10.3           | 0.25<br>-    | 90<br>91                          | 5.2<br>8.9             | 0 -          |
| 92<br>93                          | 13.5<br>5.2            | -            | 92<br>93                          | 7.2<br>11.5            | -            | 92<br>93                          | 7.6<br>22              | -            | 92<br>93                          | 7.6<br>9.5             | -            |
| 94                                | 10.7                   | -            | 94                                | 14                     | -            | 94                                | 4.2                    | -            | 94                                | -                      | -            |
| 95<br>96                          | 9.5<br>6.2             | -            | 95<br>96                          | 15.2<br>2.5            | -            | 95<br>96                          | 11.1<br>9.6            | -            | 95<br>96                          | 7.2<br>6.1             | -            |
| 97<br>98                          | 14.1<br>9.8            | -            | 97<br>98                          | 2.1<br>9.5             | -            | 97<br>98                          | 7.6<br>5.2             | -            | 97<br>98                          | 16.3<br>7.2            | -            |
| 99<br>100                         | 17<br>7.6              | - 0          | 99<br>100                         | 5.7<br>8.6             | - 0          | 99<br>100                         | 7<br>14.3              | -<br>0.25    | 99<br>100                         | 7.3<br>5.8             | 0.75         |
| Average<br>Cic, Cip<br>and Embed. | 8 82                   | 0.15         | Average<br>Cic, Cip<br>and Embed. | 8.42                   | 0.11         | Average<br>Cic, Cip<br>and Embed. | 8.59                   | 0.28         | Average<br>Cic, Cip<br>and Embed. | 11.0                   | 0.28         |
| =                                 |                        |              | =                                 |                        |              | =                                 |                        |              | =                                 |                        |              |

Notes: nm = not measurable, "-" indicates no data. Intermediate axis is the measurement across the intermediate access of the pebble and presented in cm.

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| Petals   |                         | LC_DCDS-5<br>10-May-22 |          |                         |                     |     |                  |             | LC_DC1-1<br>12-Sep-22 |  |  |  |  |  |  |  |  |  |
|--|-------------------------|------------------------|----------|-------------------------|---------------------|-----|------------------|-------------|-----------------------|--|--|--|--|--|--|--|--|--|
| 2  | Pebble                  |                        |          | Pebble                  |                     |     | Calcite Presence |             | Embeddedness (%)      |  |  |  |  |  |  |  |  |  |
| 3  |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| \$ 72  |                         | 6.5                    |          | 3                       | 0                   |     |                  | 24          |                       |  |  |  |  |  |  |  |  |  |
| 6  |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 8  | 6                       | 14.7                   | -        | 6                       | 0                   | 0   | 0                | 5           | -                     |  |  |  |  |  |  |  |  |  |
| 10   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 11   |                         |                        |          |                         |                     | -   |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 13   | 11                      | 13.4                   |          | 11                      | 0                   | 0   | 0                | 8           |                       |  |  |  |  |  |  |  |  |  |
| 15   |                         | -                      |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 16   |                         |                        |          |                         |                     | -   |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 18   | 16                      | 13                     |          | 16                      | 0                   | 0.5 | 1                | 4.9         |                       |  |  |  |  |  |  |  |  |  |
| 19   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 21   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 233   8.6     23   0   0.7   1   5.3   | 21                      | 5.3                    |          | 21                      | 0                   | 0   | 0                | 23.5        |                       |  |  |  |  |  |  |  |  |  |
| 24   |                         |                        |          |                         |                     |     | · ·              |             |                       |  |  |  |  |  |  |  |  |  |
| 286  | 24                      | 27.5                   | -        | 24                      | 0                   | 0   | 0                | 1.8         | -                     |  |  |  |  |  |  |  |  |  |
| 28   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 29   | 27                      | 7.2                    |          | 27                      | 0                   | 0   | 0                | 4.5         |                       |  |  |  |  |  |  |  |  |  |
| 31 9.4 - 31 0 0 0 0 6.8 - 32 - 33  | 29                      | 11.6                   | -        | 29                      | 0                   | 0   | 0                | 7           | -                     |  |  |  |  |  |  |  |  |  |
| 322  |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 34   | 32                      | 4.8                    | -        | 32                      | 0                   | 0   | 0                | 4.5         | -                     |  |  |  |  |  |  |  |  |  |
| 386  | 34                      | 11.1                   |          |                         | 0                   | 0   |                  | 5.7         |                       |  |  |  |  |  |  |  |  |  |
| 37   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 39   | 37                      | 16.5                   | -        | 37                      | 0                   | 0.4 | 1                | 12          | -                     |  |  |  |  |  |  |  |  |  |
| 440 6.8 0 441 0 0 0 0 77 0.5 441 12 - 441 0 0 0 0 0 0 77 0.5 442 10.2 - 422 0 0 0 0 0 77 443 10.2 - 424 0 0 0 0 0 0 77 444 10.6 0 - 444 0 0 0 0 0 0 77 445 77 - 445 0 0 0 0 0 0 23.2 446 0 0 0 0 0 13 447 10.2 - 446 0 0 0 0 0 13 448 10.2 - 446 0 0 0 0 0 13 447 12.5 448 10.2 - 446 0 0 0 0 0 13 447 12.5 449 10.2 - 446 0 0 0 0 0 12.3 447 12.5 449 10.2 - 446 0 0 0 0 0 12.3 447 12.5 449 10.2 - 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 - 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 - 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 - 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 - 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 449 10.2 -   |                         |                        |          |                         |                     | -   |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 442  |                         |                        |          | -                       |                     | -   |                  |             |                       |  |  |  |  |  |  |  |  |  |
| ### 66   | 42                      | 10.2                   |          | 42                      | 0                   | 0   | 0                | 11          |                       |  |  |  |  |  |  |  |  |  |
| 45   |                         |                        |          | -                       |                     | -   |                  |             |                       |  |  |  |  |  |  |  |  |  |
| ## 17  | 45                      | 7.7                    |          | 45                      | 0                   | 0   | 0                | 23.2        |                       |  |  |  |  |  |  |  |  |  |
| ## 16.8  | 47                      | 29.5                   |          |                         |                     |     |                  | 12          |                       |  |  |  |  |  |  |  |  |  |
| So   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| \$2  | 50                      | 21.2                   | 0.25     | 50                      | 0                   | 0   | 0                | 7.5         | 0.25                  |  |  |  |  |  |  |  |  |  |
| S4   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| Second   S   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 57   | 55                      | 9.5                    | -        | 55                      | 0                   | 0.2 | 1                | 8.4         | -                     |  |  |  |  |  |  |  |  |  |
| S8   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 60 10 0.75 60 0 0.1 1 4.88 0.5 61 4.3 - 61 0 0.1 1 1 6.8 - 62 9.5 - 62 0 0 0 0 1 1 10.5 - 63 13.9 - 63 0 0.1 1 1 10.5 - 64 2 - 64 2 - 64 0 0 0.1 1 1 0.5 - 65 8.6 - 65 0 0 0 0 0 8.8 - 66 5.8 - 66 0 0 0.1 1 1 8.2 - 67 10.8 - 67 0 0 0.3 1 7.5 - 68 24.7 - 68 0 0 0.1 1 1 8.2 - 69 6.2 - 69 0 0 0.1 1 1 6.5 - 70 24 0.25 70 0 0 0 0 6.8 - 71 4.8 - 71 0 0 0 0 13 0.5 - 72 6.5 - 72 0 0 0 0 13 0.5 - 74 4.8 - 71 0 0 0 0 6.8 - 72 6.5 - 73 0 0 0 0 15 - 73 16.5 - 73 0 0.2 1 8.3 - 74 15.7 - 74 0 0 0 0 7.7 - 75 6.5 - 75 0 0 0 0 0 4.5 - 76 9 - 77 5.8 - 77 0 0 0 0 0 7.7 - 78 9.6 - 78 0 0 0.2 1 8.3 - 77 75 8.9 6 - 78 0 0 0 0 0 7.6 - 78 9.6 - 78 0 0 0.5 1 11.8 0.5 80 15.5 0.5 80 0 0.5 1 11.8 0.5 81 8.6 - 81 0 0.5 1 1.1 1.8 0.5 82 13.4 - 79 0 0 0 0 7.6 - 83 2.9 - 83 0 0 0.5 1 1 11.8 0.5 84 3.3 - 84 0 0 0.5 1 1 11.8 0.5 85 11.5 0.5 80 0 0 0.5 1 1 11.8 0.5 86 8.7 - 89 0 0 0.0 1 1 1 6.3 - 87 12 - 85 0.5 1 1 11.8 0.5 88 4.3 3 - 84 0 0 0.5 1 1 11.8 0.5 89 11.4 - 99 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 62 9.5 - 62 0 0 0 7.3 - 66 63 13.9 - 63 13.9 - 64 2 - 64 0 0.1 1 1 10.5 - 64 2 - 64 0 0.1 1 1 5.5 - 65 65 8.6 - 65 0 0 0 0 0 6.8 - 66 65 0 0 0.1 1 1 8.2 - 67 10.8 - 67 10.8 - 67 10.8 - 67 10.8 - 67 10.8 - 68 24.7 - 68 0 0.5 1 10.5 - 68 24.7 - 68 0 0.5 1 10.5 - 69 6.2 - 69 0 0.1 1 6.5 - 69 6.2 - 69 0 0.1 1 6.5 - 67 10.8 - 71 4.8 - 71 0 0 0 0 13 0.5 - 71 4.8 - 71 0 0 0 0 0 13 0.5 - 71 4.8 - 71 0 0 0 0 0 6.8 - 72 6.5 - 72 0 0 0 0 0 15 - 73 16.5 - 73 16.5 - 73 0 0.2 1 8.3 - 74 15.7 - 74 0 0 0 0 77 - 75 6.5 - 75 0 0 0 0 0 0 77 - 75 6.5 - 75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 60                      | 10                     |          | 60                      | 0                   | 0.1 | 1                | 4.8         | 0.5                   |  |  |  |  |  |  |  |  |  |
| 63   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 65 8.6 - 66 0 0 0 0 6.8 - 67 10.8 - 66 6 0 0 0.1 1 1 8.2 - 67 10.8 - 67 10.8 - 67 0 0 0.3 1 7.5 - 68 24.7 - 68 8 0 0 0.5 1 10.5 - 69 62 - 69 0 0 0.1 1 1 6.5 - 69 62 - 69 0 0 0.1 1 1 6.5 - 69 62 - 71 0 0 0 0 0 13 0.5 - 71 4.8 - 71 0 0 0 0 0 15 - 72 6.5 - 72 0 0 0 0 15 - 73 16.5 - 73 16.5 - 73 0 0 0 0 15 - 74 18.3 - 74 19.7 - 74 0 0 0 0 77 - 74 19.7 - 75 6.5 - 75 0 0 0 0 0 77 - 75 6.5 - 75 0 0 0 0 0 0 77 - 75 6.5 - 75 0 0 0 0 0 0 0 4.5 - 75 6.5 - 76 0 0 0 0 0 0 4.5 - 77 1 6.3 - 77  | 63                      | 13.9                   |          | 63                      | 0                   | 0.1 | 1                | 10.5        |                       |  |  |  |  |  |  |  |  |  |
| 67   | 65                      | 8.6                    |          |                         |                     | 0   |                  | 6.8         |                       |  |  |  |  |  |  |  |  |  |
| 68   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 70   | 68                      | 24.7                   | -        | 68                      | 0                   | 0.5 | 1                | 10.5        | -                     |  |  |  |  |  |  |  |  |  |
| 72 6.5 - 72 0 0 0 15 - 73 16.5 - 73 16.5 - 73 0 0 0.2 1 8.3 - 74 15.7 - 74 0 0 0 0 0 0 7 - 75 6.5 - 75 6.5 - 75 0 0 0 0 0 4.5 - 77 75 6.5 - 75 0 0 0 0 0 0 4.5 - 77 77 75 6.5 - 77 7 0 0 0 0 0 7.6 - 78 0 0 0 0 0 7.6 - 78 0 0 0 0 0 7.6 - 78 0 0 0 0 0 0 7.6 - 78 0 0 0 0 0 0 7.6 - 78 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 70                      | 24                     |          | 70                      | 0                   | 0   | 0                | 13          |                       |  |  |  |  |  |  |  |  |  |
| 73   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 75 6.5 - 75 0 0 0 0 4.5 - 76 76 9 - 76 0 0.2 1 6.3 - 77 77 5.8 - 77 70 0 0 0 7.6 - 78 9.6 - 78 0 0.5 1 12.3 - 78 9.6 - 78 0 0 0.5 1 12.3 - 79 4.4 - 79 0 0 0 0 0 8.8 - 78 80 0 0.5 1 11.8 0.5 81 8.6 - 81 0 0.5 1 15.5 - 82 13.4 - 82 0 0 0 0 5.5 1 11.8 0.5 83 2.9 - 83 0 0 0 0 5.4 - 83 0 0 0 5.4 - 83 0 0 0 0 5.4 - 83 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 73                      | 16.5                   | -        | 73                      | 0                   | 0.2 | 1                | 8.3         | -                     |  |  |  |  |  |  |  |  |  |
| 76 9 - 76 0 0.2 1 6.3 - 77 5.8 - 77 0 0 0 0 7.6 - 78 9.6 - 78 0 0 0.5 1 12.3 - 79 4.4 - 79 0 0 0 0 0.5 1 111.8 0.5 8.8 - 81 0 0.5 1 111.8 0.5 81 8.6 - 81 0 0.5 1 5.5 - 82 13.4 - 82 0 0 0 0 5.4 - 83 29 - 83 0 0.4 1 11 1 1 - 84 33 - 84 4 0 0 0 0 7 7 - 85 15.2 - 85 0 0 0.1 1 1 8.6 - 85 15.2 - 85 0 0 0.1 1 1 8.6 - 85 15.2 - 86 0 0 0.3 1 16 - 87 12.3 - 88 15.5 - 88 15.2 - 85 0 0 0.1 1 1 8.6 - 85 15.2 - 85 0 0 0.1 1 1 8.6 - 85 15.2 - 85 0 0 0.1 1 1 1 1 - 85 15 - 88 15.2 - 85 0 0 0.1 1 1 1 1 - 85 15 - 85 15.2 - 85 0 0 0.1 1 1 1 1 1 - 85 15 15.2 - 85 15.2 - 85 0 0 0.1 1 1 1 1 - 85 15 15.2 - 85 15. | 75                      | 6.5                    |          | 75                      | 0                   | 0   | 0                | 4.5         |                       |  |  |  |  |  |  |  |  |  |
| 78 9.6 - 78 0 0.5 1 12.3 - 79  |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 80         15.5         0.5         80         0         0.5         1         11.8         0.5           81         8.6         -         81         0         0.5         1         5.5         -           82         13.4         -         82         0         0         0         5.4         -           83         2.9         -         83         0         0.4         1         11         -           84         3.3         -         84         0         0         0         7         -           85         15.2         -         85         0         0.1         1         8.6         -         -           86         8.7         -         86         0         0.3         1         16         -         -         -         86         0         0.3         1         11         -         -         88         0         0         0         0         8.2         -         -         88         0         0         0         0         8.2         -         -         89         0         0         0         0         7.8         0.75         9  | 78                      | 9.6                    | -        | 78                      | 0                   | 0.5 | 1                | 12.3        | -                     |  |  |  |  |  |  |  |  |  |
| 82     13.4     -     82     0     0     5.4     -       83     2.9     -     83     0     0.4     1     11     -       84     3.3     -     84     0     0     0     7     -       85     15.2     -     85     0     0.1     1     8.6     -       86     8.7     -     86     0     0.3     1     16     -       87     12     -     87     0     0.2     1     11     -       88     4.5     -     88     0     0     0     8.2     -       89     17.7     -     89     0     0     0     8.2     -       89     17.7     -     89     0     0     0     4.3     -       90     5     0.5     90     0     0     0     7.8     0.75       91     3.3     -     91     0     0     0     8.8     -       92     23.5     -     92     0     0.2     1     6.7     -       93     10.4     -     93     0     0.3     1     18     -       95   | 80                      | 15.5                   | 0.5      | 80                      | 0                   | 0.5 | 1                | 11.8        |                       |  |  |  |  |  |  |  |  |  |
| 83   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 85     15.2     -     85     0     0.1     1     8.6     -       86     8.7     -     86     0     0.3     1     16     -       87     12     -     87     0     0.2     1     11     -       88     4.5     -     88     0     0     0     0     8.2     -       89     17.7     -     89     0     0     0     0     4.3     -       90     5     0.5     90     0     0     0     7.8     0.75       91     3.3     -     91     0     0     0     8.8     -       92     23.5     -     92     0     0.2     1     6.7     -       93     10.4     -     93     0     0.3     1     18     -       94     6.5     -     94     0     0     0     4.3     -       95     5.7     -     95     0     0     0     3.7     -       96     15.8     -     96     0     0     0     3.7     -       99     11.4     -     99     0     0     0     10.   | 83                      | 2.9                    | -        | 83                      | 0                   | 0.4 | 1                | 11          | -                     |  |  |  |  |  |  |  |  |  |
| 87         12         -         87         0         0.2         1         11         -           88         4.5         -         88         0         0         0         8.2         -           89         17.7         -         89         0         0         0         4.3         -           90         5         0.5         90         0         0         0         7.8         0.75           91         3.3         -         91         0         0         0         8.8         -           92         23.5         -         92         0         0.2         1         6.7         -           93         10.4         -         93         0         0.3         1         18         -           94         6.5         -         94         0         0         0         4.3         -           95         5.7         -         95         0         0         0         3.7         -           96         15.8         -         96         0         0         0         6.5         -           98         2.1         -   | 85                      | 15.2                   |          | 85                      | 0                   | 0.1 | 1                | 8.6         |                       |  |  |  |  |  |  |  |  |  |
| 88     4.5     -     88     0     0     0     8.2     -       89     17.7     -     89     0     0     0     4.3     -       90     5     0.5     90     0     0     0     7.8     0.75       91     3.3     -     91     0     0     0     8.8     -       92     23.5     -     92     0     0.2     1     6.7     -       93     10.4     -     93     0     0.3     1     18     -       94     6.5     -     94     0     0     0     4.3     -       95     5.7     -     95     0     0     0     5.8     -       96     15.8     -     96     0     0     0     3.7     -       97     6.8     -     97     0     0     0     6.5     -       98     2.1     -     98     0     0.2     1     8     -       99     11.4     -     99     0     0     0     8.8     0.5       Average       Cic, Cip and Embed. =     0     0.14     0.39     9.202   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 90         5         0.5         90         0         0         0         7.8         0.75           91         3.3         -         91         0         0         0         8.8         -           92         23.5         -         92         0         0.2         1         6.7         -           93         10.4         -         93         0         0.3         1         18         -           94         6.5         -         94         0         0         0         4.3         -           95         5.7         -         95         0         0         0         5.8         -           96         15.8         -         96         0         0         0         3.7         -           97         6.8         -         97         0         0         0         6.5         -           98         2.1         -         98         0         0.2         1         8         -           99         11.4         -         99         0         0         0         10.5         -      100         1.3         0         100<   | 88                      | 4.5                    | -        | 88                      | 0                   | 0   | 0                | 8.2         | -                     |  |  |  |  |  |  |  |  |  |
| 91         3.3         -         91         0         0         0         8.8         -           92         23.5         -         92         0         0.2         1         6.7         -           93         10.4         -         93         0         0.3         1         18         -           94         6.5         -         94         0         0         0         4.3         -           95         5.7         -         95         0         0         0         5.8         -           96         15.8         -         96         0         0         0         3.7         -           97         6.8         -         97         0         0         0         6.5         -           98         2.1         -         98         0         0.2         1         8         -           99         11.4         -         99         0         0         0         10.5         -           100         1.3         0         100         0         0         0         8.8         0.5    Average  Cic, Cip and Embed. =  Old Calcite Index (CI) =  Old   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 93   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 95         5.7         -         95         0         0         0         5.8         -           96         15.8         -         96         0         0         0         3.7         -           97         6.8         -         97         0         0         0         6.5         -           98         2.1         -         98         0         0.2         1         8         -           99         11.4         -         99         0         0         0         10.5         -           100         1.3         0         100         0         0         0         8.8         0.5           Average           Cic, Cip and Embed. =         0         0.14         0.39         9.202         0.48  | 93                      | 10.4                   | -        | 93                      | 0                   | 0.3 | 1                | 18          | -                     |  |  |  |  |  |  |  |  |  |
| 96   |                         |                        |          |                         |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| 98 2.1 - 98 0 0.2 1 8 - 99 11.4 - 99 0 0 0 0 10.5 - 100 1.3 0 100 0 0 0 8.8 0.5  Average Cic, Cip and Embed. = Old Calcite Index (CI) = 0.39   | 96                      | 15.8                   | -        | 96                      | 0                   | 0   | 0                | 3.7         | -                     |  |  |  |  |  |  |  |  |  |
| 100         1.3         0         100         0         0         0         8.8         0.5           Average<br>Cic, Cip and<br>Embed. =         O.33         Cic, Cip and<br>Embed. =         0         0.14         0.39         9.202         0.48           Old Calcite Index (CI) =         0.39         0.39         0.39         0.39         0.39   | 98                      | 2.1                    | -        | 98                      | 0                   | 0.2 | 1                | 8           | -                     |  |  |  |  |  |  |  |  |  |
| Average Cic, Cip and   | 99<br>100               |                        |          | 99<br>100               |                     |     |                  | 10.5<br>8.8 |                       |  |  |  |  |  |  |  |  |  |
| Old Calcite Index (CI) = 0.39  | Average<br>Cic, Cip and |                        |          | Average<br>Cic, Cip and |                     |     |                  |             |                       |  |  |  |  |  |  |  |  |  |
| New Calcite Index (CI) = 0.14  |                         |                        | <u> </u> | Old Ca                  | alcite Index (CI) = |     |                  |             | <u> </u>              |  |  |  |  |  |  |  |  |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                     |                     |                       | DC1-2<br>Sep-22     |                           |                   | LC_DC1-3<br>12-Sep-22               |                     |                       |                     |                           |                   |  |
|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|-------------------|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|-------------------|--|
| Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddednes s (%) |  |
| 1 2                                 | 0                   | 0.3                   | 1                   | 8.4<br>13.2               | -                 | 1 2                                 | 0                   | 0.5<br>0.1            | 1                   | 10.2                      | -                 |  |
| 3                                   | 0                   | 0                     | 0                   | 8.3                       | -                 | 3                                   | 0                   | 0                     | 0                   | 4.5                       | -                 |  |
| 4<br>5                              | 0                   | 0<br>0.5              | 0                   | 6<br>14.5                 | -                 | 4<br>5                              | 0                   | 0.1<br>0.7            | 1                   | 4.5<br>11.5               | -                 |  |
| 6                                   | 0                   | 0                     | 0                   | 8                         | -                 | 6 7                                 | 0                   | 0                     | 0                   | 8.5<br>7.2                | -                 |  |
| 8                                   | 0                   | 0                     | 0                   | 9                         | -                 | 8                                   | 0                   | 0                     | 0                   | 9                         | -                 |  |
| 9<br>10                             | 0                   | 0                     | 0                   | 11.3<br>16                | 0.5               | 9<br>10                             | 0                   | 0.4<br>0.4            | <u>1</u><br>1       | 9.5<br>7.8                | 0.5               |  |
| 11                                  | 0                   | 0                     | 0                   | 7.4<br>8.2                | -                 | 11 12                               | 0                   | 0.5                   | 1 0                 | 11 6.3                    | -                 |  |
| 13                                  | 0                   | 0                     | 0                   | 7.3                       | -                 | 13                                  | 0                   | 0                     | 0                   | 5.3                       | -                 |  |
| 14<br>15                            | 0                   | 0                     | 0                   | 14<br>4                   | -                 | 14<br>15                            | 0                   | 0                     | 0                   | 9.3<br>17.9               | -                 |  |
| 16                                  | 0                   | 0                     | 0                   | 5                         | -                 | 16                                  | 0                   | 0                     | 0                   | 6.6                       | -                 |  |
| 17<br>18                            | 0                   | 0                     | 0                   | 20.5<br>13                | -                 | 17<br>18                            | 0                   | 0                     | 0                   | 6.7<br>8.3                | -                 |  |
| 19<br>20                            | 0                   | 0                     | 0                   | 11<br>14.9                | 0.5               | 19<br>20                            | 0                   | 0<br>0.1              | 0                   | 9.5<br>8.5                | 0.25              |  |
| 21                                  | 0                   | 0                     | 0                   | 14                        | -                 | 21                                  | 0                   | 0                     | 0                   | 10.6                      | -                 |  |
| 22<br>23                            | 0                   | 0                     | 0                   | 6<br>5                    | -                 | 22<br>23                            | 0                   | 0 0.4                 | 0<br>1              | 6.2<br>7                  | -                 |  |
| 24                                  | 0                   | 0                     | 0                   | 22.3                      | -                 | 24                                  | 0                   | 0.1                   | 1                   | 11.6                      | -                 |  |
| 25<br>26                            | 0                   | 0                     | 0                   | 5<br>8                    | -                 | 25<br>26                            | 0                   | 0                     | 0                   | 11.5<br>6.1               | -                 |  |
| 27<br>28                            | 0                   | 0                     | 0                   | 25<br>24.8                | -                 | 27<br>28                            | 0                   | 0                     | 0                   | 10.1                      | -                 |  |
| 29                                  | 0                   | 0                     | 0                   | 11                        | -                 | 29                                  | 0                   | 0                     | 0                   | 9                         | -                 |  |
| 30<br>31                            | 0                   | 0                     | 0                   | 15<br>11.4                | 0.75              | 30<br>31                            | 0                   | 0                     | 0                   | 6.5<br>7.6                | 0.25              |  |
| 32                                  | 0                   | 0                     | 0                   | 5                         | -                 | 32                                  | 0                   | 0                     | 0                   | 5.8                       | -                 |  |
| 33<br>34                            | 0                   | 0                     | 0                   | 9.3<br>13                 | -                 | 33<br>34                            | 0                   | 0                     | 0                   | 16.3<br>8.9               | -                 |  |
| 35<br>36                            | 0                   | 0                     | 0                   | 12<br>6                   | -                 | 35<br>36                            | 0                   | 0                     | 0                   | 9<br>5.6                  | -                 |  |
| 37                                  | 0                   | 0                     | 0                   | 8.5                       | -                 | 37                                  | 0                   | 0                     | 0                   | 10.3                      | -                 |  |
| 38<br>39                            | 0                   | 0                     | 0                   | 12.3<br>7.5               | -                 | 38<br>39                            | 0                   | 0.1                   | 1<br>0              | 9<br>20                   | -                 |  |
| 40                                  | 0                   | 0                     | 0                   | 7.5<br>22.5               | 0.5               | 40                                  | 0                   | 0                     | 0                   | 16                        | 0.25              |  |
| 41<br>42                            | 0                   | 0                     | 0                   | 18.5                      | -                 | 41<br>42                            | 0                   | 0                     | 0                   | 9                         | -                 |  |
| 43<br>44                            | 0                   | 0                     | 0                   | 6.5<br>8.1                | -                 | 43<br>44                            | 0                   | 0<br>0.3              | 0                   | 8                         | -                 |  |
| 45                                  | 0                   | 0                     | 0                   | 6.2                       | -                 | 45                                  | 0                   | 0                     | 0                   | 10                        | -                 |  |
| 46<br>47                            | 0                   | 0                     | 0                   | 9.3<br>31.5               | -                 | 46<br>47                            | 0                   | 0.3                   | <u> </u>            | 9.3<br>8.6                | -                 |  |
| 48<br>49                            | 0                   | 0<br>0.5              | 0                   | 4.5<br>7                  | -                 | 48<br>49                            | 0                   | 0                     | 0                   | 9.5<br>9.2                | -                 |  |
| 50                                  | 0                   | 0                     | 0                   | 19                        | 0.5               | 50                                  | 0                   | 0.5                   | 1                   | 16.5                      | 0.5               |  |
| 51<br>52                            | 0                   | 0                     | 0                   | 9.3<br>3.8                | -                 | 51<br>52                            | 0                   | 0.3                   | 1<br>0              | 5.3<br>10.6               | -                 |  |
| 53                                  | 0                   | 0.1                   | 1                   | 4.5                       | -                 | 53                                  | 0                   | 0                     | 0                   | 6.6                       | -                 |  |
| 54<br>55                            | 0                   | 0.3                   | 0                   | 11.2<br>9.6               | -                 | 54<br>55                            | 0                   | 0                     | 0                   | 10.4<br>5.2               | -                 |  |
| 56<br>57                            | 0                   | 0                     | 0                   | 4.5<br>4.7                | -                 | 56<br>57                            | 0                   | 0.5<br>0              | 1 0                 | 10.3<br>8.4               | -                 |  |
| 58                                  | 0                   | 0                     | 0                   | 3.8                       | -                 | 58                                  | 0                   | 0                     | 0                   | 8.9                       | -                 |  |
| 59<br>60                            | 0                   | 0.1<br>0.2            | 1                   | 5<br>12.4                 | 0.5               | 59<br>60                            | 0                   | 0                     | 0                   | 12.1<br>4.8               | -                 |  |
| 61<br>62                            | 0                   | 0                     | 0                   | 8.5                       | -                 | 61                                  | 0                   | 0.1                   | 1                   | 10.5                      | -                 |  |
| 63                                  | 0                   | 0                     | 0                   | 11<br>6.3                 | -                 | 62<br>63                            | 0                   | 0                     | 0                   | 8.1<br>13.5               | -                 |  |
| 64<br>65                            | 0                   | 0<br>0.2              | 0<br>1              | 11.5<br>4.2               | -                 | 64<br>65                            | 0                   | 0<br>0.3              | 0                   | 4.8<br>7.9                | -                 |  |
| 66                                  | 0                   | 0                     | 0                   | 5.1                       | -                 | 66                                  | 0                   | 0.3                   | 1                   | 6.5                       | -                 |  |
| 67<br>68                            | 0                   | 0.5<br>0              | 0                   | 13.5<br>5.8               | -                 | 67<br>68                            | 0                   | 0.1                   | 1<br>0              | 5.2<br>10.5               | -                 |  |
| 69<br>70                            | 0                   | 0<br>0.2              | 0                   | 7.1<br>7.2                | - 0               | 69<br>70                            | 0                   | 0                     | 0                   | 5.5<br>4.3                | -                 |  |
| 71                                  | 0                   | 0.5                   | 1                   | 5.1                       | -                 | 71                                  | 0                   | 0                     | 0                   | 9.5                       | 0.5               |  |
| 72<br>73                            | 0                   | 0<br>0.8              | 0<br>1              | 7.2<br>12.5               | -                 | 72<br>73                            | 0                   | 0                     | 0                   | 3.9<br>6.5                | -                 |  |
| 74<br>75                            | 0                   | 0 0.1                 | 0                   | 16<br>6.3                 | -                 | 74<br>75                            | 0                   | 0                     | 0                   | 9.5<br>5.3                | -                 |  |
| 76                                  | 0                   | 0.2                   | 1                   | 8.5                       | -                 | 76                                  | 0                   | 0                     | 0                   | 5.5                       | -                 |  |
| 77<br>78                            | 0                   | 0<br>0.5              | 0<br>1              | 8.9<br>7.5                | -                 | 77<br>78                            | 0                   | 0                     | 0                   | 4.3<br>6.5                | -                 |  |
| 79                                  | 0                   | 0                     | 0                   | 10.2                      | -                 | 79                                  | 0                   | 0                     | 0                   | 5.6                       | -                 |  |
| 80<br>81                            | 0                   | 0.5<br>0              | 0                   | 3.8<br>8.5                | 0.25              | 80<br>81                            | 0                   | 0                     | 0                   | 8.1<br>8.3                | 0.5               |  |
| 82<br>83                            | 0                   | 0                     | 0                   | 11.5<br>4.3               | -                 | 82<br>83                            | 0                   | 0.1                   | 1 0                 | 7.5<br>10.5               | -                 |  |
| 84                                  | 0                   | 0                     | 0                   | 19                        | -                 | 84                                  | 0                   | 0                     | 0                   | 11.1                      | -                 |  |
| 85<br>86                            | 0                   | 0                     | 0                   | 11<br>25                  | -                 | 85<br>86                            | 0                   | 0                     | 0                   | 12<br>6.5                 | -                 |  |
| 87                                  | 0                   | 0                     | 0                   | 7.3                       | -                 | 87                                  | 0                   | 0                     | 0                   | 4.1                       | -                 |  |
| 88<br>89                            | 0                   | 0                     | 0                   | 8.2<br>8.5                | -                 | 88<br>89                            | 0                   | 0.1                   | 0<br>1              | 11.5<br>7.2               | -                 |  |
| 90<br>91                            | 0                   | 0                     | 0                   | 7.3<br>7.8                | 0.25              | 90<br>91                            | 0                   | 0                     | 0                   | 13.4<br>6.5               | 0.25              |  |
| 92                                  | 0                   | 0                     | 0                   | 14.3                      | -                 | 92                                  | 0                   | 0                     | 0                   | 18.3                      | -                 |  |
| 93<br>94                            | 0                   | 0.3<br>0              | 0                   | 5.5<br>7.6                | -                 | 93<br>94                            | 0                   | 0 0.1                 | 0<br>1              | 6.5<br>5.8                | -                 |  |
| 95                                  | 0                   | 0                     | 0                   | 6.2                       | -                 | 95                                  | 0                   | 0.1                   | 1                   | 9.6                       | -                 |  |
| 96<br>97                            | 0                   | 0.5<br>0              | 1 0                 | 7.8<br>1.4                | -                 | 96<br>97                            | 0                   | 0.5<br>0              | 1<br>0              | 12.4<br>13.6              | -                 |  |
| 98<br>99                            | 0                   | 0                     | 0                   | 13<br>5.4                 | -                 | 98<br>99                            | 0                   | 0<br>0.3              | 0                   | 9.8<br>8.4                | -                 |  |
| 100                                 | 0                   | 0                     | 0                   | 15                        | 0.75              | 100                                 | 0                   | 0.3                   | 0                   | 7.6                       | 0.75              |  |
| Average<br>Cic, Cip and<br>Embed. = | 0                   | 0.07                  | 0.20                | 9.993                     | 0.45              | Average<br>Cic, Cip and<br>Embed. = | 0                   | 0.07                  | 0.26                | 8.76                      | 0.42              |  |
| Old Calci                           | te Index (CI) =     |                       |                     | .20                       | 1                 |                                     | te Index (CI) =     |                       |                     | 0.26                      | 1                 |  |
| New Calci                           | te Index (CI) =     |                       | 0                   | .07                       |                   | New Calci                           | te Index (CI) =     |                       |                     | 0.07                      |                   |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| Status         Proportion         Presence         Axis (cm)         ss (%)           1         0         0         0         4         -           2         0         0         0         8.3         -           3         0         0         0         6         -           4         0         0         0         4         -           5         0         0         0         4.5         -           6         0         0.1         1         5         -           7         0         0         0         6         -           8         0         0         0         4.6         -           9         0         0         0         2         -           10         0         0.3         1         13         0.75           11         0         0         0         3         -           12         0         0         0         3         -           13         0         0         0         5         -           14         0         0         0         5         - | Pebble  1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20   | Concreted Status  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 | Calcite Proportion  0.1 0 0.3 0 0 0.2 0.3 0 0 0 0.2 0.1 0 0 0.2 0.1 0 0 0.1 | Calcite Presence  1  | Intermediate Axis (cm)  6.2 4.7 11 3 1.5 6.2 14.3 9.2 5 6.5 11.2 10.5  | Embeddedne<br>ss (%)            |
|--|--|---|---|--|--|---------------------------------|
| 1       0       0       0       4       -         2       0       0       0       8.3       -         3       0       0       0       6       -         4       0       0       0       4       -         5       0       0       0       4.5       -         6       0       0.1       1       5       -         7       0       0       0       6       -         8       0       0       0       4.6       -         9       0       0       0       2       -         10       0       0.3       1       13       0.75         11       0       0       0       6       -         12       0       0       3       -         13       0       0       0       1.5       -         14       0       0       0       5       -         15       0       0.2       1       11       -         16       0       0.3       1       8       -  | 2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20 | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0                       | 0<br>0.3<br>0<br>0<br>0.2<br>0.3<br>0<br>0<br>0<br>0.2<br>0.2<br>0.2<br>0.1 | 0<br>1<br>0<br>0<br>1<br>1<br>1<br>0<br>0<br>0<br>1<br>1<br>1<br>1 | 6.2<br>4.7<br>11<br>3<br>1.5<br>6.2<br>14.3<br>9.2<br>5<br>6.5<br>11.2 | -<br>-<br>-<br>-<br>-<br>-<br>- |
| 3       0       0       0       6       -         4       0       0       0       4       -         5       0       0       0       4.5       -         6       0       0.1       1       5       -         7       0       0       0       6       -         8       0       0       0       4.6       -         9       0       0       0       2       -         10       0       0.3       1       13       0.75         11       0       0       6       -         12       0       0       3       -         13       0       0       0       1.5       -         14       0       0       0       5       -         15       0       0.2       1       11       -         16       0       0.3       1       8       -  | 3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20      | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0                                 | 0.3<br>0<br>0<br>0.2<br>0.3<br>0<br>0<br>0<br>0.2<br>0.2<br>0.2<br>0.1<br>0 | 1<br>0<br>0<br>1<br>1<br>1<br>0<br>0<br>0<br>0<br>1<br>1<br>1<br>1 | 11<br>3<br>1.5<br>6.2<br>14.3<br>9.2<br>5<br>6.5<br>11.2               |                                 |
| 5         0         0         0         4.5         -           6         0         0.1         1         5         -           7         0         0         0         6         -           8         0         0         0         4.6         -           9         0         0         0         2         -           10         0         0.3         1         13         0.75           11         0         0         0         6         -           12         0         0         0         6         -           13         0         0         0         1.5         -           14         0         0         0         5         -           15         0         0.2         1         11         -           16         0         0.3         1         8         -  | 5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19                      | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0   | 0<br>0.2<br>0.3<br>0<br>0<br>0<br>0.2<br>0.2<br>0.1<br>0                    | 0<br>1<br>1<br>0<br>0<br>0<br>1<br>1<br>1                          | 1.5<br>6.2<br>14.3<br>9.2<br>5<br>6.5<br>11.2                          | -<br>-<br>-<br>-                |
| 7     0     0     0     6     -       8     0     0     0     4.6     -       9     0     0     0     2     -       10     0     0.3     1     13     0.75       11     0     0     0     6     -       12     0     0     0     3     -       13     0     0     0     1.5     -       14     0     0     0     5     -       15     0     0.2     1     11     -       16     0     0.3     1     8     -  | 7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19                                | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0   | 0.3<br>0<br>0<br>0<br>0.2<br>0.2<br>0.1<br>0                                | 1<br>0<br>0<br>0<br>1<br>1<br>1<br>1                               | 14.3<br>9.2<br>5<br>6.5<br>11.2  | -<br>-<br>-                     |
| 8         0         0         0         4.6         -           9         0         0         0         2         -           10         0         0.3         1         13         0.75           11         0         0         0         6         -           12         0         0         0         3         -           13         0         0         0         1.5         -           14         0         0         0         5         -           15         0         0.2         1         11         -           16         0         0.3         1         8         -  | 8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19                                     | 0<br>0<br>0<br>0<br>0<br>0<br>0<br>0<br>0   | 0<br>0<br>0<br>0.2<br>0.2<br>0.1<br>0<br>0                                  | 0<br>0<br>0<br>1<br>1<br>1<br>1<br>0                               | 9.2<br>5<br>6.5<br>11.2  | -                               |
| 10     0     0.3     1     13     0.75       11     0     0     0     6     -       12     0     0     0     3     -       13     0     0     0     1.5     -       14     0     0     0     5     -       15     0     0.2     1     11     -       16     0     0.3     1     8     -  | 10<br>11<br>12<br>13<br>14<br>15<br>16<br>17<br>18<br>19   | 0<br>0<br>0<br>0<br>0<br>1<br>0   | 0<br>0.2<br>0.2<br>0.1<br>0<br>0.1  | 0<br>1<br>1<br>1<br>0  | 6.5<br>11.2  |                                 |
| 12     0     0     0     3     -       13     0     0     0     1.5     -       14     0     0     0     5     -       15     0     0.2     1     11     -       16     0     0.3     1     8     -  | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20   | 0<br>0<br>0<br>1<br>0   | 0.2<br>0.1<br>0<br>0.1  | 1<br>1<br>0  |  |                                 |
| 14         0         0         0         5         -           15         0         0.2         1         11         -           16         0         0.3         1         8         -  | 14<br>15<br>16<br>17<br>18<br>19<br>20   | 0<br>1<br>0<br>0  | 0<br>0.1  | 0  |  | -                               |
| 15         0         0.2         1         11         -           16         0         0.3         1         8         -   | 16<br>17<br>18<br>19<br>20   | 1<br>0<br>0   |   |  | 8<br>11.3  | -                               |
|  | 17<br>18<br>19<br>20   | 0   |   | 1<br>0   | 58   | -                               |
| <b>17</b> 0 0.2 1 9 -  | 19<br>20   | n   | 0.5   | 1  | 5.1  | -                               |
| 18         0         0         0         3.5         -           19         0         0.3         1         6         -  |  | 0   | 0   | 0  | 11.4<br>5  | -                               |
| 20         0         0         7.5         0.5           21         0         0.1         1         8         -  | 21   | 0   | 0.1<br>0  | 1<br>0   | 5.6<br>14  | 0.75                            |
| <b>22</b> 0 0.1 1 4.5 -  | 22   | 0   | 0   | 0  | 6.1  | -                               |
| 23         0         0.2         1         10.5         -           24         0         0.2         1         3.5         -   | 23<br>24   | 0   | 0.2<br>0.4  | 1  | 7<br>10.2  | -                               |
| <b>25</b> 0 0 0 3 - <b>26</b> 0 0.2 1 9 -  | 25<br>26   | 0   | 0.4<br>0.2  | 1  | 4<br>9   | -                               |
| <b>27</b> 0 0.2 1 4.1 -  | 27<br>28   | 0   | 0.2<br>0.1  | 1  | 11 11.3  | -                               |
| <b>29</b> 0 0 0 15 -   | 29   | 0   | 0   | 0  | 6.5  | -                               |
| 30         0         0         0         9         0.5           31         0         0         0         9.5         -  | 30<br>31   | 0   | 0.2<br>0  | 1<br>0   | 9.3<br>4.5   | 0.75<br>-                       |
| 32 0 0.4 1 5 -<br>33 0 0 0 0 3.5 -   | 32   | 0   | 0   | 0  | 5.6<br>2.6   | -                               |
| <b>34</b> 0 0.1 1 12 -   | 34   | 0   | 0   | 0  | 2  | -                               |
| 35 0 0 0 3.1 -<br>36 0 0 0 21 -  | 35<br>36   | 0   | 0.2<br>0.5  | 1<br>1   | 6<br>6   | -                               |
| 37         0         0         0         5         -           38         0         0.1         1         3         -  | 37<br>38   | 0   | 0   | 0  | 9.9<br>7.6   | -                               |
| <b>39</b> 0 0 0 7 -  | 39<br>40   | 0   | 0   | 0  | 5  | -                               |
| 41 0 0 0 8.5 -   | 41   | 0   | 0.3   | 0<br>1   | 1<br>6   | 0 -                             |
| 42         0         0         0         8         -           43         0         0         0         9         -  | 42<br>43   | 0   | 0   | 0  | 21<br>6.4  | -                               |
| 44         0         0         0         4.5         -           45         0         0         0         7         -  | 44<br>45   | 0   | 0   | 0  | 6.1<br>7   | -                               |
| <b>46</b> 0 0 0 18 -   | 46   | 0   | 0   | 0  | 3  | -                               |
| 47         0         0         0         8         -           48         0         0         0         12.6         -   | 47<br>48   | 0   | 0   | 0  | 12.5<br>7.1  | -                               |
| 49         0         0         0         7         -           50         0         0         8         0.5  | 49<br>50   | 0   | 0   | 0  | 9<br>7.6   | -<br>0.75                       |
| <b>51</b> 0 0 0 5.1 -  | 51<br>52   | 0   | 0.3   | 1  | 6.1  | -                               |
| 52         0         0.1         1         11.5         -           53         0         0         0         5.5         -   | 53   | 0   | 0.2   | 1<br>0   | 9.5<br>10.1  | -                               |
| 54         0         0.1         1         6.1         -           55         0         0.1         1         11         -   | 54<br>55   | 0   | 0   | 0  | 3.1<br>7.5   | -                               |
| 56         0         0         0         3.5         -           57         0         0         0         3         -  | 56<br>57   | 0   | 0<br>0.3  | 0  | 7.4<br>9.5   | -                               |
| <b>58</b> 0 0 0 6.1 -  | 58   | 0   | 0.3   | 1  | 10.3   | -                               |
| 59         0         0         0         6         -           60         0         0.5         1         10         0.25  | 59<br>60   | 0   | 0.5<br>0  | 0  | 16.5<br>6.5  | 0.75                            |
| 61         0         0         6         -           62         0         0         4.3         -  | 61<br>62   | 0   | 0<br>0.5  | 0  | 3.4<br>11.4  | -                               |
| <b>63</b> 0 0 0 8.2 -  | 63<br>64   | 0   | 0   | 0  | 4.6<br>9.6   | -                               |
| <b>65</b> 0 0 0 2.3 -  | 65   | 0   | 0.1<br>0  | 0  | 15   | -                               |
| 66         0         0         0         13.5         -           67         0         0         0         17.5         -  | 66<br>67   | 0   | 0.1<br>0.5  | <u>1</u><br>1  | 9.3<br>6.6   | -                               |
| 68         0         0         0         4.5         -           69         0         0         0         4.1         -  | 68<br>69   | 0   | 0   | 0  | 7.5<br>10.4  | -                               |
| <b>70</b> 0 0 0 11 0.75  | 70   | 0   | 0   | 0  | 8.3  | 0.5                             |
| 71         0         0.1         1         13.5         -           72         0         0         0         4.5         -   | 71<br>72   | 0   | 0.1<br>0  | 1<br>0   | 5.2<br>7.8   | -                               |
| 73         0         0         0         7.5         -           74         0         0.5         1         15.5         -   | 73<br>74   | 0   | 0.1<br>0  | 1<br>0   | 8.9<br>8.5   | -                               |
| 75 0 0 0 4.5 -<br>76 0 0 0 0 2.5 -   | 75<br>76   | 0   | 0   | 0  | 9.1  | -                               |
| 77 0 0 0 2 -   | 77   | 0   | 0   | 0  | 2.1  | -                               |
| 78         0         0         0         4.5         -           79         0         0         0         19         -   | 78<br>79   | 0   | 0<br>0.1  | 0<br>1   | 3<br>12.4  | -                               |
| 80         0         0.6         1         16.5         0           81         0         0         0         9.5         -   | 80<br>81   | 0   | 0   | 0  | 7<br>3.9   | 0.5<br>-                        |
| 82 0 0 0 9.5 -<br>83 0 0 0 10 -  | 82<br>83   | 0   | 0.3   | 1 0  | 14.2<br>7.5  | -                               |
| <b>84</b> 0 0 0 7.6 -  | 84   | 0   | 0.1   | 1  | 11.3   | -                               |
| 85         0         0.3         1         10.5         -           86         0         0.1         1         8.5         -   | 85<br>86   | 0   | 0.2   | 1<br>0   | 9.5<br>9   | -                               |
| 87         0         0         0         19.5         -           88         0         0         0         3.5         -   | 87<br>88   | 0   | 0.1<br>0.3  | 1  | 11<br>9.2  | -                               |
| <b>89</b> 0 0.3 1 5.6 -  | 89<br>90   | 0   | 0.3   | 1  | 7.5  | -<br>0.25                       |
| <b>91</b> 0 0 0 5 -  | 91   | 0   | 0   | 0  | 5.2<br>12  | -                               |
| 92         0         0         0         4.5         -           93         0         0.1         1         2.2         -  | 92<br>93   | 0   | 0   | 0  | 9.5<br>7.2   | -                               |
| 94         0         0         0         4.6         -           95         0         0         0         11.5         -   | 94<br>95   | 0   | 0.3<br>0.5  | 1  | 8.5<br>12  | -                               |
| <b>96</b> 0 0 0 4.2 -  | 96   | 0   | 0   | 0  | 6.5  | -                               |
| 97         0         0         0         2         -           98         0         0         0         6.3         -  | 97<br>98   | 0   | 0<br>0.1  | 0<br>1   | 5.2<br>6.6   | -                               |
| 99         0         0.1         1         12.5         -           100         0         0         7.5         0.75   | 99<br>100  | 0   | 0.1<br>0  | 1<br>0   | 4<br>6.5   | -<br>0.5                        |
| Average A Cic, Cip and 0 0.06 0.28 7.5 0.55 Cic,   | Average<br>c, Cip and<br>Embed. =  | 0.01  | 0.11  | 0.43   | 8.3  | 0.50                            |
| Old Calcite Index (CI) = 0.28  | Old Calcite  | e Index (CI) =<br>e Index (CI) =  |   |  | .44<br>.12   |                                 |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| LC_DC2-3<br>14-Sep-22               |                     |                       |                     |                           |                      | LC_DC3-1<br>13-Sep-22               |                     |                       |                     |                           |                      |  |
|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|--|
| Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |  |
| 1                                   | 0                   | 0.3                   | 1                   | 5.2                       | -                    | 1                                   | 0                   | 0.7                   | 1                   | 17                        | -                    |  |
| 3                                   | 0                   | 0.6<br>0.2            | <u>1</u><br>1       | 5.5<br>8.9                | -                    | 3                                   | 0                   | 0.3<br>0              | 1<br>0              | 8<br>5                    | -                    |  |
| 4                                   | 0                   | 0.1                   | 1                   | 7                         | -                    | 4                                   | 0                   | 0.7<br>0.7            | 1                   | 9.5                       | -                    |  |
| 5<br>6                              | 0                   | 0.5<br>0.4            | 1                   | 6<br>11                   | -                    | 5<br>6                              | 0                   | 0.7                   | 1<br>1              | 19<br>18                  | -                    |  |
| 7<br>8                              | 0                   | 0.5<br>0.3            | 1                   | 7<br>3.3                  | -                    | 7 8                                 | 0                   | 0.1<br>0.5            | 1                   | 2.1<br>7.2                | -                    |  |
| 9                                   | 0                   | 0.5                   | 1                   | 14.6                      | -                    | 9                                   | 1                   | 0.7                   | 1                   | 13.5                      | -                    |  |
| 10<br>11                            | 0                   | 0.3<br>0.4            | 1                   | 7.6<br>10.5               | 0.75                 | 10<br>11                            | 0                   | 0.7<br>0              | 1 0                 | 20<br>14.5                | 0.5                  |  |
| 12                                  | 0                   | 0.5                   | 1                   | 19.3                      | -                    | 12                                  | 0                   | 0                     | 0                   | 3.1                       | -                    |  |
| 13<br>14                            | 0                   | 0.3<br>0.3            | 1                   | 7<br>14                   | -                    | 13<br>14                            | 0                   | 0                     | 0                   | 3.5<br>0.2                | -                    |  |
| 15                                  | 0                   | 0.2                   | 1                   | 15                        | -                    | 15                                  | 0                   | 0                     | 0                   | 1                         | -                    |  |
| 16<br>17                            | 0                   | 0.2<br>0.5            | <u> </u>            | 11<br>10                  | -                    | 16<br>17                            | 0                   | 0<br>0.7              | 0                   | 4<br>11                   | -                    |  |
| 18                                  | 0                   | 0.1                   | 1                   | 6.7                       | -                    | 18                                  | 0                   | 0.5                   | 1                   | 19                        | -                    |  |
| 19<br>20                            | 0                   | 0 0.2                 | 0                   | 8.7<br>10                 | 0.5                  | 19<br>20                            | 0                   | 0.7<br>0.5            | 1                   | 10<br>14.5                | 0.5                  |  |
| 21                                  | 0                   | 0.4                   | 1                   | 8                         | -                    | 21                                  | 1                   | 0.4                   | 1                   | 13                        | -                    |  |
| 22<br>23                            | 0                   | 0 0.2                 | 0                   | 5<br>6                    | -                    | 22<br>23                            | 0                   | 0.7<br>0.7            | 1<br>1              | 7.5<br>22.5               | -                    |  |
| 24                                  | 0                   | 0.1                   | 1                   | 5.1                       | -                    | 24                                  | 0                   | 0.7                   | 1                   | 7.6                       | -                    |  |
| 25<br>26                            | 0                   | 0.5<br>0.4            | 1                   | 4.2<br>11                 | -                    | 25<br>26                            | 0                   | 0.7<br>0.7            | 1                   | 6.6<br>15                 | -                    |  |
| 27                                  | 0                   | 0.3                   | 1                   | 13                        | -                    | 27                                  | 0                   | 0.7                   | 1                   | 21.5                      | -                    |  |
| 28<br>29                            | 0                   | 0<br>0.1              | 0                   | 6<br>7                    | -                    | 28<br>29                            | 0                   | 0.8<br>0.8            | 1                   | 15<br>6.5                 | -                    |  |
| 30                                  | 0                   | 0                     | 0                   | 3.2                       | 0.75                 | 30                                  | 0                   | 0.7                   | 1                   | 7.5                       | 0                    |  |
| 31<br>32                            | 0                   | 0                     | 0                   | 23.5<br>11.5              | -                    | 31<br>32                            | 0                   | 0.5<br>0.4            | 1                   | 8.2<br>12                 | -                    |  |
| 32                                  | 0                   | 0.3                   | 1                   | 11.5<br>8.2               | -                    | 32                                  | 0                   | 0.4                   | 0                   | 2                         | -                    |  |
| 34<br>35                            | 0                   | 0.2                   | 1                   | 5.5<br>11                 | -                    | 34<br>35                            | 0                   | 0.6                   | 1                   | 6.7                       | -                    |  |
| 35<br>36                            | 1                   | 1                     | 1                   | 11<br>16.5                | -                    | 36                                  | 0                   | 0.3<br>0.5            | 1<br>1              | 14<br>8.2                 | -                    |  |
| 37<br>38                            | 0                   | 0.1                   | 1                   | 9.5<br>7.5                | -                    | 37<br>38                            | 0                   | 0.8                   | 1 0                 | 13<br>4.9                 | -                    |  |
| 38<br>39                            | 0                   | 0                     | 0                   | 7.5<br>13                 | -                    | 38                                  | 0                   | 0                     | 0                   | 4.9<br>14.6               | -                    |  |
| 40                                  | 0                   | 0                     | 0                   | 3                         | 0                    | 40                                  | 0                   | 0.7                   | 1                   | 5.6                       | 0.25                 |  |
| 41<br>42                            | 0                   | 0.3                   | 0                   | 11.6<br>7                 | -                    | 41<br>42                            | 0                   | 0 0.3                 | 1                   | 7.1<br>4.5                | -                    |  |
| 43                                  | 0                   | 0                     | 0                   | 3.4                       | -                    | 43<br>44                            | 1                   | 0.8                   | 1                   | 18.3<br>4.3               | -                    |  |
| 44<br>45                            | 0                   | 0                     | 0                   | 4.6<br>1.8                | -                    | 44                                  | 0<br>1              | 0.5<br>1              | <u> </u>            | 35                        | -                    |  |
| 46                                  | 0                   | 0.2                   | 1                   | 11                        | -                    | 46                                  | 0                   | 0.8                   | 1                   | 20                        | -                    |  |
| 47<br>48                            | <u>1</u><br>0       | 0.7<br>0.1            | <u> </u>            | 24<br>7.3                 | -                    | 47<br>48                            | 0                   | 0.8<br>0.9            | <u> </u>            | 8.5<br>25                 | -                    |  |
| 49                                  | 0                   | 0.3                   | 1                   | 14                        | -                    | 49                                  | 0                   | 0.8                   | 1                   | 18                        | -                    |  |
| 50<br>51                            | 0                   | 0.1<br>0.3            | 1                   | 4<br>5.5                  | -                    | 50<br>51                            | 0                   | 0<br>0.5              | 0<br>1              | 9.1<br>18.5               | 0.5                  |  |
| 52                                  | 0                   | 0                     | 0                   | 4.3                       | -                    | 52                                  | 0                   | 0.6                   | 1                   | 16                        | -                    |  |
| 53<br>54                            | 0                   | 0.1<br>0.1            | 1                   | 4.9<br>8.3                | -                    | 53<br>54                            | 0                   | 1<br>0.5              | 1 1                 | 2.5<br>1.5                | -                    |  |
| 55                                  | 0                   | 0                     | 0                   | 5.6                       | -                    | 55                                  | 0                   | 0.5                   | 1                   | 2.5                       | -                    |  |
| 56<br>57                            | 0                   | 0.5<br>0.5            | 1                   | 8.5<br>11.6               | -                    | 56<br>57                            | 1<br>1              | 1<br>0.8              | <u> </u>            | 12<br>27                  | -                    |  |
| 58                                  | 0                   | 0.3                   | 1                   | 7.6                       | -                    | 58                                  | 0                   | 0.9                   | 1                   | 15.5                      | -                    |  |
| 59<br>60                            | 0                   | 0                     | 0                   | 7.8<br>5.6                | 0.25                 | 59<br>60                            | 0                   | 0.6<br>0.8            | <u> </u>            | 11.5<br>9.8               | 0.5                  |  |
| 61                                  | 0                   | 0.4                   | 1                   | 12.5                      | -                    | 61                                  | 0                   | 0.6                   | 1                   | 18.5                      | -                    |  |
| 62<br>63                            | 0                   | 0.3                   | 0                   | 7.5<br>7.6                | -                    | 62<br>63                            | 0                   | 1<br>0.8              | <u> </u>            | 15.5<br>15                | -                    |  |
| 64                                  | 0                   | 0.8                   | 1                   | 9.2                       | -                    | 64                                  | 0                   | 0.9                   | 1                   | 14.5                      | -                    |  |
| 65<br>66                            | 0                   | 0.3<br>0.1            | <u>1</u><br>1       | 7.3<br>8.6                | -                    | 65<br>66                            | 0                   | 0.5<br>0.5            | <u> </u>            | 8.5<br>16                 | -                    |  |
| 67                                  | 0                   | 0                     | 0                   | 5.4                       | -                    | 67                                  | 0                   | 0.6                   | 1                   | 15.5                      | -                    |  |
| 68<br>69                            | 0                   | 0.5<br>0              | 0                   | 6.6<br>3.1                | -                    | 68<br>69                            | 0                   | 0.5<br>0.6            | <u> </u>            | 12.5<br>4.3               | -                    |  |
| 70                                  | 0                   | 0.5                   | 1                   | 9.2                       | 0.25                 | 70                                  | 0                   | 0.5                   | 1                   | 3.5                       | 0.5                  |  |
| 71<br>72                            | 0                   | 0.3<br>0.5            | 1                   | 4.3<br>7.9                | -                    | 71<br>72                            | 0                   | 0.3<br>0.6            | 1<br>1              | 2.1<br>7                  | -                    |  |
| 73<br>74                            | 0                   | 0.5                   | 1                   | 9.3                       | -                    | 73<br>74                            | 0                   | 0.6                   | 1                   | 12.5                      | -                    |  |
| 75                                  | 0                   | 0<br>0.5              | 1                   | 11.5<br>14.2              | -                    | 75                                  | 0                   | 1<br>0.9              | 1<br>1              | 10.5<br>5.5               | -                    |  |
| 76<br>77                            | 0                   | 0.3                   | 1                   | 12.5                      | -                    | 76<br>77                            | 0                   | 0.6                   | 1                   | 9.6                       | -                    |  |
| 77<br>78                            | 0                   | 0.5<br>0.3            | 1                   | 6<br>7.6                  | -                    | 78                                  | 0                   | 0.5<br>0.5            | 1<br>1              | 10.1<br>5.2               | -                    |  |
| 79<br>80                            | 0                   | 0<br>0.5              | 0                   | 8.2<br>12.8               | -<br>0.25            | 79<br>80                            | 0                   | 0.5<br>0.3            | 1                   | 5.1<br>2.2                | -<br>0.5             |  |
| 81                                  | 0                   | 0.5                   | 1                   | 6.3                       | 0.25                 | 81                                  | 0                   | 0.5                   | 1<br>1              | 16.5                      | 0.5                  |  |
| 82                                  | 0                   | 0.2                   | 1                   | 4.8                       | -                    | 82                                  | 0                   | 0.6                   | 1                   | 4.7                       | -                    |  |
| 83<br>84                            | 0                   | 0.3<br>0.5            | 1                   | 5.1<br>8.4                | -                    | 83<br>84                            | 0                   | 1<br>0.9              | 1<br>1              | 15.7<br>12.5              | -                    |  |
| 85<br>86                            | 0                   | 0<br>0.5              | 0                   | 8.9<br>16.4               | -                    | 85<br>86                            | 0                   | 0<br>0.9              | 0                   | 2.5<br>8.5                | -                    |  |
| 87                                  | 0                   | 0.5                   | 1                   | 5.8                       | -                    | 86                                  | 0                   | 0.9                   | 1                   | 3.5                       | -                    |  |
| 88<br>89                            | 0                   | 0.5<br>0.2            | 1                   | 11.8<br>4.3               | -                    | 88<br>89                            | 0                   | 0.1<br>0.7            | 1                   | 5.6<br>5.9                | -                    |  |
| 90                                  | 0                   | 0.5                   | 1<br>1              | 4.3<br>13.5               | 0.25                 | 90                                  | 0                   | 0.3                   | 1<br>1              | 4.8                       | 0.75                 |  |
| 91<br>92                            | 0                   | 0.1<br>0.2            | 1                   | 6.4<br>6.5                | -                    | 91<br>92                            | 0                   | 0.7<br>0.5            | 1                   | 13<br>6.5                 | -                    |  |
| 93                                  | 0                   | 0.1                   | 1                   | 6.3                       | -                    | 93                                  | 0                   | 0.7                   | 1                   | 34                        | -                    |  |
| 94                                  | 0                   | 0.3                   | 1                   | 8.5                       | -                    | 94                                  | 0                   | 0.7                   | 1                   | 16                        | -                    |  |
| 95<br>96                            | 0                   | 0.2                   | 1                   | 6.2<br>6.4                | -                    | 95<br>96                            | 0                   | 0.8                   | 1<br>1              | 13<br>3.8                 | -                    |  |
| 97                                  | 0                   | 0                     | 0                   | 3<br>6.5                  | -                    | 97                                  | 0                   | 0.9                   | 1                   | 8.5                       | -                    |  |
| 98<br>99                            | 0                   | 0                     | 0                   | 5.2                       | -                    | 98<br>99                            | 0                   | 1                     | 1                   | 10.1<br>6.5               | -                    |  |
| 100                                 | 0                   | 0.5                   | 1                   | 14.5                      | 0.75                 | 100                                 | 0                   | 0.9                   | 1                   | 10.3                      | 0.25                 |  |
| Average<br>Cic, Cip and<br>Embed. = | 0.02                | 0.25                  | 0.73                | 8.5                       | 0.42                 | Average<br>Cic, Cip and<br>Embed. = | 0.10                | 0.56                  | 0.87                | 10.7                      | 0.43                 |  |
|                                     | te Index (CI) =     |                       |                     | .75                       | <u> </u>             | Old Calcit                          | e Index (CI) =      |                       |                     | 0.97                      | 1                    |  |
| New Calci                           | te Index (CI) =     |                       | 0                   | .27                       |                      | New Calcit                          | e Index (CI) =      |                       | (                   | 0.66                      |                      |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| LC_DC3-2<br>13-Sep-22               |                     |                       |                     |                           |                      | LC_DC3-3<br>13-Sep-22         |                     |                       |                     |                           |                   |  |  |
|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------|---------------------|-----------------------|---------------------|---------------------------|-------------------|--|--|
| Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                        | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne ss (%) |  |  |
| 1                                   | 0                   | 0                     | 0                   | 5.3                       | -                    | 1                             | 0                   | 0.5                   | 1                   | 9.4                       | -                 |  |  |
| 2 3                                 | 0                   | 0.1                   | 0                   | 4.4<br>3                  | -                    | 2 3                           | 0                   | 0.4<br>0.5            | 1                   | 22.6<br>13.2              | -                 |  |  |
| 4<br>5                              | 0                   | 0                     | 0                   | 2.1<br>4.9                | -                    | 4<br>5                        | 0                   | 0.2<br>0.5            | 1                   | 16<br>4.1                 | -                 |  |  |
| 6                                   | 0                   | 0.5                   | 1                   | 26.1                      | -                    | 6                             | 0                   | 0.5                   | 1                   | 6.6                       | -                 |  |  |
| 7<br>8                              | 0                   | 0.5<br>0              | 1 0                 | 9<br>3.2                  | -                    | 7<br>8                        | 0                   | 0.5<br>0.4            | 1<br>1              | 10.2<br>14.8              | -                 |  |  |
| 9                                   | 0                   | 0.5                   | 1                   | 8.2                       | -                    | 9                             | 0                   | 0.5                   | 1                   | 5.2                       | -                 |  |  |
| 10<br>11                            | 0                   | 0.5<br>0.2            | 1                   | 10<br>7.5                 | 0.5                  | 10<br>11                      | 0                   | 0<br>0.5              | 0<br>1              | 4.6<br>14.5               | 0                 |  |  |
| 12                                  | 0                   | 0.5                   | 1                   | 6.1                       | -                    | 12                            | 0                   | 0.5                   | 1                   | 5.6                       | -                 |  |  |
| 13<br>14                            | 0                   | 0.5<br>0.1            | 1                   | 5.3<br>4.7                | -                    | 13<br>14                      | 0                   | 0.1<br>0.4            | 1                   | 4<br>15.1                 | -                 |  |  |
| 15                                  | 0                   | 0.8                   | 1                   | 3.6                       | -                    | 15                            | 0                   | 0                     | 0                   | 3.1                       | -                 |  |  |
| 16<br>17                            | 0                   | 0.5<br>0.5            | 1                   | 12<br>10.9                | -                    | 16<br>17                      | 0                   | 0.2<br>0.2            | 1                   | 2.6<br>2.5                | -                 |  |  |
| 18                                  | 0                   | 0.3                   | 1                   | 5                         | -                    | 18                            | 0                   | 0.5                   | 1                   | 16.9                      | -                 |  |  |
| 19<br>20                            | 0                   | 0.4<br>0.7            | 1                   | 5.9<br>22                 | 0.25                 | 19<br>20                      | 0                   | 0.3                   | 0                   | 4.6<br>5.7                | 0.25              |  |  |
| 21                                  | 0                   | 0.7                   | 1                   | 8                         | -                    | 21                            | 0                   | 0.1                   | 1                   | 4.4                       | -                 |  |  |
| 22<br>23                            | 0                   | 0.4<br>0.4            | 1                   | 5.5<br>10.5               | -                    | 22<br>23                      | 0                   | 0.5<br>0.5            | 1                   | 3.5                       | -                 |  |  |
| 24                                  | 0                   | 0.4                   | 1                   | 2.6                       | -                    | 24                            | 0                   | 0.9                   | 1                   | 7                         | -                 |  |  |
| 25<br>26                            | 0                   | 0.3<br>0.7            | 1                   | 6.1<br>16                 | -                    | 25<br>26                      | 0                   | 0.1<br>0.1            | 1                   | 4 4.5                     | -                 |  |  |
| 27                                  | 0                   | 0.4                   | 1                   | 6.5                       | -                    | 27                            | 0                   | 0.5                   | 1                   | 17                        | -                 |  |  |
| 28<br>29                            | 0                   | 0.4                   | 1                   | 8.4<br>3.2                | -                    | 28<br>29                      | 0                   | 0.9<br>0.5            | 1                   | 21<br>7                   | -                 |  |  |
| 30                                  | 0                   | 0.2                   | 1                   | 5.6                       | 0.5                  | 30                            | 0                   | 0                     | 0                   | 4.1                       | 0.75              |  |  |
| 31<br>32                            | 0                   | 0.5<br>0.8            | 1                   | 8<br>17                   | -                    | 31<br>32                      | 0                   | 0.4<br>0.1            | 1                   | 6<br>5.1                  | -                 |  |  |
| 32                                  | 0                   | 0.8                   | 1                   | 9                         | -                    | 32<br>33                      | 0                   | 0.1                   | 1<br>1              | 5.1<br>5.1                | -                 |  |  |
| 34                                  | 0                   | 0.4                   | 1                   | 7.1                       | -                    | 34                            | 0                   | 0.4                   | 1                   | 5.7                       | -                 |  |  |
| 35<br>36                            | 0                   | 0.2<br>0.6            | 1                   | 6<br>13                   | -                    | 35<br>36                      | 0                   | 0.7                   | 0<br>1              | 2.7<br>6.6                | -                 |  |  |
| 37                                  | 0                   | 0                     | 0                   | 1.5                       | -                    | 37                            | 1                   | 0.8                   | 1                   | 17                        | -                 |  |  |
| 38<br>39                            | 0                   | 0                     | 0                   | 2 2                       | -                    | 38<br>39                      | 0                   | 0.5<br>0.6            | 1<br>1              | 10<br>11.5                | -                 |  |  |
| 40                                  | 0                   | 0                     | 0                   | 2.4                       | 0.75                 | 40                            | 0                   | 0.5                   | 1                   | 7                         | 0.75              |  |  |
| 41<br>42                            | 0                   | 0.6<br>0.5            | <u>1</u><br>1       | 8.5<br>4                  | -                    | 41<br>42                      | 0                   | 0.4<br>0.3            | 1<br>1              | 4<br>8.2                  | -                 |  |  |
| 43                                  | 0                   | 0.5                   | 1                   | 10.1                      | -                    | 43                            | 0                   | 0.5                   | 1                   | 12.6                      | -                 |  |  |
| 44<br>45                            | 0                   | 0.4<br>0.9            | 1                   | 5.1<br>14                 | -                    | 44<br>45                      | 0                   | 0.2                   | 1<br>0              | 3.5<br>2                  | -                 |  |  |
| 46                                  | 0                   | 0.5                   | 1                   | 4                         | -                    | 46                            | 0                   | 0.1                   | 1                   | 3                         | -                 |  |  |
| 47<br>48                            | 0                   | 0.1<br>0.8            | 1                   | 3.6<br>13.6               | -                    | 47<br>48                      | 0                   | 0.1<br>0.7            | 1                   | 7<br>11                   | -                 |  |  |
| 49                                  | 0                   | 0.8                   | 1                   | 20.3                      | -                    | 49                            | 0                   | 0.9                   | 1                   | 20                        | -                 |  |  |
| 50<br>51                            | 0                   | 0.9<br>0.6            | 1                   | 12.3<br>9.3               | 0.5<br>-             | 50<br>51                      | 0                   | 0<br>0.3              | 0<br>1              | 3<br>5.5                  | 0.75              |  |  |
| 52                                  | 1                   | 0.5                   | 1                   | 6.5                       | -                    | 52                            | 0                   | 0                     | 0                   | 3.5                       | -                 |  |  |
| 53<br>54                            | 0                   | 0.6<br>0.5            | 1                   | 9.5<br>7.3                | -                    | 53<br>54                      | 0                   | 0.5<br>0.3            | 1                   | 5.3<br>3.5                | -                 |  |  |
| 55                                  | 0                   | 0.4                   | 1                   | 3.8                       | -                    | 55                            | 0                   | 0                     | 0                   | 3                         | -                 |  |  |
| 56<br>57                            | 0                   | 0.3<br>0.6            | 1                   | 8.2<br>8.7                | -                    | 56<br>57                      | 0                   | 0                     | 0                   | 4<br>2.2                  | -                 |  |  |
| 58                                  | 0                   | 0.5                   | 1                   | 5.1                       | -                    | 58                            | 0                   | 0.5                   | 1                   | 6.8                       | -                 |  |  |
| 59<br>60                            | 0                   | 0.5<br>0.5            | 1                   | 7.1<br>3.6                | - 0                  | 59<br>60                      | 0                   | 0<br>0.1              | 0                   | 5.3<br>3.5                | 0.25              |  |  |
| 61                                  | 0                   | 0.5                   | 1                   | 3.4                       | -                    | 61                            | 0                   | 0.5                   | 1                   | 7.5                       | -                 |  |  |
| 62<br>63                            | 0                   | 0.7<br>0.6            | 1                   | 6.2<br>9.8                | -                    | 62<br>63                      | 0                   | 0.5<br>0.6            | 1<br>1              | 5.1<br>2.5                | -                 |  |  |
| 64                                  | 0                   | 0.8                   | 1                   | 10.2                      | -                    | 64                            | 1                   | 0.5                   | 1                   | 14.5                      | -                 |  |  |
| 65                                  | 0                   | 0.6                   | 1                   | 6.3                       | -                    | 65                            | 0                   | 0.5                   | 1                   | 8.5                       | -                 |  |  |
| 66<br>67                            | 0                   | 0.7<br>0.6            | <u>1</u><br>1       | 8.4<br>3.6                | -                    | 66<br>67                      | 0                   | 0.3                   | 1<br>0              | 4.5<br>6.3                | -                 |  |  |
| 68                                  | 0                   | 0.4                   | 1                   | 4.2                       | -                    | 68                            | 0                   | 0.6                   | 1                   | 6.2                       | -                 |  |  |
| 69<br>70                            | 0                   | 0.3<br>0.3            | 1                   | 12.5<br>6.6               | 0.75                 | 69<br>70                      | 0                   | 0.8<br>0.5            | 1                   | 21<br>4.5                 | 0.25              |  |  |
| 71                                  | 0                   | 0.6                   | 1                   | 15.5                      | -                    | 71                            | 0                   | 0.8                   | 1                   | 15.5                      | -                 |  |  |
| 72<br>73                            | 0                   | 0.7<br>0.8            | 1                   | 12.5<br>7.8               | -                    | 72<br>73                      | 0                   | 0.5<br>0.6            | 1                   | 10.2<br>6.3               | -                 |  |  |
| 74                                  | 0                   | 0.5                   | 1                   | 6.5                       | -                    | 74                            | 0                   | 0.5                   | 1                   | 19                        | -                 |  |  |
| 75<br>76                            | 0                   | 0.3<br>0.2            | 1                   | 4.5<br>4.6                | -                    | 75<br>76                      | 0                   | 0.5<br>0.7            | 1                   | 6.5<br>4.5                | -                 |  |  |
| 77                                  | 1                   | 0.8                   | 1                   | 14                        | -                    | 77                            | 0                   | 0.8                   | 1                   | 9.5                       | -                 |  |  |
| 78<br>79                            | 0                   | 0.6<br>0.8            | 1                   | 15<br>10.5                | -                    | 78<br>79                      | 0                   | 0.7<br>0.6            | 1                   | 15.5<br>10.5              | -                 |  |  |
| 80                                  | 0                   | 0.3                   | 1                   | 11.6                      | 0.25                 | 80                            | 0                   | 0.3                   | 1                   | 5.3                       | 0.25              |  |  |
| 81<br>82                            | 0                   | 0.8<br>0.9            | 1                   | 16<br>13.5                | -                    | 81<br>82                      | 0                   | 0.5<br>0.3            | 1                   | 2.3<br>8.5                | -                 |  |  |
| 83                                  | 0                   | 0.8                   | 1                   | 9.6                       | -                    | 83                            | 0                   | 0.5                   | 1                   | 9.3                       | -                 |  |  |
| 84<br>85                            | 0                   | 0.7<br>0.8            | 1                   | 5.6<br>10.3               | -                    | 84<br>85                      | 0                   | 0.6<br>0.5            | 1                   | 5.1<br>5.5                | -                 |  |  |
| 86                                  | 0                   | 0.6                   | 1                   | 8.5                       | -                    | 86                            | 0                   | 0.6                   | 1                   | 7.5                       | -                 |  |  |
| 87<br>88                            | 0                   | 0.8<br>0.6            | 1                   | 6.5<br>6.3                | -                    | 87<br>88                      | 0                   | 0.6<br>0.5            | 1                   | 6.3<br>6.2                | -                 |  |  |
| 89                                  | 0                   | 0.8                   | 1                   | 5.6                       | -                    | 89                            | 0                   | 0.6                   | 1                   | 7.5                       | -                 |  |  |
| 90<br>91                            | 0                   | 0.9<br>0.8            | 1                   | 6.8<br>21                 | 0.25                 | 90<br>91                      | 0                   | 0.3<br>0.6            | 1                   | 6.5<br>7.5                | 0.25              |  |  |
| 92                                  | 0                   | 0.6                   | 1                   | 7.3                       | -                    | 92                            | 0                   | 0.6                   | 1                   | 12.1                      | -                 |  |  |
| 93<br>94                            | 0                   | 0.4<br>0.5            | 1                   | 24<br>6.6                 | -                    | 93<br>94                      | 0                   | 0.3<br>0.5            | 1                   | 12.5<br>12.5              | -                 |  |  |
| 95                                  | 0                   | 0.5                   | 1                   | 10.1                      | -                    | 95                            | 0                   | 0.5                   | 1                   | 6.5                       | -                 |  |  |
| 96<br>97                            | 0                   | 0.5<br>0.6            | 1                   | 27<br>9.5                 | -                    | 96<br>97                      | 0                   | 0.3<br>0.2            | 1<br>1              | 5.2<br>8.5                | -                 |  |  |
| 98                                  | 0                   | 0.3                   | 1                   | 6.5                       | -                    | 98                            | 0                   | 0.3                   | 1                   | 4.6                       | -                 |  |  |
| 99<br>100                           | 0                   | 0.5<br>0.3            | 1                   | 5.3<br>6.2                | -<br>0.5             | 99<br>100                     | 0                   | 0<br>0.7              | 0<br>1              | 5.1<br>13.3               | 0.25              |  |  |
| Average<br>Cic, Cip and<br>Embed. = | 0.04                | 0.48                  | 0.90                | 8.5                       |                      | Average Cic, Cip and Embed. = | 0.02                | 0.39                  | 0.86                | 7.9                       | 0.38              |  |  |
|                                     | te Index (CI) =     |                       | 0                   | .94                       |                      |                               | te Index (CI) =     |                       | 0                   | 0.88                      |                   |  |  |
| New Calci                           | te Index (CI) =     |                       |                     | .52                       |                      | New Calci                     | te Index (CI) =     |                       |                     | .41                       |                   |  |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                |                     |                       | DC4-1<br>Sep-22     |                           |                      |                                |                     |                       | DC4-2<br>Sep-22     |                           |                      |
|--------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|--------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|
| Pebble                         | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble<br>1                    | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |
| 1<br>2<br>3                    | 0                   | 0.4<br>0.1<br>0       | 1 0                 | 16<br>10                  | -                    | 2 3                            | 0                   | 0                     | 0 0                 | 7.9<br>7.5                | -                    |
| 4 5                            | 0                   | 0.6                   | 1 0                 | 11.5<br>11.2              | -                    | 4 5                            | 0                   | 0                     | 0                   | 10                        | -                    |
| 6                              | 0                   | 0.3                   | 1                   | 10                        | -                    | 6                              | 0                   | 0                     | 0                   | 5.9                       | -                    |
| 7<br>8                         | 0                   | 0.5<br>0              | 1<br>0              | 16.3<br>4.5               | -                    | 7<br>8                         | 0                   | 0.3<br>0              | 1 0                 | 12<br>14                  | -                    |
| 9<br>10                        | 0                   | 0.1<br>0              | 1<br>0              | 6<br>7.5                  | 0.5                  | 9<br>10                        | 0                   | 0<br>0.1              | 0                   | 12<br>10                  | 0.5                  |
| 11<br>12                       | 0                   | 0.5<br>0              | 1 0                 | 12.5<br>2                 | -                    | 11<br>12                       | 0                   | 0.3                   | 1 0                 | 12.1<br>11                | -                    |
| 13                             | 0                   | 0                     | 0                   | 6.6                       | -                    | 13<br>14                       | 0                   | 0                     | 0                   | 6 6.1                     | -                    |
| 15                             | 0                   | 0.3                   | 1                   | 5.5                       | -                    | 15                             | 0                   | 0                     | 0                   | 8                         | -                    |
| 16<br>17                       | 0                   | 0.7                   | 0                   | 12.2<br>18.5              | -                    | 16<br>17                       | 0                   | 0                     | 0                   | 7<br>11.9                 | -                    |
| 18<br>19                       | 0                   | 0                     | 0                   | 12.1<br>4.1               | -                    | 18<br>19                       | 0                   | 0<br>0.5              | 0                   | 5.2<br>15.5               | -                    |
| 20<br>21                       | 0                   | 0                     | 0                   | 14<br>8                   | 0.25                 | 20<br>21                       | 0                   | 0                     | 0                   | 4.1<br>8.5                | 0.5                  |
| 22                             | 0                   | 0                     | 0                   | 7                         | -                    | 22                             | 0                   | 0                     | 0                   | 5                         | -                    |
| 24                             | 0                   | 0.5                   | 0                   | 12.3<br>7                 | -                    | 24                             | 0                   | 0.1                   | 1                   | 12.9<br>2.1               | -                    |
| 25<br>26                       | 0                   | 0                     | 0                   | 7<br>5                    | -                    | 25<br>26                       | 0                   | 0<br>0.1              | 0                   | 4<br>12.1                 | -                    |
| 27<br>28                       | 0                   | 0                     | 0                   | 16<br>8                   | -                    | 27<br>28                       | 0                   | 0                     | 0                   | 4.5<br>2.5                | -                    |
| 29<br>30                       | 0                   | 0                     | 0                   | 16<br>12.5                | 0.25                 | 29<br>30                       | 0                   | 0                     | 0                   | 4.6<br>13                 | 0.5                  |
| 31                             | 0                   | 0                     | 0                   | 17                        | -                    | 31                             | 0                   | 0                     | 0                   | 12.5                      | -                    |
| 32<br>33                       | 0                   | 0                     | 0                   | 14.5<br>6.1               | -                    | 32<br>33                       | 0                   | 0.3<br>0.1            | 1                   | 12.5<br>4.1               | -                    |
| 34<br>35                       | 0                   | 0                     | 0                   | 5<br>8                    | -                    | 34<br>35                       | 0                   | 0<br>0.3              | 0                   | 4.6<br>11.3               | -                    |
| 36<br>37                       | 0                   | 0.1                   | 1 0                 | 7<br>5.5                  | -                    | 36<br>37                       | 0                   | 0                     | 0                   | 6.1<br>8.5                |                      |
| 38<br>39                       | 0                   | 0.1                   | 1 0                 | 7.3<br>8.5                | -                    | 38<br>39                       | 0                   | 0.2                   | 1 0                 | 10.6<br>7.5               | -                    |
| 40                             | 0                   | 0.3                   | 1                   | 13.5                      | 0                    | 40                             | 0                   | 0.1                   | 1                   | 13                        | 0.5                  |
| 41<br>42                       | 0                   | 0                     | 0                   | 10.6<br>9.3               | -                    | 41<br>42                       | 0                   | 0                     | 0                   | 4.5<br>18.5               | -                    |
| 43<br>44                       | 0                   | 0<br>0.2              | 0<br>1              | 8.9<br>14.5               | -                    | 43<br>44                       | 0                   | 0<br>0.1              | 0                   | 7<br>12.5                 | -                    |
| 45<br>46                       | 0                   | 0                     | 0                   | 16.9<br>10                | -                    | 45<br>46                       | 0                   | 0                     | 0                   | 5<br>9.2                  | -                    |
| 47                             | 0                   | 0                     | 0                   | 9                         | -                    | 47                             | 0                   | 0                     | 0                   | 10.5                      | -                    |
| 48<br>49                       | 0                   | 0                     | 0                   | 12.5<br>5.6               | -                    | 48<br>49                       | 0                   | 0.1                   | 1<br>0              | 5<br>5.2                  | -                    |
| 50<br>51                       | 0                   | 0                     | 0                   | 11<br>3.5                 | 0.5                  | 50<br>51                       | 0                   | 0                     | 0                   | 10.6<br>8.8               | 0.75                 |
| 52<br>53                       | 0                   | 0                     | 0                   | 4.5<br>5.8                | -                    | 52<br>53                       | 0                   | 0<br>0.2              | 0                   | 3.9<br>5.3                | -                    |
| 54<br>55                       | 0                   | 0.1                   | 1 0                 | 9.8<br>9.1                | -                    | 54<br>55                       | 0                   | 0                     | 0                   | 2.9<br>8.7                | -                    |
| 56                             | 0                   | 0.5                   | 1                   | 8.6                       | -                    | 56                             | 0                   | 0                     | 0                   | 5.2                       | -                    |
| 57<br>58                       | 0                   | 0                     | 0                   | 7.3<br>10.5               | -                    | 57<br>58                       | 0                   | 0.1<br>0.1            | 1                   | 12.1<br>4.5               | -                    |
| 59<br>60                       | 0                   | 0                     | 0                   | 5.3<br>4.6                | - 0                  | 59<br>60                       | 0                   | 0                     | 0                   | 3.2<br>8.5                | 0.75                 |
| 61<br>62                       | 0                   | 0                     | 0                   | 9.8<br>4.5                | -                    | 61<br>62                       | 0                   | 0.1                   | 1 0                 | 5.5<br>5.4                | -                    |
| 63<br>64                       | 0                   | 0                     | 0                   | 9.9<br>16.5               | -                    | 63<br>64                       | 0                   | 0                     | 0                   | 8.5<br>10.2               | -                    |
| 65                             | 0                   | 0.5                   | 1                   | 8.1                       | -                    | 65                             | 0                   | 0.1                   | 1                   | 5.3                       | -                    |
| 66<br>67                       | 0                   | 0                     | 0                   | 14.5<br>10.2              | -                    | 66<br>67                       | 0                   | 0                     | 0                   | 5.6<br>4.5                | -                    |
| 68<br>69                       | 0                   | 0<br>0.3              | 0                   | 4.5<br>7.6                | -                    | 68<br>69                       | 0                   | 0.1<br>0.1            | 1                   | 7.3<br>6.4                | -                    |
| 70<br>71                       | 0                   | 0.3                   | 1 0                 | 10.2                      | 0.75                 | 70<br>71                       | 0                   | 0                     | 0                   | 4.8                       | 0.25                 |
| 72                             | 0                   | 0.2                   | 1                   | 5.8                       | -                    | 72                             | 0                   | 0                     | 0                   | 8.5                       | -                    |
| 73<br>74                       | 0                   | 0                     | 0                   | 12.3<br>5.4               | -                    | 73<br>74                       | 0                   | 0                     | 0                   | 4.4<br>5.8                | -                    |
| 75<br>76                       | 0                   | 0.1                   | 0                   | 8.5<br>1.9                | -                    | 75<br>76                       | 0                   | 0 0.3                 | 0                   | 10.5<br>11.1              | -                    |
| 77<br>78                       | 0                   | 0.3                   | 1<br>0              | 11.2<br>15.5              | -                    | 77<br>78                       | 0                   | 0<br>0.2              | 0                   | 12.4<br>10.5              | -                    |
| 79<br>80                       | 0                   | 0                     | 0                   | 5.2<br>9.2                | - 0.5                | 79<br>80                       | 0                   | 0 0.2                 | 0                   | 7.5<br>6.6                | 0.5                  |
| 81                             | 0                   | 0.1                   | 1                   | 6.7                       | -                    | 81                             | 0                   | 0                     | 0                   | 8.5                       | -                    |
| 82<br>83                       | 0                   | 0<br>0.3              | 0<br>1              | 1.8<br>10.3               | -                    | 82<br>83                       | 0                   | 0                     | 0                   | 5.4<br>9.8                | -                    |
| 84<br>85                       | 0                   | 0                     | 0                   | 6.5<br>8.8                | -                    | 84<br>85                       | 0                   | 0.1                   | 1 0                 | 7.2<br>8.4                | -                    |
| 86<br>87                       | 0                   | 0.1                   | 1 0                 | 4.3<br>4.6                | -                    | 86<br>87                       | 0                   | 0.1                   | 1 0                 | 6.5<br>5.2                |                      |
| 88<br>89                       | 0                   | 0.8                   | 1 0                 | 11.5<br>7.9               | -                    | 88<br>89                       | 0                   | 0.1                   | 1 0                 | 13.5<br>4.1               | -                    |
| 90                             | 0                   | 0                     | 0                   | 8.1                       | 0.5                  | 90                             | 0                   | 0                     | 0                   | 2.2                       | 0                    |
| 91<br>92                       | 0                   | 0                     | 0                   | 4.5<br>7.5                | -                    | 91<br>92                       | 0                   | 0                     | 0                   | 15.6<br>4                 | -                    |
| 93<br>94                       | 0                   | 0.1                   | 1<br>0              | 3.2<br>7.4                | -                    | 93<br>94                       | 0                   | 0                     | 0                   | 13.5<br>9.8               | -                    |
| 95<br>96                       | 0                   | 0                     | 0                   | 15.2<br>14.1              | -                    | 95<br>96                       | 0                   | 0.1                   | 1 0                 | 9.5<br>3.6                | -                    |
| 97                             | 0                   | 0                     | 0                   | 5.3                       | -                    | 97                             | 0                   | 0.1                   | 1                   | 9.7                       | -                    |
| 98<br>99                       | 0                   | 0<br>0.2              | 0<br>1              | 8.6<br>4.4                | -                    | 98<br>99                       | 0                   | 0                     | 0                   | 4.7<br>8.2                | -                    |
| 100<br>Average<br>Sic, Cip and | 0                   | 0.09                  | 0<br><b>0.29</b>    | 4.8<br><b>8.9</b>         | 0.25<br><b>0.35</b>  | 100<br>Average<br>Cic, Cip and | 0                   | 0.3<br><b>0.05</b>    | 0.29                | 14.5<br><b>8.1</b>        | 0.5<br><b>0.48</b>   |
| Embed. =                       | to Index (0)        |                       |                     |                           |                      | Embed. =                       | to Index (C)        |                       |                     | 1 20                      |                      |
|                                | te Index (CI) =     | 1                     |                     | .09                       |                      |                                | te Index (CI) =     |                       |                     | ).29<br>).05              |                      |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                  |                     |                       | DC4-3<br>Sep-22     |                           |                      |                         | LC_DCDS-1<br>13-Sep-22    |                     |                         | LC_DCDS-2<br>13-Sep-22    |                    |
|----------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------|---------------------------|---------------------|-------------------------|---------------------------|--------------------|
| Pebble                           | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                  | Intermediate<br>Axis (cm) | Embeddedne ss (%)   | Pebble                  | Intermediate<br>Axis (cm) | Embeddedne ss (%)  |
| 1 2                              | 0                   | 0                     | 0                   | 8.4<br>7.6                | -                    | 1 2                     | 8<br>10.1                 | -                   | 1 2                     | 4.7<br>4.1                | -                  |
| 3 4                              | 0                   | 0                     | 0                   | 9                         | -                    | 3 4                     | 13.2                      | -                   | 3 4                     | 5                         | -                  |
| 5                                | 0                   | 0.1                   | 0                   | 7                         | -                    | 5                       | 7.1<br>5.5                | -                   | 5                       | 22                        | -                  |
| 6<br>7                           | 0                   | 0                     | 0                   | 11.3<br>11.5              | -                    | 6<br>7                  | 7.6<br>6.7                | -                   | 6<br>7                  | 13<br>5.6                 | -                  |
| 8                                | 0                   | 0                     | 0                   | 7.6<br>12.6               | -                    | 8                       | 9.5<br>6.5                | -                   | 8 9                     | 5.7<br>5.4                | -                  |
| 10                               | 0                   | 0                     | 0                   | 4                         | 0                    | 10                      | 10                        | 0.75                | 10                      | 6                         | 0.5                |
| 11<br>12                         | 0                   | 0.1                   | 0                   | 7.1<br>11                 | -                    | 11<br>12                | 7<br>9                    | -                   | 11<br>12                | 5.6<br>7.3                | -                  |
| 13<br>14                         | 0                   | 0.1                   | 1 0                 | 13<br>3.6                 | -                    | 13<br>14                | 11<br>17                  | -                   | 13<br>14                | 4.3<br>5                  | -                  |
| 15                               | 0                   | 0                     | 0                   | 11.5                      | -                    | 15<br>16                | 2.5                       | -                   | 15<br>16                | 4<br>15                   | -                  |
| 16<br>17                         | 0                   | 0                     | 0                   | 7<br>6.2                  | -                    | 17                      | 3<br>4.5                  | -                   | 17                      | 20                        | -                  |
| 18<br>19                         | 0                   | 0                     | 0                   | 13.5<br>7                 | -                    | 18<br>19                | 9                         | -                   | 18<br>19                | 11.5<br>8                 | -                  |
| 20<br>21                         | 0                   | 0                     | 0                   | 7<br>6.1                  | 0.25                 | 20<br>21                | 5.5<br>6.7                | 0.5                 | 20<br>21                | 13<br>21                  | 0.25               |
| 22                               | 0                   | 0                     | 0                   | 10.6                      | -                    | 22                      | 7                         | -                   | 22                      | 21.5                      | -                  |
| 23<br>24                         | 0                   | 0.1                   | 1<br>0              | 11<br>6.5                 | -                    | 23<br>24                | 5<br>5.6                  | -                   | 23<br>24                | 14<br>11                  | -                  |
| 25<br>26                         | 0                   | 0                     | 0                   | 3.5<br>4.2                | -                    | 25<br>26                | 10<br>3.1                 | -                   | 25<br>26                | 7.1<br>8                  | -                  |
| 27                               | 0                   | 0.5                   | 1                   | 16                        | -                    | 27                      | 4                         | -                   | 27                      | 11                        | -                  |
| 28<br>29                         | 0                   | 0.3                   | 0                   | 10.9<br>8.4               | -                    | 28<br>29                | 9.1<br>16                 | -                   | 28<br>29                | 6.2<br>1.5                | -                  |
| 30<br>31                         | 0                   | 0                     | 0                   | 6 6.1                     | 0.5                  | 30<br>31                | 11.5<br>5.7               | 0.25                | 30<br>31                | 7<br>8.5                  | 0.5                |
| 32                               | 0                   | 0                     | 0                   | 11.5                      | -                    | 32                      | 6                         | -                   | 32                      | 8.5                       | -                  |
| 33<br>34                         | 0                   | 0                     | 0                   | 8<br>12                   | -                    | 33<br>34                | 8.7<br>4.5                | -                   | 33<br>34                | 13<br>7                   | -                  |
| 35<br>36                         | 0                   | 0                     | 0                   | 8                         | -                    | 35<br>36                | 7.3                       | -                   | 35<br>36                | 10                        | -                  |
| 37                               | 0                   | 0                     | 0                   | 8.2                       | -                    | 37                      | 6.1                       | -                   | 37                      | 13                        | -                  |
| 38<br>39                         | 0                   | 0                     | 0                   | 12.5<br>11.6              | -                    | 38<br>39                | 4.3                       | -                   | 38<br>39                | 5.6<br>9.6                | -                  |
| 40<br>41                         | 0                   | 0                     | 0                   | 16<br>9                   | 0.5                  | 40<br>41                | 10.5<br>11.5              | 0.5                 | 40<br>41                | 13.1<br>10.6              | 0.5                |
| 42                               | 0                   | 0                     | 0                   | 5                         | -                    | 42                      | 6                         | -                   | 42                      | 10                        | -                  |
| 43<br>44                         | 0                   | 0                     | 0                   | 10.3<br>9                 | -                    | 43<br>44                | 9.3<br>14                 | -                   | 43<br>44                | 7.2<br>13.3               | -                  |
| 45<br>46                         | 0                   | 0                     | 0                   | 13<br>9                   | -                    | 45<br>46                | 19<br>5.2                 | -                   | 45<br>46                | 15.5<br>8                 | -                  |
| 47                               | 0                   | 0                     | 0                   | 6                         | -                    | 47                      | 13.3                      | -                   | 47                      | 8.2                       | -                  |
| 48<br>49                         | 0                   | 0                     | 0                   | 12.3<br>7                 | -                    | 48<br>49                | 4.6<br>5.5                | -                   | 48<br>49                | 7<br>10                   | -                  |
| 50<br>51                         | 0                   | 0                     | 0                   | 18.9<br>7.5               | 0.25                 | 50<br>51                | 8<br>10.3                 | 0.25                | 50<br>51                | 10.5<br>9.1               | 0.75               |
| 52                               | 0                   | 0                     | 0                   | 13                        | -                    | 52                      | 7.8                       | -                   | 52                      | 7.3                       | -                  |
| 53<br>54                         | 0                   | 0.6<br>0              | 0                   | 13<br>4.3                 | -                    | 53<br>54                | 11.2<br>4.1               | -                   | 53<br>54                | 3.9<br>4.6                | -                  |
| 55<br>56                         | 0                   | 0                     | 0                   | 11.5<br>16                | -                    | 55<br>56                | 6.5<br>2.4                | -                   | 55<br>56                | 3.8<br>6.5                | -                  |
| 57                               | 0                   | 0                     | 0                   | 5.3                       | -                    | 57                      | 8.9                       | -                   | 57                      | 1.4                       | -                  |
| 58<br>59                         | 0                   | 0.5                   | 1                   | 8                         | -                    | 58<br>59                | 7.4<br>1                  | -                   | 58<br>59                | 9.8<br>35.6               | -                  |
| 60<br>61                         | 0                   | 0<br>0.1              | 0<br>1              | 5<br>4.4                  | 0.25                 | 60<br>61                | 7<br>22                   | 0.25                | 60<br>61                | 2.5<br>3.2                | 0.5                |
| 62                               | 0                   | 0                     | 0                   | 6.3                       | -                    | 62                      | 21                        | -                   | 62                      | 2.1                       | -                  |
| 63<br>64                         | 0                   | 0.2                   | 1                   | 4.2<br>8.8                | -                    | 63<br>64                | 6.1<br>5.4                | -                   | 63<br>64                | 7.6<br>6.3                | -                  |
| 65<br>66                         | 0                   | 0 0.1                 | 0                   | 5.8<br>9.4                | -                    | 65<br>66                | 6.8<br>4.3                | -                   | 65<br>66                | 8.5<br>7.4                | -                  |
| 67<br>68                         | 0                   | 0                     | 0                   | 6.7<br>7.2                | -                    | 67<br>68                | 4.2<br>4.6                | -                   | 67<br>68                | 18<br>6.8                 | -                  |
| 69                               | 0                   | 0                     | 0                   | 6.5                       | -                    | 69                      | 3.5                       | -                   | 69                      | 13.5                      | -                  |
| 70<br>71                         | 0                   | 0.2                   | 1<br>0              | 7.3<br>13                 | 0.5                  | 70<br>71                | 5.1<br>0.9                | 0.75                | 70<br>71                | 7.5<br>8.5                | 0.75               |
| 72<br>73                         | 0                   | 0                     | 0                   | 10.4<br>6.3               | -                    | 72<br>73                | 8.2<br>8.4                | -                   | 72<br>73                | 6.9<br>5.5                | -                  |
| 74                               | 0                   | 0                     | 0                   | 8.5                       | -                    | 74                      | 10.1                      | -                   | 74                      | 7.4                       | -                  |
| 75<br>76                         | 0                   | 0                     | 0                   | 6.4<br>12.1               | -                    | 75<br>76                | 9.8<br>10                 | -                   | 75<br>76                | 10.5<br>14.6              | -                  |
| 77<br>78                         | 0                   | 0                     | 0                   | 4.5<br>1.8                | -                    | 77<br>78                | 14<br>3.5                 | -                   | 77<br>78                | 8.5<br>6.3                | -                  |
| 79                               | 0                   | 0                     | 0                   | 11.7                      | -                    | 79                      | 2                         | -                   | 79                      | 7.8                       | -                  |
| 80<br>81                         | 0                   | 0                     | 0                   | 5.5<br>6.7                | 0.5                  | 80<br>81                | 5.3<br>9.1                | 0.5                 | 80<br>81                | 6.3<br>2.4                | 0.5                |
| 82<br>83                         | 0                   | 0                     | 0                   | 3.2<br>2.4                | -                    | 82<br>83                | 4.5<br>6.5                | -                   | 82<br>83                | 13.5<br>3.4               | -                  |
| 84                               | 0                   | 0.2                   | 1                   | 18.3                      | -                    | 84                      | 19                        | -                   | 84                      | 5.1                       | -                  |
| 85<br>86                         | 0                   | 0.2                   | 0                   | 8.6<br>7.5                | -                    | 85<br>86                | 4.1<br>6.2                | -                   | 85<br>86                | 7.2<br>4.8                | -                  |
| 87<br>88                         | 0                   | 0.1                   | 1 0                 | 11<br>1.7                 | -                    | 87<br>88                | 13.5<br>16.1              | -                   | 87<br>88                | 5.9<br>10                 | -                  |
| 89                               | 0                   | 0                     | 0                   | 12.4                      | -                    | 89                      | 13.2                      | -                   | 89                      | 10.8                      | -                  |
| 90<br>91                         | 0                   | 0                     | 0                   | 7.6<br>7.7                | 0.75                 | 90<br>91                | 19<br>5.3                 | 0.5                 | 90<br>91                | 7.3<br>6.8                | 0.75               |
| 92<br>93                         | 0                   | 0                     | 0                   | 5.6<br>6.4                | -                    | 92<br>93                | 6.2<br>7                  | -                   | 92<br>93                | 9<br>4.7                  | -                  |
| 94                               | 0                   | 0                     | 0                   | 9.5                       | -                    | 94                      | 4.5                       | -                   | 94                      | 5.1                       | -                  |
| 95<br>96                         | 0                   | 0                     | 0                   | 8.3<br>4.8                | -                    | 95<br>96                | 6.3                       | -                   | 95<br>96                | 9.2                       | -                  |
| 97<br>98                         | 0                   | 0 0.1                 | 0                   | 7.5<br>13                 | -                    | 97<br>98                | 2.1                       | -                   | 97<br>98                | 7.4<br>8.3                | -                  |
| 99                               | 0                   | 0                     | 0                   | 5.5                       | -                    | 99                      | 24                        | -                   | 99                      | 4                         | -                  |
| Average<br>Cic, Cip and          | 0<br><b>0</b>       | 0<br><b>0.04</b>      | 0<br><b>0.17</b>    | 5<br><b>8.5</b>           | 0.25<br>0.38         | Average<br>Cic, Cip and | 10.3<br><b>8.0</b>        | 0.75<br><b>0.50</b> | Average<br>Cic, Cip and | 12<br><b>8.6</b>          | 0.5<br><b>0.55</b> |
| Embed. =  Old Calcit  New Calcit | te Index (CI) =     |                       |                     | .17<br>.04                |                      | Embed. =                |                           |                     | Embed. =                |                           |                    |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                     |                     |                       | DCDS-3<br>Sep-22                   |                           |                      |                                     |                     | LC_DCDS-4<br>13-Sep-22 |                     |                           |                      |
|-------------------------------------|---------------------|-----------------------|------------------------------------|---------------------------|----------------------|-------------------------------------|---------------------|------------------------|---------------------|---------------------------|----------------------|
| Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence                | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion  | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |
| 1 2                                 | 0                   | 0.1<br>0.4            | 1                                  | 55<br>7.7                 | -                    | 1 2                                 | 0                   | 0.5                    | 0                   | 9<br>7.5                  | -                    |
| 3<br>4                              | 0                   | 0<br>0.4              | 0                                  | 5<br>7.5                  | -                    | 3<br>4                              | 0                   | 0.2<br>0.6             | 1                   | 6.9<br>10.3               | -                    |
| 5                                   | 0                   | 0.9                   | 1                                  | 8.5                       | -                    | 5                                   | 0                   | 0.4                    | 1                   | 8.5                       | -                    |
| 6<br>7                              | 0                   | 0.2<br>0.5            | 1                                  | 13.5<br>17                | -                    | 6<br>7                              | 0                   | 0.1<br>0.3             | 1 1                 | 12.2<br>4.7               | -                    |
| 8                                   | 0                   | 0.3                   | 1                                  | 17.6<br>17.6              | -                    | 8                                   | 0                   | 0.2<br>0.3             | 1                   | 12<br>2.9                 | -                    |
| 10                                  | 0                   | 0.4<br>0.2            | 1                                  | 12                        | 0.25                 | 10                                  | 0                   | 0.3                    | 1 1                 | 9.5                       | 0.5                  |
| 11<br>12                            | 0                   | 0<br>0.2              | 0                                  | 4.3<br>12.3               | -                    | 11<br>12                            | 0                   | 0.1<br>0.3             | 1                   | 4.1<br>7.5                | -                    |
| 13                                  | 0                   | 0.9                   | 1                                  | 17                        | -                    | 13                                  | 0                   | 0.1                    | 1                   | 9.5                       | -                    |
| 14<br>15                            | 0                   | 0                     | 0                                  | 7.2                       | -                    | 14<br>15                            | 0                   | 0.1<br>0.5             | 1                   | 7.1<br>7.6                | -                    |
| 16                                  | 0                   | 0.5                   | 1                                  | 11.3                      | -                    | 16                                  | 0                   | 0.9                    | 1                   | 21.5                      | -                    |
| 17<br>18                            | 0                   | 0                     | 0                                  | 3                         | -                    | 17<br>18                            | 0                   | 0.5<br>0.6             | 1 1                 | 12<br>16                  | -                    |
| 19                                  | 0                   | 0.1                   | 1                                  | 5.2                       | -                    | 19                                  | 0                   | 0.7                    | 1                   | 12                        | -                    |
| 20<br>21                            | 0                   | 0.2<br>0.5            | 1                                  | 5.4<br>7.6                | 0.75                 | 20<br>21                            | 0                   | 0.5<br>0.7             | 1                   | 14.5<br>10                | 0.25                 |
| 22                                  | 0                   | 0.5                   | 1                                  | 6                         | -                    | 22                                  | 0                   | 0                      | 0                   | 4.1                       | -                    |
| 23<br>24                            | 0                   | 0                     | 0                                  | 3.2<br>2.7                | -                    | 23<br>24                            | 0                   | 0.5<br>0.7             | 1 1                 | 10.5<br>16                | -                    |
| 25                                  | 0                   | 0.6                   | 1                                  | 7.2                       | -                    | 25                                  | 0                   | 0.7                    | 1                   | 12.5                      | -                    |
| 26<br>27                            | 0                   | 0.7<br>0.4            | 1                                  | 16<br>16.5                | -                    | 26<br>27                            | 0                   | 0.7<br>0.8             | 1 1                 | 19<br>6                   | -                    |
| 28                                  | 0                   | 0.5                   | 1                                  | 5.6                       | -                    | 28                                  | 0                   | 0.9                    | 1                   | 9                         | -                    |
| 29<br>30                            | 0                   | 0.7<br>0.8            | 1                                  | 6.7<br>9.7                | 0.75                 | 29<br>30                            | 0                   | 0.7<br>0.4             | 1                   | 9.1<br>10.3               | 0.75                 |
| 31                                  | 0                   | 0.5                   | 1                                  | 15                        | -                    | 31                                  | 0                   | 1                      | 1                   | 8.6                       | -                    |
| 32<br>33                            | 0                   | 0.5<br>0              | 0                                  | 14.1<br>4                 | -                    | 32<br>33                            | 0                   | 0.5                    | 1 1                 | 25.5<br>13                | -                    |
| 34                                  | 0                   | 0.2                   | 1                                  | 5.3                       | -                    | 34                                  | 0                   | 0.7                    | 1                   | 18.3                      | -                    |
| 35<br>36                            | 0                   | 0.7<br>0.8            | 1                                  | 7.6<br>4.9                | -                    | 35<br>36                            | 0                   | 0.2<br>0.9             | 1                   | 7.1<br>21                 | -                    |
| 37                                  | 0                   | 0.7                   | 1                                  | 4.7                       | -                    | 37                                  | 0                   | 0.1                    | 1                   | 7                         | -                    |
| 38<br>39                            | 0                   | 0.4                   | 0                                  | 3                         | -                    | 38<br>39                            | 0                   | 0.3<br>0.7             | 1 1                 | 8<br>12                   | -                    |
| 40                                  | 0                   | 0.3                   | 1                                  | 14.4                      | 0.5                  | 40                                  | 0                   | 0                      | 0                   | 8                         | 0.5                  |
| 41<br>42                            | 0                   | 0.9<br>0              | 0                                  | 10<br>2.9                 | -                    | 41<br>42                            | 0                   | 0.5<br>0.3             | 1 1                 | 10.5<br>10                | -                    |
| 43                                  | 0                   | 0.5                   | 1                                  | 9                         | -                    | 43                                  | 0                   | 0.7                    | 1                   | 19.5                      | -                    |
| 44<br>45                            | 0                   | 0.7<br>0.5            | 1                                  | 5<br>10                   | -                    | 44<br>45                            | 0                   | 0.4                    | 0                   | 9                         | -                    |
| 46                                  | 0                   | 0.9                   | 1                                  | 21                        | -                    | 46                                  | 0                   | 0.3                    | 1                   | 11.3                      | -                    |
| 47<br>48                            | 0                   | 0.7<br>0.5            | 1                                  | 7.1                       | -                    | 47<br>48                            | 0                   | 0.5                    | 0 1                 | 8<br>15.3                 | -                    |
| 49                                  | 0                   | 0.5                   | 1                                  | 10.3                      | -                    | 49                                  | 0                   | 0.4                    | 1                   | 7.9                       | -                    |
| 50<br>51                            | 0                   | 0.4<br>0.5            | 1                                  | 6.5<br>12.3               | 0.25                 | 50<br>51                            | 0                   | 0<br>0.8               | 0                   | 5<br>16.5                 | 0.5                  |
| 52                                  | 0                   | 0.2                   | 1                                  | 14                        | -                    | 52                                  | 0                   | 0.5                    | 1                   | 7.5                       | -                    |
| 53<br>54                            | 0                   | 0.5<br>0.7            | 1                                  | 22<br>15                  | -                    | 53<br>54                            | 0                   | 0.5<br>0.6             | 1                   | 4.5<br>17.5               | -                    |
| 55                                  | 0                   | 0                     | 0                                  | 8.2                       | -                    | 55                                  | 0                   | 0                      | 0                   | 6.5                       | -                    |
| 56<br>57                            | 0                   | 0.7<br>8              | 1                                  | 10.5<br>18                | -                    | 56<br>57                            | 0                   | 0.8                    | 1 0                 | 7.8<br>2.8                | -                    |
| 58                                  | 0                   | 0                     | 0                                  | 4.5                       | -                    | 58                                  | 0                   | 0                      | 0                   | 2.2                       | -                    |
| 59<br>60                            | 0                   | 0.7<br>0.4            | 1                                  | 16.5<br>8.5               | 0.5                  | 59<br>60                            | 0                   | 0.8<br>0.6             | 1                   | 9.5<br>5.5                | 0.75                 |
| 61                                  | 0                   | 0                     | 0                                  | 3.3                       | -                    | 61                                  | 0                   | 0                      | 0                   | 3.5                       | -                    |
| 62<br>63                            | 0                   | 0.5<br>0.3            | 1                                  | 14<br>10.5                | -                    | 62<br>63                            | 0                   | 0                      | 0                   | 4.1                       | -                    |
| 64                                  | 0                   | 0.1                   | 1                                  | 3.5                       | -                    | 64                                  | 0                   | 0.8                    | 1                   | 12.5                      | -                    |
| 65<br>66                            | 0                   | 0.4<br>0.5            | 1                                  | 11.5<br>21                | -                    | 65<br>66                            | 0                   | 0.9<br>0.8             | 1 1                 | 19.5<br>34.5              | -                    |
| 67                                  | 0                   | 0                     | 0                                  | 5                         | -                    | 67                                  | 0                   | 0.6                    | 1                   | 20.5                      | -                    |
| 68<br>69                            | 0                   | 0.2                   | 0                                  | 10.3<br>4.5               | -                    | 68<br>69                            | 0                   | 0                      | 0                   | 5.5<br>5.8                | -                    |
| 70<br>71                            | 0                   | 0                     | 0                                  | 6.5<br>3.6                | 0.25                 | 70<br>71                            | 0                   | 0                      | 0                   | 2.5<br>5.5                | 0                    |
| 72                                  | 0                   | 0.5                   | 1                                  | 10.2                      | -                    | 72                                  | 0                   | 0.7                    | 0                   | 8.5                       | -                    |
| 73<br>74                            | 0                   | 0                     | 0                                  | 8.1<br>5.2                | -                    | 73<br>74                            | 0                   | 0.5<br>1               | 1                   | 17.5<br>15.6              | -                    |
| 75                                  | 0                   | 0.1                   | 1                                  | 5.3                       | -                    | 75                                  | 0                   | 0.5                    | 1                   | 4.8                       | -                    |
| 76<br>77                            | 0                   | 0.5<br>0              | 1 0                                | 8.4<br>7.4                | -                    | 76<br>77                            | 0                   | 0                      | 0                   | 3.2<br>4.1                | -                    |
| 78                                  | 0                   | 0.5                   | 1                                  | 8.3                       | -                    | 78                                  | 0                   | 0.5                    | 1                   | 7.3                       | -                    |
| 79<br>80                            | 0                   | 0.5<br>0              | 1 0                                | 4.1<br>7.3                | -<br>0.5             | 79<br>80                            | 0                   | 1 0                    | 1 0                 | 10.4<br>4.5               | 0.25                 |
| 81                                  | 0                   | 0                     | 0                                  | 5.7                       | -                    | 81                                  | 0                   | 0.5                    | 1                   | 9.8                       | 0.25                 |
| 82<br>83                            | 0                   | 0<br>0.3              | 0                                  | 10.3<br>8.6               | -                    | 82<br>83                            | 0                   | 0.6<br>0.5             | 1                   | 7.6<br>10.5               | -                    |
| 84                                  | 0                   | 0.6                   | 1                                  | 12.5                      | -                    | 84                                  | 0                   | 0.5                    | 1                   | 11                        | -                    |
| 85<br>86                            | 0                   | 0.3                   | 1 0                                | 10.2<br>2.4               | -                    | 85<br>86                            | 0                   | 0.6                    | 1 0                 | 12<br>9.2                 | -                    |
| 87                                  | 0                   | 0.3                   | 1                                  | 9.3                       | -                    | 87                                  | 0                   | 0.3                    | 1                   | 8.3                       | -                    |
| 88<br>89                            | 0                   | 0.1<br>0.4            | 1                                  | 3.4<br>8.3                | -                    | 88<br>89                            | 0                   | 0.3<br>0.5             | 1                   | 11.1<br>16.2              | -                    |
| 90                                  | 0                   | 0.2                   | 1                                  | 9.1                       | 0.75                 | 90                                  | 0                   | 0.5                    | 1                   | 9.3                       | 0.25                 |
| 91<br>92                            | 0                   | 0<br>0.5              | 0                                  | 5.3<br>8.1                | -                    | 91<br>92                            | 0                   | 0<br>0.5               | 0                   | 0.1<br>19                 | -                    |
| 93                                  | 0                   | 0                     | 0                                  | 8.4                       | -                    | 93                                  | 0                   | 0.5                    | 1                   | 14.5                      | -                    |
| 94<br>95                            | 0                   | 0.3<br>0.3            | 1                                  | 9.5<br>7.8                | -                    | 94<br>95                            | 0                   | 0<br>0.5               | 0                   | 2.5<br>16.3               | -                    |
| 96                                  | 0                   | 0                     | 0                                  | 3.8                       | -                    | 96                                  | 0                   | 0.2                    | 1                   | 10.1                      | -                    |
| 97<br>98                            | 0                   | 0.1<br>0.5            | 1                                  | 5.5<br>18.2               | -                    | 97<br>98                            | 0                   | 0.1<br>0.4             | 1 1                 | 11<br>7.2                 | -                    |
| 99                                  | 0                   | 0.6                   | 1                                  | 12.3                      | -                    | 99                                  | 0                   | 0.3                    | 1                   | 16                        | -                    |
| 100                                 | 0                   | 0                     | 0                                  | 4.6                       | 0.75                 | 100                                 | 0                   | 0.1                    | 1                   | 3.8                       | 0.25                 |
| Average<br>Cic, Cip and<br>Embed. = | 0                   | 0.40                  | 0.71                               | 9.3                       | 0.53                 | Average<br>Cic, Cip and<br>Embed. = | 0                   | 0.41                   | 0.79                | 10.2                      | 0.40                 |
|                                     | te Index (CI) =     |                       |                                    | .71                       | 1                    |                                     | te Index (CI) =     |                        |                     | 0.79                      | 1                    |
| New Calci                           | te Index (CI) =     |                       | 0.40 New Calcite Index (CI) = 0.41 |                           |                      |                                     |                     |                        |                     |                           |                      |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                    |                     |                       | DCDS-5<br>Sep-22    |                           |                      | LC_DCEF-1<br>13-Sep-22              |                     |                       |                     |                           |                      |  |
|------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|--|
| Pebble                             | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |  |
| 1 2                                | 0                   | 0                     | 0                   | 9.5<br>8.2                | -                    | 1 2                                 | 0                   | 0                     | 0                   | 20                        | -                    |  |
| 3<br>4                             | 0                   | 0<br>0.3              | 0                   | 9.3<br>9.4                | -                    | 3<br>4                              | 0                   | 0                     | 0                   | 4 4                       | -                    |  |
| 5<br>6                             | 0                   | 0                     | 0                   | 8.5<br>5.2                | -                    | 5<br>6                              | 0                   | 0                     | 0                   | 2<br>2.5                  | -                    |  |
| 7<br>8                             | 0                   | 0.3<br>0.2            | 1                   | 10.1<br>3.3               | -                    | 7<br>8                              | 0                   | 0                     | 0                   | 14<br>3.1                 | -                    |  |
| 9                                  | 0                   | 0.3                   | 1 0                 | 13<br>5.1                 | -<br>0.25            | 9                                   | 0                   | 0                     | 0                   | 10.5<br>18.5              | 0.5                  |  |
| 11                                 | 0                   | 0                     | 0                   | 4.2<br>15.5               | -                    | 11                                  | 0                   | 0                     | 0                   | 30 2.6                    | -                    |  |
| 13<br>14                           | 0                   | 0.3                   | 0                   | 4.5<br>10.1               | -                    | 13<br>14                            | 0                   | 0                     | 0                   | 3                         | -                    |  |
| 15                                 | 0                   | 0.5                   | 1                   | 16.5                      | -                    | 15                                  | 0                   | 0                     | 0                   | 8                         | -                    |  |
| 16<br>17                           | 0                   | 0                     | 0                   | 9.5<br>12.3               | -                    | 16<br>17                            | 0                   | 0                     | 0                   | 6<br>7.9                  | -                    |  |
| 18<br>19                           | 0                   | 0.2                   | 1<br>0              | 9.5<br>10.5               | -                    | 18<br>19                            | 0                   | 0                     | 0                   | 4<br>17.5                 | -                    |  |
| 20<br>21                           | 0                   | 0<br>0.3              | 0<br>1              | 11.3<br>8.1               | 0.25                 | 20<br>21                            | 0                   | 0                     | 0                   | 6<br>5.2                  | 0.5                  |  |
| 22<br>23                           | 0                   | 0.6<br>0.2            | 1                   | 8.5<br>11.2               | -                    | 22<br>23                            | 0                   | 0                     | 0                   | 6<br>23.5                 | -                    |  |
| 24<br>25                           | 0                   | 0.1<br>0.5            | 1                   | 4.2<br>6.5                | -                    | 24<br>25                            | 0                   | 0                     | 0                   | 9<br>6.5                  | -                    |  |
| 26<br>27                           | 0                   | 0.5                   | 1 0                 | 13.5                      | -                    | 26<br>27                            | 0                   | 0                     | 0                   | 8 14.2                    | -                    |  |
| 28<br>29                           | 0                   | 0.3                   | 1 0                 | 6.5<br>8.3                | -                    | 28<br>29                            | 0                   | 0                     | 0                   | 11 5.5                    | -                    |  |
| 30                                 | 0                   | 0.1                   | 1                   | 6.5                       | 0.5                  | 30                                  | 0                   | 0                     | 0                   | 2.4                       | 0.25                 |  |
| 31<br>32                           | 0                   | 0.3<br>0              | 1<br>0              | 12.5<br>5.1               | -                    | 31<br>32                            | 0                   | 0                     | 0                   | 5.6<br>7.1                | -                    |  |
| 33<br>34                           | 0                   | 0<br>0.3              | 0<br>1              | 8.5<br>7.5                | -                    | 33<br>34                            | 0                   | 0                     | 0                   | 9.3<br>6                  | -                    |  |
| 35<br>36                           | 0                   | 0<br>0.3              | 0<br>1              | 6.5<br>13.5               | -                    | 35<br>36                            | 0                   | 0                     | 0                   | 3.4<br>3.2                | -                    |  |
| 37<br>38                           | 0                   | 0.5<br>0.5            | 1                   | 6.5<br>10.5               | -                    | 37<br>38                            | 0                   | 0                     | 0                   | 2<br>1.2                  | -                    |  |
| 39<br>40                           | 0                   | 0                     | 0                   | 1.3                       | 0.75                 | 39<br>40                            | 0                   | 0                     | 0                   | 2.2                       | 0.5                  |  |
| 41                                 | 0                   | 0                     | 0                   | 7.2                       | -                    | 41                                  | 0                   | 0                     | 0                   | 3                         | -                    |  |
| 42<br>43                           | 0                   | 0<br>0.1              | 0                   | 11.3<br>5.2               | -                    | 42<br>43                            | 0                   | 0                     | 0                   | 2.8                       | -                    |  |
| 44<br>45                           | 0                   | 0.5<br>1              | 1<br>1              | 11.3<br>10.5              | -                    | 44<br>45                            | 0                   | 0                     | 0                   | 1.4<br>7                  | -                    |  |
| 46<br>47                           | 0                   | 0<br>0.4              | 0<br>1              | 5.5<br>12.5               | -                    | 46<br>47                            | 0                   | 0                     | 0                   | 4.9<br>23                 | -                    |  |
| 48<br>49                           | 0                   | 0                     | 0                   | 5.8<br>6.5                | -                    | 48<br>49                            | 0                   | 0                     | 0                   | 4<br>22.3                 | -                    |  |
| 50<br>51                           | 0                   | 0                     | 0                   | 6.8<br>8.5                | 0.25                 | 50<br>51                            | 0                   | 0                     | 0                   | 5<br>5.1                  | 0.75                 |  |
| 52                                 | 0                   | 0                     | 0                   | 5                         | -                    | 52                                  | 0                   | 0                     | 0                   | 3                         | -                    |  |
| 53<br>54                           | 0                   | 0.6<br>0              | 1                   | 10.5<br>3.4               | -                    | 53<br>54                            | 0                   | 0                     | 0                   | 1.4<br>6.3                | -                    |  |
| 55<br>56                           | 0                   | 0.1<br>0              | 1 0                 | 4<br>3.9                  | -                    | 55<br>56                            | 0                   | 0                     | 0                   | 16.5<br>4                 | -                    |  |
| 57<br>58                           | 0                   | 0                     | 0                   | 2.5<br>4.5                | -                    | 57<br>58                            | 0                   | 0                     | 0                   | 5.1<br>20                 | -                    |  |
| 59<br>60                           | 0                   | 0<br>0.7              | 0                   | 2.9<br>21.1               | 0.75                 | 59<br>60                            | 0                   | 0                     | 0                   | 5<br>4.5                  | 0.25                 |  |
| 61<br>62                           | 0                   | 0                     | 0                   | 6.5<br>17                 | -                    | 61<br>62                            | 0                   | 0                     | 0                   | 4.5<br>2.8                | -                    |  |
| 63<br>64                           | 0                   | 0.5                   | 1 0                 | 12.5<br>12.2              | -                    | 63<br>64                            | 0                   | 0                     | 0                   | 1.6<br>5.5                | -                    |  |
| 65                                 | 0                   | 0                     | 0                   | 3                         | -                    | 65                                  | 0                   | 0                     | 0                   | 23.5                      | -                    |  |
| 66<br>67                           | 0                   | 0.3<br>0.1            | 1                   | 12.9<br>7                 | -                    | 66<br>67                            | 0                   | 0                     | 0                   | 7.5<br>13                 | -                    |  |
| 68<br>69                           | 0                   | 0.5<br>0              | 0                   | 19.5<br>0.5               | -                    | 68<br>69                            | 0                   | 0                     | 0                   | 10.4<br>10                | -                    |  |
| 70<br>71                           | 0                   | 0.3<br>0.7            | 1<br>1              | 8.5<br>12.3               | 0.25                 | 70<br>71                            | 0                   | 0                     | 0                   | 4.6<br>4.1                | 0.75                 |  |
| 72<br>73                           | 0                   | 0.5<br>0              | 1 0                 | 29<br>9                   | -                    | 72<br>73                            | 0                   | 0                     | 0                   | 5<br>3.5                  | -                    |  |
| 74<br>75                           | 0                   | 0.1                   | 1 0                 | 3                         | -                    | 74<br>75                            | 0                   | 0                     | 0                   | 7.5<br>9                  | -                    |  |
| 76<br>77                           | 0                   | 0.5                   | 1                   | 16.5                      | -                    | 76                                  | 0                   | 0                     | 0                   | 1.5                       | -                    |  |
| 78                                 | 0                   | 0.5<br>0.4            | 1<br>1              | 2.6<br>1                  | -                    | 77<br>78                            | 0                   | 0                     | 0                   | 16.2<br>2                 | -                    |  |
| 79<br>80                           | 0                   | 0.7<br>0              | 1<br>0              | 5.1<br>15                 | 0.5                  | 79<br>80                            | 0                   | 0                     | 0                   | 15<br>25                  | 0.75                 |  |
| 81<br>82                           | 0                   | 0.5<br>0.5            | 1                   | 12.3<br>29                | -                    | 81<br>82                            | 0                   | 0                     | 0                   | 11<br>2.6                 | -                    |  |
| 83<br>84                           | 0                   | 0.6<br>0              | 1<br>0              | 9                         | -                    | 83<br>84                            | 0                   | 0                     | 0                   | 7<br>7.1                  | -                    |  |
| 85<br>86                           | 0                   | 0.5<br>0.5            | 1                   | 10<br>16.5                | -                    | 85<br>86                            | 0                   | 0                     | 0                   | 4 0.7                     | -                    |  |
| 87<br>88                           | 0                   | 0                     | 0                   | 2.6                       | -                    | 87<br>88                            | 0                   | 0                     | 0                   | 9.5<br>25.2               | -                    |  |
| 89                                 | 0                   | 0.1                   | 1                   | 5.1                       | -                    | 89                                  | 0                   | 0                     | 0                   | 12.2                      | -                    |  |
| 90<br>91                           | 0                   | 0.6<br>0.7            | 1                   | 15<br>11.2                | 0.5                  | 90<br>91                            | 0                   | 0                     | 0                   | 8<br>2.2                  | 0.5                  |  |
| 92<br>93                           | 0                   | 0.1<br>0              | 1<br>0              | 5<br>5.5                  | -                    | 92<br>93                            | 0                   | 0                     | 0                   | 5<br>4.6                  | -                    |  |
| 94<br>95                           | 0                   | 2<br>0.5              | 1                   | 7.6<br>10.5               | -                    | 94<br>95                            | 0                   | 0                     | 0                   | 4.8<br>2.5                | -                    |  |
| 96<br>97                           | 0                   | 0.7<br>0.2            | 1                   | 10                        | -                    | 96<br>97                            | 0                   | 0                     | 0                   | 4 3                       | -                    |  |
| 98                                 | 0                   | 0.5<br>0.7            | 1                   | 6.5<br>16                 | -                    | 98<br>99                            | 0                   | 0                     | 0                   | 7 25                      | -                    |  |
| 100                                | 0                   | 0.7                   | 1                   | 7                         | 0.5                  | 100                                 | 0                   | 0                     | 0                   | 1.4                       | 0                    |  |
| Average<br>ic, Cip and<br>Embed. = | 0                   | 0.26                  | 0.58                | 8.9                       | 0.45                 | Average<br>Cic, Cip and<br>Embed. = | 0                   | 0                     | 0                   | 7.7                       | 0.48                 |  |
| Old Colo                           | ite Index (CI) =    |                       | (                   | 0.58                      | 1                    | Old Calci                           | te Index (CI) =     |                       |                     | 0.00                      | 1                    |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| LC_DCEF-2<br>13-Sep-22              |                     |                       |                     |                           |                      | LC_DCEF-3<br>13-Sep-22              |                     |                       |                     |                           |                      |  |
|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|--|
| Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |  |
| 1<br>2<br>3                         | 0<br>0<br>0         | 0<br>0<br>0           | 0<br>0<br>0         | 5.5<br>7.5<br>7.3         | -                    | 1<br>2<br>3                         | 0<br>0<br>0         | 0 0                   | 0<br>0<br>0         | 6<br>8<br>23.5            | -                    |  |
| 4<br>5                              | 0                   | 0                     | 0                   | 10.1<br>4.6               | -                    | 3<br>4<br>5                         | 0                   | 0 0                   | 0                   | 8 5                       | -                    |  |
| 6 7                                 | 0                   | 0                     | 0                   | 19<br>11.5                | -                    | 6 7                                 | 0                   | 0                     | 0                   | 8.2<br>6                  | -                    |  |
| 8                                   | 0                   | 0                     | 0                   | 8.5                       | -                    | 8                                   | 0                   | 0                     | 0                   | 5.4                       | -                    |  |
| 9<br>10                             | 0                   | 0                     | 0                   | 13.1<br>3.5               | 0.75                 | 9<br>10                             | 0<br>0              | 0                     | 0                   | 4<br>6                    | 0.75                 |  |
| 11<br>12                            | 0                   | 0                     | 0                   | 8.3<br>14                 | -                    | 11<br>12                            | 0                   | 0                     | 0                   | 9 2.1                     | -                    |  |
| 13<br>14                            | 0                   | 0                     | 0                   | 7.4<br>10.3               | -                    | 13<br>14                            | 0                   | 0                     | 0                   | 7.1<br>9.5                | -                    |  |
| 15<br>16                            | 0                   | 0                     | 0                   | 20.9<br>15.5              | -                    | 15<br>16                            | 0                   | 0                     | 0                   | 5.5<br>12                 | -                    |  |
| 17<br>18                            | 0<br>0              | 0                     | 0                   | 8<br>16.3                 | -                    | 17<br>18                            | 0<br>0              | 0                     | 0                   | 23<br>5.6                 | -                    |  |
| 19<br>20                            | 0                   | 0                     | 0                   | 2.1<br>1.6                | 0.75                 | 19<br>20                            | 0                   | 0                     | 0                   | 8<br>3.6                  | 0.5                  |  |
| 21<br>22                            | 0                   | 0                     | 0                   | 12.4<br>14.3              | -                    | 21<br>22                            | 0                   | 0                     | 0                   | 7 4                       | -                    |  |
| 23                                  | 0                   | 0                     | 0                   | 14.6<br>6.3               | -                    | 23                                  | 0                   | 0                     | 0                   | 1.8<br>1.5                | -                    |  |
| 25<br>26                            | 0                   | 0                     | 0                   | 9.5<br>7                  | -                    | 25<br>26                            | 0                   | 0                     | 0                   | 4 3                       | -                    |  |
| 27<br>28                            | 0                   | 0                     | 0                   | 8.2                       | -                    | 27<br>28                            | 0                   | 0                     | 0                   | 7 10.5                    | -                    |  |
| 29                                  | 0                   | 0                     | 0                   | 3.4                       |                      | 29                                  | 0                   | 0                     | 0                   | 6.2                       |                      |  |
| 30<br>31                            | 0                   | 0                     | 0                   | 20<br>3.6                 | 0.25                 | 30<br>31                            | 0                   | 0                     | 0                   | 8.5<br>2.5                | 0.75                 |  |
| 32<br>33                            | 0                   | 0                     | 0                   | 4.1<br>9.2                | -                    | 32<br>33                            | 0                   | 0                     | 0                   | 3.2<br>6.7                | -                    |  |
| 34<br>35                            | 0                   | 0                     | 0                   | 6.6<br>2.5                | -                    | 34<br>35                            | 0                   | 0                     | 0                   | 4.6<br>7                  | -                    |  |
| 36<br>37                            | 0                   | 0                     | 0                   | 6.4<br>4.5                | -                    | 36<br>37                            | 0                   | 0                     | 0                   | 9<br>9.2                  | -                    |  |
| 38<br>39                            | 0                   | 0                     | 0                   | 6.4<br>1.7                | -                    | 38<br>39                            | 0                   | 0                     | 0                   | 8<br>8.9                  | -                    |  |
| 40<br>41                            | 0                   | 0                     | 0                   | 10<br>15.6                | 0.5                  | 40<br>41                            | 0                   | 0                     | 0                   | 6.7<br>5.5                | 0.25                 |  |
| 42                                  | 0                   | 0                     | 0                   | 17 24.2                   | -                    | 42                                  | 0                   | 0                     | 0                   | 12<br>6.2                 | -                    |  |
| 44<br>45                            | 0                   | 0                     | 0                   | 4.6                       | -                    | 44<br>45                            | 0                   | 0                     | 0                   | 10.3<br>7.5               | -                    |  |
| 46<br>47                            | 0                   | 0                     | 0                   | 3.1<br>6.6                | -                    | 46<br>47                            | 0                   | 0                     | 0                   | 2.2                       | -                    |  |
| 48                                  | 0                   | 0                     | 0                   | 5.9                       | -                    | 48                                  | 0                   | 0                     | 0                   | 1.8                       | -                    |  |
| 49<br>50                            | 0                   | 0                     | 0                   | 4.9                       | 0.75                 | 49<br>50                            | 0                   | 0                     | 0                   | 1.6<br>3.2                | - 0                  |  |
| 51<br>52                            | 0                   | 0                     | 0                   | 2.2<br>4.5                | -                    | 51<br>52                            | 0<br>0              | 0                     | 0                   | 6<br>15                   | -                    |  |
| 53<br>54                            | 0                   | 0                     | 0                   | 5<br>2.2                  | -                    | 53<br>54                            | 0                   | 0                     | 0                   | 1.6                       | -                    |  |
| 55<br>56                            | 0                   | 0                     | 0                   | 6.1<br>2.6                | -                    | 55<br>56                            | 0                   | 0                     | 0                   | 1.2<br>3.4                | -                    |  |
| 57<br>58                            | 0                   | 0                     | 0                   | 7.2<br>4.7                |                      | 57<br>58                            | 0                   | 0                     | 0                   | 4.6<br>2.7                |                      |  |
| 59<br>60                            | 0                   | 0                     | 0                   | 4.1<br>1.6                | - 0                  | 59<br>60                            | 0                   | 0                     | 0                   | 2.2<br>20                 | 0.75                 |  |
| 61<br>62                            | 0                   | 0                     | 0                   | 13<br>4.8                 | -                    | 61<br>62                            | 0                   | 0                     | 0                   | 13<br>16                  | -                    |  |
| 63<br>64                            | 0                   | 0                     | 0                   | 4.1                       | -                    | 63<br>64                            | 0                   | 0                     | 0                   | 17                        | -                    |  |
| 65<br>66                            | 0                   | 0                     | 0                   | 5<br>2.8                  | -                    | 65<br>66                            | 0                   | 0                     | 0                   | 3.2<br>4.5                | -                    |  |
| 67<br>68                            | 0                   | 0                     | 0                   | 14.5<br>7.8               | -                    | 67<br>68                            | 0                   | 0                     | 0                   | 11.6<br>6.6               | -                    |  |
| 69                                  | 0                   | 0                     | 0                   | 6                         | -                    | 69                                  | 0                   | 0                     | 0                   | 2.6                       | -                    |  |
| 70<br>71                            | 0                   | 0                     | 0                   | 3.6<br>4.5                | 0.5                  | 70<br>71                            | 0                   | 0                     | 0                   | 7<br>6.6                  | 0.25                 |  |
| 72<br>73                            | 0                   | 0                     | 0                   | 2.3<br>11.5               | -                    | 72<br>73                            | 0                   | 0                     | 0                   | 4.2                       | -                    |  |
| 74<br>75                            | 0                   | 0                     | 0                   | 14.5<br>11                | -                    | 74<br>75                            | 0                   | 0                     | 0                   | 7<br>8.9                  | -                    |  |
| 76<br>77                            | 0                   | 0                     | 0                   | 8.3<br>3.5                | -                    | 76<br>77                            | 0                   | 0                     | 0                   | 5.6<br>7.1                | -                    |  |
| 78<br>79                            | 0                   | 0                     | 0                   | 5.5<br>2.3                | -                    | 78<br>79                            | 0                   | 0                     | 0                   | 4<br>25                   | -                    |  |
| 80<br>81                            | 0                   | 0                     | 0                   | 3.9<br>14                 | 0.75                 | 80<br>81                            | 0                   | 0                     | 0                   | 4<br>3.6                  | 0.75                 |  |
| 82<br>83                            | 0                   | 0                     | 0                   | 5.3<br>5.6                | -                    | 82<br>83                            | 0                   | 0                     | 0                   | 9.6<br>13                 |                      |  |
| 84<br>85                            | 0                   | 0                     | 0                   | 7.5<br>6.3                |                      | 84<br>85                            | 0                   | 0                     | 0                   | 48 3.6                    |                      |  |
| 86<br>87                            | 0                   | 0                     | 0                   | 11<br>4.5                 | -                    | 86<br>87                            | 0                   | 0                     | 0                   | 3                         | -                    |  |
| 88<br>89                            | 0                   | 0                     | 0                   | 1.6<br>9.5                | -                    | 88<br>89                            | 0                   | 0                     | 0                   | 2.5<br>2.8                | -                    |  |
| 90<br>91                            | 0                   | 0                     | 0                   | 9.5                       | 0.5                  | 90                                  | 0                   | 0                     | 0                   | 8.6                       | 0.75                 |  |
| 92                                  | 0                   | 0                     | 0                   | 10.5<br>7.3               | -                    | 91<br>92                            | 0                   | 0                     | 0                   | 4.2<br>9                  | -                    |  |
| 93<br>94                            | 0                   | 0                     | 0                   | 10.5<br>3.9               | -                    | 93<br>94                            | 0                   | 0                     | 0                   | 10.2<br>5.4               | -                    |  |
| 95<br>96                            | 0                   | 0                     | 0                   | 12<br>4.8                 | -                    | 95<br>96                            | 0                   | 0                     | 0                   | 4<br>6.5                  | -                    |  |
| 97<br>98                            | 0                   | 0                     | 0                   | 6.3<br>4.2                | -                    | 97<br>98                            | 0                   | 0                     | 0                   | 3<br>4                    | -                    |  |
| 99<br>100                           | 0                   | 0                     | 0                   | 5.5<br>4.5                | 0.5                  | 99<br>100                           | 0                   | 0                     | 0                   | 6.5<br>5.6                | 0.25                 |  |
| Average<br>Cic, Cip and<br>Embed. = |                     | 0                     | 0                   | 7.6                       | 0.53                 | Average<br>Cic, Cip and<br>Embed. = |                     | 0                     | 0                   | 7.2                       | 0.50                 |  |
| Old Calci                           | te Index (CI) =     |                       |                     | 0.00                      |                      | Old Calci                           | te Index (CI) =     |                       |                     | 0.00                      |                      |  |
| New Calci                           | te Index (CI) =     |                       |                     | 0.00                      |                      | New Calci                           | te Index (CI) =     |                       | (                   | 0.00                      |                      |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| Part      |              | LC_FRB-1<br>10-Sep-22 |         |         |              |      |              | LC_FRB-2<br>10-Sep-22 |            |      |                        |                      |  |  |  |
|--|--------------|-----------------------|---------|---------|--------------|------|--------------|-----------------------|------------|------|------------------------|----------------------|--|--|--|
| 1  | Pebble       |                       | Calcite | Calcite |              |      | Pebble       |                       |            |      |                        | Embeddedne<br>ss (%) |  |  |  |
| 3  |              |                       |         |         |              | -    |              |                       |            |      | 13                     | -                    |  |  |  |
| \$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 3            | 0                     | 0.5     | 1       | 17           | -    | 3            | 0                     | 0.5        | 1    | 17                     | -                    |  |  |  |
| 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  |              |                       |         |         |              |      |              |                       | -          |      |                        |                      |  |  |  |
| 8  | -            |                       |         |         |              |      |              |                       | -          | -    |                        |                      |  |  |  |
| 191 0 0 0 0 0 1 3 0 1 10 0 0 0 3 3 3 3 0 1 10 10 10 10 10 10 10 10 10 10 10 10   | 8            | 0                     | 0.3     | 1       | 11           | -    | 8            | 0                     | 0.3        | 1    | 11                     | -                    |  |  |  |
| 12   | -            |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 13   |              |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 15   | 13           | 0                     | 0       |         | 4            |      | 13           |                       | 0          | 0    | 4                      | -                    |  |  |  |
| TT   | 15           | 0                     | 0       | 0       | 3            |      | 15           | 0                     | 0          | 0    | 3                      |                      |  |  |  |
| 191 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | -            |                       |         | •       |              |      |              |                       |            |      |                        |                      |  |  |  |
| 221 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1  |              |                       |         |         |              |      |              |                       | -          | -    |                        |                      |  |  |  |
| 22 0 0 0 0 3 4   | 20           | 0                     | 0       | 0       | 4            | 0.25 | 20           | 0                     | 0          | 0    | 4                      | 0.25                 |  |  |  |
| 24 0 0 0 0 S - 224 0 0 0 0 5   |              |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 25 0 0 08 1 20 - 25 1 0 08 1 20 - 25 1 0 08 1 20 - 25 20 0 0 0 1 1 20 - 25 20 0 0 0 1 1 1 20 - 25 20 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 0 0 1 1 1 20 - 25 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   |              |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 277  | 25           | 0                     | 0.8     | 1       | 20           | -    | 25           | 1                     | 0.8        | 1    | 20                     | -                    |  |  |  |
| 29   | 27           |                       |         |         |              |      | 27           |                       |            |      |                        |                      |  |  |  |
| 30   |              |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 32   | 30           | 0                     | 0       | 0       | 5            | 0    | 30           | 0                     | 0          | 0    | 5                      | 0                    |  |  |  |
| 34 0 0 0 0 14 - 34 0 0 0 0 14 - 34 0 0 0 0 14 - 34 0 0 0 0 14 - 34 0 0 0 0 14 - 34 0 0 0 0 14 0 - 34 0 0 0 0 0 18 0 - 38 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 32           | 0                     | 0       |         | 7            |      | 32           | 0                     | 0          |      | 7                      |                      |  |  |  |
| 36 0 0 0 18 - 36 0 0 0 18 - 36 0 0 0 18 - 36 0 0 0 18 - 36 0 0 0 3 1 8 3 - 36 0 0 0 3 1 8 3 - 36 0 0 0 0 0 1 8 3 - 36 0 0 0 0 0 0 1 8 3 - 36 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   |              |                       |         | •       |              |      |              |                       |            |      |                        |                      |  |  |  |
| 37 0 0 0 0 38 - 37 0 0 0 0 38 - 37 37 0 0 0 0 38 - 38 3 38 0 0 0 0 0 3 3 - 38 38 0 0 0 0 0 0 3 3 - 38 38 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 35           | 0                     | 0       | 0       | 18           | -    | 35           | 0                     | 0          | 0    | 18                     | -                    |  |  |  |
| 39 0 0 0 0 28 - 39 0 0 0 0 28 - 39 0 0 0 0 28 - 5 0 0 0 0 28 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 37           | 0                     | 0       | 0       | 3.8          |      | 37           | 0                     | 0          | 0    | 3.8                    |                      |  |  |  |
| 440 0 0 0.5 1 20 0.5 40 0 0.5 1 20 0.5 44 1 0 0 0.5 1 20 0.5 44 1 0 0 0 0 0 4 5 1 20 0.5 44 1 0 0 0 0 0 4 5 1 20 0.5 44 1 0 0 0 0 0 0 4 5 1 20 0 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1   |              |                       |         |         |              |      |              |                       | -          |      |                        |                      |  |  |  |
| 42 0 0 0 0 5 - 42 0 0 0 0 5 - 43 0 0 0 0 5 5 - 43 0 0 0 0 1 1 16.5 - 43 0 0 0 0 0 1 16.5 - 43 0 0 0 0 0 1 16.5 - 43 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 0 3.2 - 44 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 40           | 0                     | 0.5     | 1       | 20           | 0.5  | 40           | 0                     | 0.5        | 1    | 20                     | 0.5                  |  |  |  |
| 44 0 0 0 0 32 - 44 0 0 0 0 32 - 44 4 0 0 0 0 32 - 44 4 5 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 1 1 - 45 0 0 0 0 0 1 1 - 45 0 0 0 0 0 1 1 - 45 0 0 0 0 0 1 1 - 45 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 42           |                       |         |         | 5            |      | 42           |                       |            | 0    |                        |                      |  |  |  |
| 45 0 0 0 1 1 18.5 - 46 0 0 0 1 1 5.5 - 47 0 0 0.3 1 18.5 - 47 0 0 0.3 1 18.5 - 47 0 0 0.5 1 1 20.1 - 47 1 0 0.6 1 1 20.1 - 5 1 0 0.5 1 1 20.1 - 5 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | -            |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 47 0 0 0.6 1 20.1 - 47 1 0.6 1 20.1 - 48 0 0 0.3 1 8 - 48 0 0 0.3 1 8 8 - 48 0 0 0.3 1 8 8 - 48 0 0 0.3 1 8 8 - 48 0 0 0.3 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 8 8 - 48 0 0 0.2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 45           | 0                     | 0       | 0       | 1            |      | 45           | 0                     | 0          | 0    | 1                      | -                    |  |  |  |
| 49 0 0 02 1 8 - 49 0 02 1 8 - 29 0.5 60 0 0 77 1 26 0.5 50 1 0.7 1 29 0.5 61 0 0 0.7 1 26 0.5 50 1 0.7 1 29 0.5 61 0 0 0.6 1 20 - 81 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 - 20 1 0.6 1 20 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 20 - 20 1 0.6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 47           |                       | 0.6     | •       |              |      | 47           |                       | 0.6        |      |                        |                      |  |  |  |
| S0   |              |                       | 0.3     |         |              |      | 48<br>49     |                       | 0.3        |      |                        |                      |  |  |  |
| S2   | 50           | 0                     | 0.7     | 1       | 26           | 0.5  | 50           | 1                     | 0.7        | 1    | 29                     | 0.5                  |  |  |  |
| 554 0 0 0.5 1 7.1 - 54 0 0.5 1 7.1 7.1 - 55 5 0 0 0 0 3.3 - 55 0 0 0 0 3.3 - 55 0 0 0 0 3.3 - 55 0 0 0 0 0 3.3 - 55 0 0 0 0 0 3.3 - 55 0 0 0 0 0 3.3 - 55 0 0 0 0 0 3.3 - 55 0 0 0 0 0 0 3.3 - 55 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 52           |                       | 0.3     |         | 7.5          |      | 52           |                       | 0.3        |      | 7.5                    |                      |  |  |  |
| 55   |              |                       |         |         |              |      | 53<br>54     |                       | 0.5<br>0.5 |      | 14.5<br>7.1            |                      |  |  |  |
| S7   | 55           | 0                     | 0       | 0       | 3.3          | -    | 55           | 0                     | 0          | 0    | 3.3                    | -                    |  |  |  |
| Sep  | 57           |                       | 0.3     |         | 5            |      | 57           | 0                     | 0.3        |      | 5                      |                      |  |  |  |
| 660 0 0.3 1 5.2 0.5 660 0 0.3 1 5.2 0.26 61 0 0 0.8 1 6 6 - 61 1 0.8 1 6 6 - 61 1 0.8 1 6 6 - 61 1 10.8 1 6 6 - 61 1 10.8 1 6 6 - 61 1 10.8 1 16 6 - 61 1 10.8 1 16 6 - 61 1 10.8 1 16 6 - 61 1 10.8 1 16 6 - 61 1 10.8 1 16 6 - 61 1 10.8 1 10.8 1 16 6 - 61 1 10.8  |              |                       |         |         |              |      | 58<br>59     |                       |            |      |                        |                      |  |  |  |
| 62   | 60           | 0                     | 0.3     | 1       | 5.2          | 0.5  | 60           | 0                     | 0.3        | 1    | 5.2                    | 0.25                 |  |  |  |
| 64 0 0 0.8 1 12.3 - 64 0 0.8 1 12.3 - 65 0 0.6 1 12.2 - 66 6 0 0 0.6 1 12.2 - 66 6 0 0 0.6 1 12.2 - 66 6 0 0 0.1 1 1 4.8 - 66 0 0 0.1 1 1 4.8 - 66 0 0 0.1 1 1 4.8 - 66 0 0 0.1 1 1 4.8 - 66 0 0 0.1 1 1 4.8 - 7 - 67 1 1 0.4 1 1 7 - 68 0 0 0.5 1 1 10.5 - 68 0 0 0.5 1 1 10.5 - 68 0 0 0.5 1 1 10.5 - 7 1 1 0.4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 62           |                       | 0.5     |         | 17.5         |      | 62           |                       | 0.5        |      | 17.5                   |                      |  |  |  |
| 65   |              |                       |         |         | 3.5<br>12.3  |      |              |                       |            |      | 9.5<br>12.3            |                      |  |  |  |
| 67   | 65           | 0                     | 0.6     | 1       | 12.2         | -    | 65           | 0                     | 0.6        | 1    | 12.2                   | -                    |  |  |  |
| 69 0 0 0.6 1 17.5 - 69 1 0.6 1 17.5 - 13 0.25 70 0 0 0.5 1 13 0.25 71 0 0 0.8 1 10.5 - 71 0 0 0.5 1 13 0.25 71 0 0 0.8 1 10.5 - 71 0 0 0.8 1 10.5 - 73 72 0 0 0.5 1 7.5 - 73 0 0 0.5 1 15 73 0 0 0.5 1 7.5 - 73 0 0 0.5 1 7.5 - 74 74 0 0 0.5 1 4.5 - 72 1 0 0.5 1 7.5 - 74 75 0 0 0.4 1 7.3 - 76 0 0.4 1 7.3 - 75 76 0 0.4 1 7.3 - 76 0 0.4 1 7.3 - 76 77 0 0 0.5 1 12.1 - 77 0 0.5 1 12.1 - 77 78 0 0 0.5 1 133 - 78 1 0.5 1 12.1 - 77 79 0 0.5 1 133 - 78 1 0.5 1 12.1 - 77 80 0 0.5 1 133 - 78 1 0.5 1 12.1 - 78 80 0 0.5 1 1 20 0.25 80 0 0.5 1 26 - 88 80 0 0 0.5 1 20 0.25 80 0 0.5 1 20 0.25 81 0 0.8 1 7.5 - 81 0 0.8 1 7.5 - 82 82 0 0.3 1 8.2 - 82 0 0.3 1 8.2 - 82 83 0 0 0.4 1 4.2 - 83 0 0.4 1 4.2 - 83 84 0 0 0.5 1 10 - 84 0 0.5 1 10 - 84 0 0.5 1 10 - 84 84 0 0 0.5 1 10 - 84 0 0.5 1 10 - 84 85 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 86 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 86 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 86 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 86 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 87 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 88 0 0 0 0.5 1 10 0 0.5 1 10 0 0.5 1 10 0 0.5 89 0 0 0 0 0 0 2 0 0 2 0 0.5 1 10 0 0.5 1 10 0 0.5 89 0 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0  | 67           |                       | 0.4     |         | 7            |      | 67           |                       | 0.4        |      | 7                      |                      |  |  |  |
| 70   |              |                       |         |         | 10.5<br>17.5 |      | 68<br>69     |                       | 0.5<br>0.6 |      |                        |                      |  |  |  |
| 72   | 70           | 0                     | 0.5     | 1       | 13           | 0.25 | 70           | 0                     | 0.5        | 1    | 13                     | 0.25                 |  |  |  |
| 73   | 72           | 0                     | 0.5     | 1       | 15           | -    | 72           | 1                     | 0.5        | 1    | 15                     | -                    |  |  |  |
| 75 0 0 0.4 1 7.3 - 75 0 0.4 1 7.3 - 76 0 0.4 1 7.3 - 76 76 0 0.2 1 8.2 - 77 0 0.5 1 8.2 - 77 0 0.5 1 12.1 - 77 0 0.5 1 12.1 - 77 0 0.5 1 12.1 - 78 0 0.5 1 12.1 - 79 0 0.1 12.1 - 79 0 0.5 1 12. | 73<br>74     |                       | 0.5     |         | 7.5          |      | 73           |                       | 0.5        |      | 7.5                    |                      |  |  |  |
| 77   | 75           | 0                     | 0.4     | 1       | 7.3          | -    | 75           | 0                     | 0.4        | 1    | 7.3                    | -                    |  |  |  |
| 79   | 77           | 0                     | 0.5     | 1       | 12.1         |      | 77           | 0                     | 0.5        | 1    | 12.1                   |                      |  |  |  |
| 80   |              |                       |         |         | 13<br>26     |      | 78<br>79     |                       | 0.5<br>0.5 |      | 13<br>26               |                      |  |  |  |
| 82   | 80           | 0                     | 0.5     | 1       | 20           | 0.25 | 80           | 0                     | 0.5        | 1    | 20                     | 0.25                 |  |  |  |
| 84 0 0.5 1 100 - 84 0 0.5 1 100 - 85 85 0 0.5 1 100 - 85 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 8 - 85 0 0.3 1 9 - 85 0 0.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 82           | 0                     | 0.3     | 1       | 8.2          |      | 82           | 0                     | 0.3        | 1    | 8.2                    |                      |  |  |  |
| 85   |              |                       |         |         |              |      |              |                       |            |      |                        |                      |  |  |  |
| 87 0 0.5 1 6.5 - 87 0 0.5 1 6.5 - 88 8 0 0.3 1 7.5 - 88 8 0 0.3 1 7.5 - 89 0 0.1 1 1 4.5 - 90 0 0 0.6 1 13 0.25 90 0 0 0.6 1 13 0.25 91 0 0.4 1 7.5 - 91 0 0.4 1 7.5 - 91 0 0.4 1 7.5 - 92 0 0.8 1 18 - 92 0 0.8 1 18 - 92 0 0.8 1 18 - 92 0 0.8 1 18 - 93 0 0 0.7 1 13.4 - 93 0 0 0.7 1 13.4 - 93 0 0 0.6 1 22 - 94 0 0.6 1 22 - 94 0 0.6 1 22 - 95 0 0.3 1 7.5 - 95 0 0.3 1 7.5 - 95 0 0.3 1 7.5 - 95 0 0.3 1 7.5 - 96 0 0.8 1 7.8 - 96 0 0.8 1 7.8 - 97 0 0.1 1 7.2 - 98 0 0.6 1 17.2 - 99 0 0 0.2 1 1 7.2 - 99 0 0 0.2 1 1 5.5 - 99 0 0 0.2 1 1 5.5 - 99 0 0 0.2 1 1 5.5 - 99 0 0 0.2 1 1 5.5 - 99 0 0 0.2 1 1 3.8 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25   | 85           | 0                     | 0.3     | 1       | 8            | -    | 85           | 0                     | 0.3        | 1    | 8                      | -                    |  |  |  |
| 88   | 87           | 0                     | 0.5     | 1       | 6.5          |      | 87           | 0                     | 0.5        | 1    | 6.5                    |                      |  |  |  |
| 90   |              |                       |         | -       |              |      | 88<br>89     |                       |            |      |                        |                      |  |  |  |
| 92         0         0.8         1         18         -         92         0         0.8         1         18         -           93         0         0.7         1         13.4         -         93         0         0.7         1         13.4         -           94         0         0.6         1         22         -         94         0         0.6         1         22         -         95         0         0.3         1         7.5         -         95         0         0.3         1         7.5         -         95         0         0.3         1         7.5         -         96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -         97         0         0.1         1         7.2         -         97         0         0.1         1         7.2         -         98         1         0.6         1         16 </th <th>90</th> <th>0</th> <th>0.6</th> <th>1</th> <th>13</th> <th>0.25</th> <th>90</th> <th>0</th> <th>0.6</th> <th>1</th> <th>13</th> <th>0.25</th>   | 90           | 0                     | 0.6     | 1       | 13           | 0.25 | 90           | 0                     | 0.6        | 1    | 13                     | 0.25                 |  |  |  |
| 94         0         0.6         1         22         -         94         0         0.6         1         22         -           95         0         0.3         1         7.5         -         95         0         0.3         1         7.5         -           96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -           97         0         0.1         1         7.2         -         97         0         0.1         1         7.2         -           98         0         0.6         1         16         -         98         1         0.6         1         16         -           99         0         0.2         1         5.5         -         99         0         0.2         1         5.5         -           100         0         0.1         1         3.8         0.25         100         0         0.1         1         3.8         0.25           Average Cic, Cip and Embed. =         0         0.68         9.5         0.25         0.25         0.68         9.5         0.25   | 92           | 0                     | 0.8     | 1       | 18           |      | 92           | 0                     | 0.8        | 1    | 18                     |                      |  |  |  |
| 95         0         0.3         1         7.5         -         95         0         0.3         1         7.5         -           96         0         0.8         1         7.8         -         96         0         0.8         1         7.8         -           97         0         0.1         1         7.2         -         97         0         0.1         1         7.2         -           98         0         0.6         1         16         -         98         1         0.6         1         16         -           99         0         0.2         1         5.5         -         99         0         0.2         1         5.5         -           100         0         0.1         1         3.8         0.25         100         0         0.1         1         3.8         0.25           Average Embed. =         0         0.32         0.68         9.4         0.28         Cic, Cip and Embed. =         0.15         0.32         0.68         9.5         0.25  |              |                       |         |         | 13.4<br>22   |      |              |                       |            |      | 1 <del>3.4</del><br>22 |                      |  |  |  |
| 97         0         0.1         1         7.2         -         97         0         0.1         1         7.2         -         98         0         0.1         1         7.2         -         98         1         0.6         1         16         -         98         1         0.6         1         16         -         99         0         0.2         1         5.5         -         99         0         0.2         1         5.5         -         -         99         0         0.2         1         5.5         -         -         100         0         0.1         1         3.8         0.25         0.25         100         0         0.1         1         3.8         0.25           Average Cic, Cip and Embed. =         0.32         0.68         9.5         0.25         0.25         0.68         9.5         0.25           Old Calcite Index (CI) =         0.68         0.68         0.68         0.83         0.83   | 95           | 0                     | 0.3     | 1       | 7.5          | -    | 95           | 0                     | 0.3        | 1    | 7.5                    | -                    |  |  |  |
| 98         0         0.6         1         16         -         98         1         0.6         1         16         -           99         0         0.2         1         5.5         -         99         0         0.2         1         5.5         -           100         0         0.1         1         3.8         0.25         100         0         0.1         1         3.8         0.25           Average         Cic, Cip and Embed. =         0.15         0.32         0.68         9.5         0.25           Old Calcite Index (CI) =         0.68         0.83   | 97           | 0                     | 0.1     | 1       | 7.2          |      | 97           | 0                     | 0.1        | 1    | 7.2                    |                      |  |  |  |
| 100         0         0.1         1         3.8         0.25         100         0         0.1         1         3.8         0.25           Average Cic, Cip and Embed. =         0         0.32         0.68         9.4         0.28         Cic, Cip and Embed. =         0.15         0.32         0.68         9.5         0.25           Old Calcite Index (CI) =         0.68         Old Calcite Index (CI) =         0.83   |              |                       | 0.6     |         |              |      |              | 1                     | 0.6        |      |                        |                      |  |  |  |
| Cic, Cip and Embed. =     0.32     0.68     9.4     0.28     Cic, Cip and Embed. =     0.15     0.32     0.68     9.5     0.25       Old Calcite Index (CI) =     0.68     Old Calcite Index (CI) =     0.83   |              |                       |         |         | 3.8          |      |              |                       | 0.1        |      |                        | 0.25                 |  |  |  |
| Old Calcite Index (CI) = 0.68 Old Calcite Index (CI) = 0.83  | Cic, Cip and | 0                     | 0.32    | 0.68    | 9.4          | 0.28 | Cic, Cip and | 0.15                  | 0.32       | 0.68 | 9.5                    | 0.25                 |  |  |  |
| New Calcite Index (CI) = 0.32 New Calcite Index (CI) = 0.47  | Old Calci    | te Index (CI) =       |         |         |              | ı    | Old Calcit   | e Index (CI) =        |            |      |                        | l .                  |  |  |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| PADD     | LC_FRB-3<br>10-Sep-22 |                |                       |                     |           |      | LC_FRUS-1<br>10-Sep-22 |                |                       |                     |           |                      |  |  |
|---|-----------------------|----------------|-----------------------|---------------------|-----------|------|------------------------|----------------|-----------------------|---------------------|-----------|----------------------|--|--|
| 2   |                       | Status         | Calcite<br>Proportion | Calcite<br>Presence | Axis (cm) |      |                        | Status         | Calcite<br>Proportion | Calcite<br>Presence | Axis (cm) | Embeddedne<br>ss (%) |  |  |
| 4 5 C C 1 1 3 C C 1 1 3 C C C C C 1 1 123 C C C C C C C C C C C C C C C C C C C   | 2                     | 0              | 0.1                   | 1                   | 5         |      | 2                      | 0              | 0                     | 0                   | 11        |                      |  |  |
| ## 3  | 4                     | 0              | 0.1                   | -                   | 3         |      | 4                      | 0              | 0.5                   | 1                   | 10.8      |                      |  |  |
| 7   |                       | -              |                       |                     |           |      |                        |                |                       | _                   |           |                      |  |  |
| 3   | 7                     | 0              | 0.3                   | 1                   | 13.9      | -    | 7                      | 1              | 0.6                   | 1                   | 14        | -                    |  |  |
| 11  |                       |                |                       |                     |           |      |                        |                |                       | •                   |           |                      |  |  |
| 12   3   61   1   7.5   -   12   3   5   0   3   -     17   17   17   17   17   17   1  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 141 0 0 05 1 1 207 . 144 0 0 07 1 1 72 1 . 161 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 12                    | 0              | 0.1                   | 1                   | 7.5       |      | 12                     | 0              | 0                     | 0                   | 9         |                      |  |  |
| 18  |                       |                |                       |                     |           |      |                        |                |                       | •                   |           |                      |  |  |
| 177 0 0 01 1 1 2 0 - 1 17 1 0 77 1 20 - 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 0 1 18 19 19 19 19 19 19 19 19 19 19 19 19 19   |                       |                | 0.2                   |                     | 5         |      | 15                     |                |                       |                     | 10.5      |                      |  |  |
| 191 0 0 0 2 1 1 5 5 0 1 191 0 0 0 0 1 1 10 0 1 1 1 10 0 1 1 1 1   | 17                    | 0              | 0.1                   | 1                   | 2         |      | 17                     | 1              | 0.7                   | 1                   | 20        |                      |  |  |
| 281 0 0 04 1 32 103 20 0 0.8 1 1.15 1.2 0.9 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2 1.2   |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 22  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 242 0 0 0.2 1 4 - 244 1 0 0 0 3 254 1 1 0 0 0 3 258 1 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0   | 22                    | 0              | 0.3                   | 1                   | 5         |      | 22                     | 0              | 0.8                   | 1                   | 11.5      |                      |  |  |
| 282 0 0 06 1 52 . 385 0 0 08 1 75 . 386 0 0 08 1 75 . 387 . 388 . |                       |                |                       |                     |           |      |                        |                |                       | -                   |           |                      |  |  |
| 27 0 0 3 1 4 - 27 0 0 0 0 6 .  28 0 0 0 0 0 0 0 6 5 .  28 0 0 0 0 0 0 6 6 5 .  28 0 0 0 0 0 6 6 6 5 .  28 0 0 0 0 0 6 6 6 5 .  29 0 0 0 0 0 6 6 6 5 .  29 0 0 0 0 0 0 6 6 6 5 .  29 0 0 0 0 0 0 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 7 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 1 1 8 .  20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   | 25                    | 0              | 0.6                   | 1                   | 5.2       | -    | 25                     | 0              | 0.8                   | 1                   | 7.5       | -                    |  |  |
| 287 0 0 03 1 73 - 288 0 0 0 0 0 2 2 - 3 3   |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 330 0 02 1 35 0 02 1 35 0 02 34 1 038 1 1 175 0.25  331 0 0 04 1 0 05   | -                     |                | 0                     |                     |           |      | 28                     | 0              | 0                     | 0                   | 8.5       |                      |  |  |
| 322   | 30                    | 0              | 0.2                   | 1                   | 3.5       | 0.25 | 30                     | 1              | 0.8                   | 1                   | 17.5      | 0.25                 |  |  |
| 33 0 0 0.4 1 5.5 - 33 0 0 0.5 1 1 17 - 34 1 18 - 34 1 18 - 34 1 18 18 - 34 18 18 18 18 18 18 18 18 18 18 18 18 18   |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 35  | 33                    | 0              | 0.4                   | 1                   | 5.6       | -    | 33                     | 0              | 0.5                   | 1                   | 17        | -                    |  |  |
| 37 0 0 0.2 1 0.5 - 38 0 0 0 0 10.8 1.13   | 35                    | 1              | 0.4                   | 1                   | 23.5      |      | 35                     | 0              | 0                     | 0                   | 10        |                      |  |  |
| 38 0 0 0.2 1 5  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 40 0 0 0.1 1 7.4 0 40 0 0 0 0 8 0.5 1 177 - 4 4 1 0 0 0.5 1 177 - 4 4 1 0 0 0.5 1 1 177 - 4 4 1 0 0 0.5 1 1 177 - 4 4 1 0 0 0.5 1 1 177 - 4 4 1 0 0 0.5 1 1 177 - 4 4 1 0 0 0.5 1 1 177 - 4 4 1 0 0 0.5 1 1 175 - 4 4 1 0 0 0.5 1 1 15.5 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 38                    | 0              | 0.2                   | 1                   | 5         | -    | 38                     | 0              | 0.6                   | 1                   | 11.3      | -                    |  |  |
| 42  |                       |                |                       |                     |           |      |                        |                |                       |                     | 8         |                      |  |  |
| 43  |                       |                |                       |                     |           |      |                        |                |                       |                     |           | -                    |  |  |
| 46 0 0 03 1 1 0 4.8   | 43                    | 0              | 0.3                   | 1                   | 15        |      | 43                     | 1              | 0.8                   | 1                   | 23        |                      |  |  |
| 46 0 0 0.3 1 1 8  |                       |                |                       |                     |           |      |                        |                |                       | -                   |           | -                    |  |  |
| 48 0 0 0.4 1 5  | 46                    | 0              |                       | 1                   | 6         |      | 46                     |                | 0.6                   |                     | 14        |                      |  |  |
| 50  | 48                    | 0              | 0.4                   | 1                   | 5         |      | 48                     | 0              | 0.5                   | 1                   | 10.5      |                      |  |  |
| St  |                       |                |                       |                     |           |      |                        | · ·            |                       |                     |           |                      |  |  |
| S3  | 51                    | 0              | 0.1                   | 1                   | 4.5       | -    | 51                     | 0              | 0.5                   | 1                   | 7.5       | -                    |  |  |
| 55  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| Section   Sect  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| S8  | 56                    | 0              | 0.2                   | 1                   | 5.1       | -    | 56                     | 0              | 0.7                   | 1                   | 22        | -                    |  |  |
| 60 0 0 0.5 1 7.3 0.25 60 0 0.6 1 10.0 0.75 61 0 0.5 1 1 5.1 - 61 0 0.9 1 1 8.5 - 62 0 0 0 0 0 7.5 - 62 0 0.5 1 13.5 - 63 0 0.3 1 14 - 63 0 0.6 1 7.5 - 64 1 0.5 1 25.5 - 64 0 0.8 1 19 65 0 0.1 1 4.5 - 65 0 0.9 1 13.5 - 66 0 0 0 0 7.7 - 66 0 0.1 17 66 0 0 0 0 0 7 66 0 0.1 17 66 0 0 0 0 0 7 66 0 0.1 17 67 0 0.1 1 12 - 67 0 0.5 1 9 - 68 1 0.5 1 18 - 68 0 0.7 1 11 68 1 0.5 1 18 - 68 0 0.7 1 11 69 0 0.1 1 7.5 - 69 0 0.6 1 8 - 69 0 0.1 1 7.5 - 69 0 0.6 1 8 - 69 0 0.1 1 7.5 - 69 0 0.6 1 8 - 70 0 0 0.2 1 7.5 0.5 70 0 0.8 1 11 70 0 0 0.2 1 7.5 0.5 70 0 0.8 1 11 71 0 0.1 1 6.5 - 72 0 0.7 1 11 72 1 0 0.1 1 6.5 - 72 0 0.7 1 11 73 1 0 0.3 1 4.5 - 72 0 0.7 1 1 74 1 0 0.5 1 3.5 - 72 0 0.7 1 1 75 0 0 0.3 1 13.5 - 73 0 0.7 1 1 75 0 0 0.3 1 13.5 - 73 0 0.7 1 1 76 0 0 0.3 1 13.5 - 73 0 0.7 1 1 77 0 0 0.5 1 8.5 - 72 0 0.7 1 1 78 0 0 0.3 1 13.5 - 73 0 0.7 1 1 78 0 0 0.3 1 13.5 - 73 0 0.7 1 1 78 0 0.0 3 1 13.5 - 74 0 0.2 1 7.5 - 78 0 0.0 3 1 13.5 - 75 0 0.0 2 1 7.5 - 78 0 0 0.3 1 1 17 - 77 0 0.8 11 16 - 79 0 0 0.5 1 8.5 - 79 0 0.3 1 1 15 - 78 0 0 0.5 1 8.5 - 79 0 0.3 1 1 15 - 78 0 0 0.5 1 8.5 - 79 0 0.3 1 1 15 - 78 0 0 0.5 1 18.5 - 79 0 0.3 1 1 15 - 78 0 0 0.5 1 18.5 - 79 0 0.3 1 1 15 - 78 0 0 0.5 1 1 8.5 - 79 0 0.3 1 1 15 - 83 0 0 0.1 1 1 10.4 - 85 0 0.6 1 1 14 0.5 - 83 0 0 0.1 1 1 10.4 - 85 0 0.6 1 1 14 0.5 - 83 0 0 0.1 1 1 10.4 - 85 0 0.6 1 1 14 0.5 - 83 0 0 0.1 1 1 10.4 - 85 0 0.6 1 1 14 0.5 - 83 0 0 0.1 1 1 10.4 - 85 0 0.6 1 1 14 0.5 - 84 0 0 0.5 1 1 9.8 - 84 0 0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0   |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 61 0 0 0.5 1 5.1 - 61 0 0.9 1 1 8.5 - 62 0 0.05 1 13.5 - 63 0 0.0 0.5 1 13.5 - 63 0 0.0 0.5 1 13.5 - 64 1 1 0.5 1 25.5 - 64 0 0.8 1 1 19 - 65 0 0.5 1 13.5 - 65 0 0.9 1 1 13.5 - 66 0 0.0 0 7 7 - 66 0 0.9 1 1 13.5 - 66 0 0.0 0 7 7 - 66 0 0.1 1 7 7 - 67 0 0.5 1 1 13.5 - 67 0 0.5 1 1 13.5 - 67 0 0.5 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.9 1 1 13.5 - 68 1 0 0.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 63 0 0.3 1 14 - 63 0 0.6 1 7.5 - 64 1 0.5 1 25.5 - 64 0 0.8 1 19 - 65 - 65 0 0.9 1 13.5 - 65 0 0.0 1 1 4.5 - 65 0 0.9 1 13.5 - 67 0 0.5 1 1 25.5 - 66 0 0.9 1 13.5 - 67 0 0.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   | 61                    | 0              | 0.5                   | 1                   | 5.1       | -    | 61                     | 0              | 0.9                   | 1                   | 8.5       | -                    |  |  |
| 65  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 668 0 0 0 0 1 1 1 1 12 - 66 0 0.1 1 1 7 - 68 6 0 0.1 1 1 9 - 68 6 1 0.5 1 9 - 68 6 1 0.5 1 9 - 68 6 1 0.5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   |                       | 1              | 0.5                   |                     | 25.5      |      | 64                     |                | 0.8                   |                     | 19        |                      |  |  |
| 688   | 66                    | 0              | 0                     | 0                   | 7         |      | 66                     | 0              | 0.1                   | 1                   | 7         |                      |  |  |
| 68  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 71  |                       |                | 0.1                   |                     | 7.5       |      | 69                     |                |                       |                     |           |                      |  |  |
| 73  | 71                    |                | 0.1                   |                     | 6.5       |      | 71                     |                | 0.5                   |                     | 5.5       |                      |  |  |
| 74  |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 76  | 74                    | 1              | 0.5                   | 1                   | 11        | -    | 74                     | 0              | 0.2                   | 1                   | 7         | -                    |  |  |
| 78  | 76                    | 1              | 0.5                   | 1                   | 14        |      | 76                     | 0              | 0.1                   | 1                   | 6         |                      |  |  |
| 79  |                       |                | 0.1                   |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 81 0 0 0 11 - 81 0 0 0.5 1 15 - 82 0 0.7 1 16 - 83 0 0.1 1 16 - 83 0 0.1 1 16 0 - 83 0 0.1 1 1 10 0 - 84 0 0.2 1 9.8 - 84 0 0.8 1 19 - 85 0 0.6 1 8 5 0 0.1 1 1 10.4 - 85 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 8 5 0 0.6 1 1 8 0 0.8 8 1 0 0.3 1 1 13 0 0.5 1 1 17 0 0 0.5 1 1 17 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  | 79                    | 0              | 0.5                   | 1                   | 8.5       | -    | 79                     | 0              | 0.3                   | 1                   | 5         | -                    |  |  |
| 82  | 81                    |                | 0                     |                     | 11        |      |                        |                | 0.5                   |                     |           |                      |  |  |
| 84 0 0.2 1 9.8 - 84 0 0.8 1 19 - 85 0 0.6 1 8 1 19 - 85 0 0.6 1 1 8 - 86 0 0 0 0 0 0 6 - 87 0 0.5 1 17 17 - 87 0 0.1 1 1 15 - 88 0 0.3 1 1 13 - 88 0 0.3 1 1 13 - 89 0 0.3 1 1 29 0.25 90 0 0 0.6 1 1 10 0.5 91 0 0 0 0 9 - 91 0 0.5 1 1 20 - 93 0 0.5 1 1 10 0 0.5 91 0 0 0.3 1 1 8 - 92 0 0.3 1 1 9 9 - 93 0 0 0.3 1 1 9 9 - 91 0 0 0.3 1 1 9 9 - 93 0 0 0.5 1 1 10 0 0.5 91 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0  |                       |                |                       |                     | 29        |      | 82                     |                | 0.7                   |                     | 16        |                      |  |  |
| 86         0         0         0.55         1         177         -         86         0         0         0         6         -           87         0         0.5         1         177         -         87         0         0.1         1         5         -           88         0         0.5         1         199         -         88         0         0.3         1         133         -           89         0         0.4         1         21         -         89         0         0.7         1         144         -           90         0         0.3         1         29         0.25         90         0         0.6         1         10         0.5           91         0         0         0         0         9         -         91         0         0.5         1         20         -           92         0         0.3         1         8         -         92         0         0.3         1         90         -           93         0         0.5         1         22         -         93         0         0.4         1   | 84                    | 0              | 0.2                   | 1                   | 9.8       | -    | 84                     | 0              | 0.8                   | 1                   | 19        | -                    |  |  |
| 87  | 86                    |                | 0                     |                     | 7.5       |      |                        |                | 0                     |                     |           |                      |  |  |
| 89         0         0.4         1         21         -         89         0         0.7         1         14         -           90         0         0.3         1         29         0.25         90         0         0.6         1         10         0.5           91         0         0         0         9         -         91         0         0.55         1         20         -           92         0         0.3         1         8         -         92         0         0.3         1         9         -           93         0         0.5         1         22         -         93         0         0.4         1         10         -           94         0         0.4         1         7.5         -         94         1         0.8         1         11         -           95         0         0         0         2         -         95         0         0.5         1         15         -           96         0         0         0         0         7         -         97         0         0.3         1         4.8         - <td>87</td> <td>0</td> <td>0.5</td> <td>1</td> <td>17</td> <td>-</td> <td>87</td> <td>0</td> <td>0.1</td> <td>1</td> <td>5</td> <td>-</td>   | 87                    | 0              | 0.5                   | 1                   | 17        | -    | 87                     | 0              | 0.1                   | 1                   | 5         | -                    |  |  |
| 91         0         0         9         -         91         0         0.5         1         20         -           92         0         0.3         1         8         -         92         0         0.3         1         9         -           93         0         0.5         1         92         -         93         0         0.4         1         10         -           94         0         0.4         1         7.5         -         94         1         0.8         1         11         -           95         0         0         0         2         -         95         0         0.5         1         15         -           96         0         0         0         0         2         -         95         0         0.5         1         11         -           97         0         0         0         7         -         97         0         0.3         1         4.8         -           98         0         0.1         1         5.1         -         98         0         0.8         1         19.8         -  | 89                    | 0              | 0.4                   | 1                   | 21        | -    | 89                     | 0              | 0.7                   | 1                   | 14        | -                    |  |  |
| 92         0         0.3         1         8         -         92         0         0.3         1         9         -           93         0         0.5         1         22         -         93         0         0.4         1         10         -           94         0         0.4         1         7.5         -         94         1         0.8         1         11         -           95         0         0         0         2         -         95         0         0.5         1         15         -           96         0         0         0         0         3.5         -         96         0         0.7         1         11         -           97         0         0         0         0         7         -         97         0         0.3         1         4.8         -           98         0         0.1         1         5.1         -         98         0         0.8         1         19.8         -           99         0         0         0         0         4.6         -         99         0         0.6         1   |                       |                |                       |                     |           |      |                        |                |                       |                     |           |                      |  |  |
| 94         0         0.4         1         7.5         -         94         1         0.8         1         11         -           95         0         0         0         2         -         95         0         0.5         1         15         -           96         0         0         0         3.5         -         96         0         0.7         1         11         -           97         0         0         0         7         -         97         0         0.3         1         4.8         -           98         0         0.1         1         5.1         -         98         0         0.8         1         19.8         -           99         0         0         0         4.6         -         99         0         0.6         1         17.4         -           100         0         0.2         1         5.9         0.5         100         0         0.2         1         6         0           Average Embed. =         0         0         0.82         11.3         0.45  | 92                    | 0              | 0.3                   | 1                   | 8         | -    | 92                     | 0              | 0.3                   | 1                   | 9         | -                    |  |  |
| 96         0         0         0         3.5         -         96         0         0.7         1         11         -           97         0         0         0         7         -         97         0         0.3         1         4.8         -           98         0         0.1         1         5.1         -         98         0         0.8         1         19.8         -           99         0         0         0         0         4.6         -         99         0         0.6         1         17.4         -           100         0         0.2         1         5.9         0.5         100         0         0.2         1         6         0           Average Embed. =         0.08         0.80         9.4         0.35         Cic, Cip and Embed. =         0.09         0.50         0.82         11.3         0.45   | 94                    | 0              | 0.4                   | 1                   | 7.5       |      | 94                     | 1              | 0.8                   | 1                   | 11        |                      |  |  |
| 97         0         0         0         7         -         97         0         0.3         1         4.8         -           98         0         0.1         1         5.1         -         98         0         0.8         1         19.8         -           99         0         0         0         0         4.6         -         99         0         0.6         1         17.4         -           100         0         0.2         1         5.9         0.5         100         0         0.2         1         6         0           Average           Cic, Cip and Embed. =         0.09         0.50         0.82         11.3         0.45           Old Calcite Index (CI) =         0.91  |                       |                |                       |                     |           |      |                        |                |                       |                     |           | -                    |  |  |
| 99         0         0         0         4.6         -         99         0         0.6         1         17.4         -           100         0         0.2         1         5.9         0.5         100         0         0.2         1         6         0           Average Cic, Cip and Embed. =         0.09         0.50         0.82         11.3         0.45           Old Calcite Index (CI) =         0.88         Old Calcite Index (CI) =         0.91   | 97                    | 0              | 0                     | 0                   | 7         | -    | 97                     | 0              | 0.3                   | 1                   | 4.8       | -                    |  |  |
| 100         0         0.2         1         5.9         0.5         100         0         0.2         1         6         0           Average Cic, Cip and Embed. =         0.08         0.25         0.80         9.4         0.35         Cic, Cip and Embed. =         0.09         0.50         0.82         11.3         0.45           Old Calcite Index (CI) =         0.88         Old Calcite Index (CI) =         0.91  | 99                    | 0              | 0                     | 0                   | 4.6       | -    | 99                     | 0              | 0.6                   | 1                   | 17.4      | -                    |  |  |
| Embed. =         Embed. =           Old Calcite Index (CI) =         0.88           Old Calcite Index (CI) =         0.91   | 100<br>Average        | 0              | 0.2                   | 1                   | 5.9       |      | 100<br>Average         | 0              | 0.2                   | 1                   | 6         |                      |  |  |
| New Calcite Index (CI) =         0.33         New Calcite Index (CI) =         0.59   | Embed. =              | e Index (CI) = |                       | 0                   | 0.88      | 0.00 | Embed. =               | e Index (CI) = |                       |                     | 0.91      | U.70                 |  |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                               |                     |                       | FRUS-2<br>Sep-22    |                           |                      | LC_FRUS-3<br>10-Sep-22              |                     |                       |                     |                        |                      |  |  |
|-------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------------|---------------------|-----------------------|---------------------|------------------------|----------------------|--|--|
| Pebble                        | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate Axis (cm) | Embeddedne<br>ss (%) |  |  |
| 1                             | 0                   | 0                     | 0                   | 10                        | -                    | 1                                   | 0                   | 0.8                   | 1                   | 10.5                   | -                    |  |  |
| 2                             | 0                   | 0                     | 0                   | 10.5<br>12                | -                    | 2 3                                 | 0                   | 0.6<br>0.5            | 1                   | 16<br>7.5              | -                    |  |  |
| 4 5                           | 0                   | 0                     | 0                   | 11<br>15                  | -                    | 4 5                                 | 0                   | 0.8<br>0.5            | 1                   | 8.5<br>5.5             | -                    |  |  |
| 6                             | 0                   | 0                     | 0                   | 2                         | -                    | 6                                   | 0                   | 0.6                   | 1                   | 15.3                   | -                    |  |  |
| 7<br>8                        | 0                   | 0.7<br>0.7            | 1                   | 9<br>10.5                 | -                    | 7<br>8                              | 0                   | 0.7<br>0.9            | 1                   | 15.5<br>10.5           | -                    |  |  |
| 9                             | 0                   | 0                     | 0                   | 9                         | -                    | 9                                   | 0                   | 0.7                   | 1                   | 9.5                    | - 0.75               |  |  |
| 11                            | 0                   | 0.3                   | 0                   | 6                         | 0.5                  | 11                                  | 0                   | 0.7                   | 1                   | 7.5<br>7.5             | 0.75                 |  |  |
| 12<br>13                      | 0                   | 0<br>0.7              | 0                   | 5.3<br>9                  | -                    | 12<br>13                            | 0                   | 0.6                   | 1                   | 5.6<br>9.3             | -                    |  |  |
| 14                            | 0                   | 0                     | 0                   | 7.5                       | -                    | 14                                  | 0                   | 0.5                   | 1                   | 11.4                   | -                    |  |  |
| 15<br>16                      | 0                   | 0 0.4                 | 0<br>1              | 6<br>5.7                  | -                    | 15<br>16                            | 0                   | 0.5<br>0.6            | 1                   | 6.5<br>6.8             | -                    |  |  |
| 17<br>18                      | 0                   | 0.6<br>0.7            | 1                   | 5.5<br>11.5               | -                    | 17<br>18                            | 0                   | 1<br>0.8              | 1                   | 7.5<br>6.8             | -                    |  |  |
| 19                            | 0                   | 0                     | 0                   | 3                         | -                    | 19                                  | 0                   | 0.9                   | 1                   | 8.9                    | -                    |  |  |
| 20<br>21                      | 0                   | 0<br>0.4              | 0                   | 1.2<br>7.3                | 0.25                 | 20<br>21                            | 0                   | 0.5<br>0.6            | 1                   | 13<br>8.8              | 0.75                 |  |  |
| 22                            | 0                   | 0                     | 0                   | 1                         | -                    | 22                                  | 0                   | 0.7                   | 1                   | 12                     | -                    |  |  |
| 23<br>24                      | 0                   | 0.4<br>0.4            | 1                   | 5.6<br>7                  | -                    | 23<br>24                            | 0                   | 0.8                   | 1                   | 5<br>9.6               | -                    |  |  |
| 25<br>26                      | 0                   | 0                     | 0                   | 3<br>7                    | -                    | 25<br>26                            | 0                   | 0.5<br>0.9            | 1                   | 12.1<br>13.5           | -                    |  |  |
| 27                            | 0                   | 0.8                   | 1                   | 23                        | -                    | 27                                  | 0                   | 0.6                   | 1                   | 15                     | -                    |  |  |
| 28<br>29                      | 0                   | 0.6<br>0.8            | 1<br>1              | 8<br>21                   | -                    | 28<br>29                            | 0                   | 0.7<br>0.5            | 1                   | 12<br>9.3              | -                    |  |  |
| 30                            | 0                   | 0.6                   | 1                   | 6.5                       | 0.25                 | 30                                  | 0                   | 0.7                   | 1                   | 9                      | 0.5                  |  |  |
| 31<br>32                      | 0                   | 0.3                   | 0                   | 9.2                       | -                    | 31<br>32                            | 0                   | 0.3<br>0.4            | 1                   | 8.2<br>10.4            | -                    |  |  |
| 33<br>34                      | 0                   | 0.7<br>0.4            | 1                   | 9<br>9.2                  | -                    | 33<br>34                            | 0                   | 0.6<br>0.7            | 1                   | 17<br>14               | -                    |  |  |
| 35                            | 0                   | 0.4                   | 1                   | 15                        | -                    | 35                                  | 0                   | 0.5                   | 1                   | 7                      | -                    |  |  |
| 36<br>37                      | 0                   | 0.5<br>0.5            | 1<br>1              | 8                         | -                    | 36<br>37                            | 0                   | 0.8                   | 1                   | 8.5<br>7.1             | -                    |  |  |
| 38<br>39                      | 0                   | 0.9                   | 1                   | 12                        | -                    | 38<br>39                            | 0                   | 1 0.7                 | 1                   | 6.8                    | -                    |  |  |
| 40                            | 0                   | 0.3                   | 0<br>1              | 7                         | 0.5                  | 39<br>40                            | 0                   | 0.7                   | 1                   | 11<br>14               | 0.5                  |  |  |
| 41<br>42                      | 0                   | 0.3<br>0.4            | 1<br>1              | 8.6                       | -                    | 41<br>42                            | 0                   | 0.8<br>0.5            | 1                   | 7.1<br>17              | -                    |  |  |
| 43                            | 0                   | 0.5                   | 1                   | 8                         | -                    | 43                                  | 0                   | 0.5                   | 1                   | 20                     | -                    |  |  |
| 44<br>45                      | 0                   | 0.7<br>0              | 1<br>0              | 16<br>4                   | -                    | 44<br>45                            | 0                   | 0.9<br>0.5            | 1                   | 13<br>10.5             | -                    |  |  |
| 46                            | 0                   | 0                     | 0                   | 4.5                       | -                    | 46                                  | 0                   | 0.8                   | 1                   | 2.6                    | -                    |  |  |
| 47<br>48                      | 0                   | 0.1<br>0.1            | 1                   | 7<br>6.6                  | -                    | 47<br>48                            | 0                   | 0.8<br>0.8            | 1                   | 3.8<br>9.2             | -                    |  |  |
| 49<br>50                      | 0                   | 0                     | 0                   | 6.4<br>9                  | 0.5                  | 49<br>50                            | 0                   | 0.8<br>0.3            | 1                   | 7.5<br>16              | 0.75                 |  |  |
| 51                            | 0                   | 0.8                   | 1                   | 5.9                       | -                    | 51                                  | 0                   | 0                     | 0                   | 9                      | -                    |  |  |
| 52<br>53                      | 0                   | 0                     | 0                   | 1.9<br>2.8                | -                    | 52<br>53                            | 0                   | 0.7<br>0.4            | 1                   | 4.5<br>8               | -                    |  |  |
| 54<br>55                      | 0                   | 0.1<br>0.3            | 1                   | 3.8<br>4.8                | -                    | 54<br>55                            | 0                   | 0.8<br>0.6            | 1                   | 7 5                    | -                    |  |  |
| 56                            | 0                   | 1                     | 1                   | 8.7                       | -                    | 56                                  | 0                   | 0.9                   | 1                   | 6.7                    | -                    |  |  |
| 57<br>58                      | 0                   | 0.4<br>0.3            | 1                   | 5.3<br>7.1                | -                    | 57<br>58                            | 0                   | 0.5<br>0.6            | 1                   | 9.5<br>11.1            | -                    |  |  |
| 59                            | 0                   | 0                     | 0                   | 7.5                       | -                    | 59                                  | 0                   | 0.5                   | 1                   | 15                     | -                    |  |  |
| 60<br>61                      | 0                   | 0.5<br>0.1            | 1                   | 8.7<br>5.2                | 0.75                 | 60<br>61                            | 0                   | 0.5<br>0.3            | 1                   | 11<br>7.6              | 0.5                  |  |  |
| 62<br>63                      | 0                   | 0                     | 0                   | 6.1<br>7.6                | -                    | 62<br>63                            | 0                   | 1<br>0.8              | 1                   | 6.2<br>4.4             | -                    |  |  |
| 64                            | 0                   | 0.1                   | 1                   | 8.5                       | -                    | 64                                  | 0                   | 0.6                   | 1                   | 13.5                   | -                    |  |  |
| 65<br>66                      | 0                   | 0.1                   | 1<br>0              | 9.5<br>3.5                | -                    | 65<br>66                            | 0                   | 0.6<br>0.5            | 1                   | 10<br>25               | -                    |  |  |
| 67                            | 0                   | 0.1                   | 1                   | 4.2                       | -                    | 67                                  | 0                   | 0.7                   | 1                   | 10.5                   | -                    |  |  |
| 68<br>69                      | 0                   | 0.2                   | 0<br>1              | 3<br>8.5                  | -                    | 68<br>69                            | 0                   | 0.9<br>0.5            | 1                   | 18<br>7                | -                    |  |  |
| 70<br>71                      | 0                   | 0.1<br>0.1            | 1                   | 9.5<br>5.5                | 0 -                  | 70<br>71                            | 0                   | 0.6<br>0.8            | 1                   | 6.5<br>7               | 0.5                  |  |  |
| 72                            | 0                   | 0.3                   | 1                   | 4.5                       | -                    | 72                                  | 0                   | 0.9                   | 1                   | 6.8                    | -                    |  |  |
| 73<br>74                      | 0                   | 0.1<br>0.3            | 1                   | 8.5<br>7.6                | -                    | 73<br>74                            | 0                   | 0.8<br>0.7            | 1 1                 | 19.5<br>8.1            | -                    |  |  |
| 75<br>76                      | 0                   | 0.4<br>0.4            | 1                   | 6.8<br>5.8                | -                    | 75<br>76                            | 0                   | 0.9<br>0.6            | 1                   | 9.8<br>8.5             | -                    |  |  |
| 77                            | 0                   | 0                     | 0                   | 3.6                       | -                    | 77                                  | 0                   | 0.5                   | 1                   | 7.9                    | -                    |  |  |
| 78<br>79                      | 0                   | 0.3<br>0.3            | 1                   | 7.2<br>6.1                | -                    | 78<br>79                            | 0                   | 0.1<br>0.6            | 1                   | 5<br>4                 | -                    |  |  |
| 80                            | 0                   | 0.1                   | 1                   | 3.5                       | 0                    | 80                                  | 0                   | 1                     | 1                   | 12                     | 0.5                  |  |  |
| 81<br>82                      | 0                   | 0.4                   | 1<br>0              | 5.8<br>4.5                | -                    | 81<br>82                            | 0<br>1              | 0.9<br>0.8            | 1                   | 19<br>34               | -                    |  |  |
| 83<br>84                      | 0                   | 0.5<br>0              | 1 0                 | 14.5<br>4.5               | -                    | 83<br>84                            | 0                   | 0.6<br>0.4            | 1                   | 17.5<br>13.5           | -                    |  |  |
| 85                            | 0                   | 0.1                   | 1                   | 4.3                       | -                    | 85                                  | 0                   | 0.8                   | 1                   | 12.5                   | -                    |  |  |
| 86<br>87                      | 0                   | 0.3                   | 0<br>1              | 3<br>12                   | -                    | 86<br>87                            | 0                   | 0.5<br>0.6            | 1                   | 3.6<br>7.5             | -                    |  |  |
| 88                            | 0                   | 0.2                   | 1                   | 4.3                       | -                    | 88                                  | 0                   | 0.8                   | 1                   | 7.9                    | -                    |  |  |
| 89<br>90                      | 0                   | 0<br>0.8              | 0<br>1              | 4.5<br>7.2                | 0.75                 | 89<br>90                            | 0                   | 0.9<br>0.9            | 1                   | 12<br>7.5              | 0.5                  |  |  |
| 91<br>92                      | 0                   | 1<br>0.8              | 1                   | 4.5<br>6.5                | -                    | 91<br>92                            | 0                   | 1<br>0.7              | 1                   | 5.6<br>5.2             | -                    |  |  |
| 93                            | 0                   | 0.8                   | 1                   | 5.8                       | -                    | 93                                  | 0                   | 0.7                   | 1                   | 7                      | -                    |  |  |
| 94<br>95                      | 0                   | 0.7<br>0              | 1<br>0              | 4.5<br>4.5                | -                    | 94<br>95                            | 0                   | 0.7<br>0.7            | 1                   | 8<br>9.9               | -                    |  |  |
| 96                            | 0                   | 0                     | 0                   | 2.8                       | -                    | 96                                  | 0                   | 0.6                   | 1                   | 15.2                   | -                    |  |  |
| 97<br>98                      | 0                   | 0.1<br>0.3            | 1<br>1              | 4.5<br>9.5                | -                    | 97<br>98                            | 0                   | 0.7<br>0.6            | 1                   | 16<br>7                | -                    |  |  |
| 99<br>100                     | 0                   | 0.5<br>0.8            | 1                   | 7<br>6.5                  | 0.5                  | 99<br>100                           | 0                   | 0.4<br>0.4            | 1                   | 10.1                   | 0.25                 |  |  |
| Average Cic, Cip and Embed. = |                     | 0.28                  | 0.64                | 7.1                       |                      | Average<br>Cic, Cip and<br>Embed. = | 0.02                | 0.67                  | 0.99                | 10.2                   | 0.55                 |  |  |
|                               | te Index (CI) =     |                       | 0                   | 0.64                      |                      |                                     | te Index (CI) =     |                       |                     | 1.01                   |                      |  |  |
| New Calci                     | te Index (CI) =     |                       |                     | 0.28                      |                      | New Calci                           | te Index (CI) =     |                       |                     | 0.69                   |                      |  |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

| LC_GRCK-1<br>14-Sep-22            |                     |                       |                     |                           |                      | LC_GRCK-2<br>14-Sep-22              |                     |                       |                     |                           |                     |  |
|-----------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|-------------------------------------|---------------------|-----------------------|---------------------|---------------------------|---------------------|--|
| Pebble                            | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                              | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedn<br>ss (%) |  |
| 1 2                               | 0                   | 0                     | 0                   | 11<br>8.2                 | -                    | 1 2                                 | 0                   | 0                     | 0                   | 9.7<br>8.8                | -                   |  |
| 3<br>4                            | 0                   | 0                     | 0                   | 8.4<br>6                  | -                    | 3<br>4                              | 0                   | 0                     | 0                   | 10<br>7.3                 | -                   |  |
| 5<br>6                            | 0                   | 0                     | 0                   | 6.3<br>8.2                | -                    | 5<br>6                              | 0                   | 0                     | 0                   | 7.2<br>5.4                | -                   |  |
| 7                                 | 0                   | 0                     | 0                   | 9.5                       | -                    | 7                                   | 0                   | 0                     | 0                   | 4.5                       | -                   |  |
| 8<br>9                            | 0                   | 0                     | 0                   | 5.5<br>5.6                | -                    | 8                                   | 0                   | 0                     | 0                   | 2.2<br>4.3                | -                   |  |
| 10<br>11                          | 0                   | 0                     | 0                   | 13<br>5.3                 | 0.5                  | 10<br>11                            | 0                   | 0                     | 0                   | 3.7<br>6.7                | -                   |  |
| 12<br>13                          | 0                   | 0                     | 0                   | 8.1<br>14.5               | -                    | 12<br>13                            | 0                   | 0                     | 0                   | 3.6<br>5                  | -                   |  |
| 14<br>15                          | 0                   | 0                     | 0                   | 5.1<br>24.9               | -                    | 14<br>15                            | 0                   | 0                     | 0                   | 9 7.1                     | -                   |  |
| 16                                | 0                   | 0                     | 0                   | 3.5                       | -                    | 16                                  | 0                   | 0                     | 0                   | 9                         | -                   |  |
| 17<br>18                          | 0                   | 0                     | 0                   | 2 4                       | -                    | 17<br>18                            | 0                   | 0                     | 0                   | 3.7<br>3.3                | -                   |  |
| 19<br>20                          | 0                   | 0                     | 0                   | 10<br>3.5                 | 0.75                 | 19<br>20                            | 0                   | 0                     | 0                   | 8.5<br>5                  | 0.75                |  |
| 21<br>22                          | 0                   | 0                     | 0                   | 6.2<br>10                 | -                    | 21<br>22                            | 0                   | 0                     | 0                   | 8<br>7                    | -                   |  |
| 23                                | 0                   | 0                     | 0                   | 6.7                       | -                    | 23                                  | 0                   | 0                     | 0                   | 3.6                       | -                   |  |
| 24<br>25                          | 0                   | 0                     | 0                   | 4.5<br>7                  | -                    | 24<br>25                            | 0                   | 0                     | 0                   | 9 3.2                     | -                   |  |
| 26<br>27                          | 0                   | 0                     | 0                   | 7.5<br>5.5                | -                    | 26<br>27                            | 0                   | 0                     | 0                   | 11<br>10                  |                     |  |
| 28<br>29                          | 0                   | 0                     | 0                   | 4<br>8.5                  | -                    | 28<br>29                            | 0                   | 0                     | 0                   | 15<br>5.6                 | -                   |  |
| 30                                | 0                   | 0                     | 0                   | 3.1                       | 0.5                  | 30                                  | 0                   | 0                     | 0                   | 7.1                       | 0.75                |  |
| 31<br>32                          | 0                   | 0                     | 0                   | 5.3<br>7                  | -                    | 31<br>32                            | 0                   | 0                     | 0                   | 5<br>32                   |                     |  |
| 33<br>34                          | 0                   | 0                     | 0                   | 5.1<br>4.4                | -                    | 33<br>34                            | 0                   | 0                     | 0                   | 16<br>2                   |                     |  |
| 35<br>36                          | 0                   | 0                     | 0                   | 8.1<br>2.3                | -                    | 35<br>36                            | 0                   | 0                     | 0                   | 2.5<br>4.7                | -                   |  |
| 37                                | 0                   | 0                     | 0                   | 8                         | -                    | 37                                  | 0                   | 0                     | 0                   | 3                         | -                   |  |
| 38<br>39                          | 0                   | 0                     | 0                   | 5<br>5.5                  | -                    | 38<br>39                            | 0                   | 0                     | 0                   | 4.3                       | -                   |  |
| 40<br>41                          | 0                   | 0<br>0.2              | 0                   | 8                         | 0.75                 | 40<br>41                            | 0                   | 0                     | 0                   | 16<br>6                   | 0.75                |  |
| 42                                | 0                   | 0                     | 0                   | 3.4<br>10                 | -                    | 42                                  | 0                   | 0                     | 0                   | 8<br>4.5                  | -                   |  |
| 44                                | 0                   | 0                     | 0                   | 8.5                       | -                    | 44                                  | 0                   | 0                     | 0                   | 3.1                       | -                   |  |
| 45<br>46                          | 0                   | 0                     | 0                   | 16<br>5.3                 | -                    | 45<br>46                            | 0                   | 0                     | 0                   | 2 3                       | -                   |  |
| 47<br>48                          | 0                   | 0                     | 0                   | 13<br>10                  | -                    | 47<br>48                            | 0                   | 0                     | 0                   | 17.5<br>3.5               |                     |  |
| 49                                | 0                   | 0                     | 0                   | 8                         | -                    | 49                                  | 0                   | 0                     | 0                   | 4                         | -                   |  |
| 50<br>51                          | 0                   | 0                     | 0                   | 8.7<br>8.2                | 0.25                 | 50<br>51                            | 0                   | 0                     | 0                   | 4<br>3.6                  | 0.5                 |  |
| 52<br>53                          | 0                   | 0                     | 0                   | 9.3<br>4.5                | -                    | 52<br>53                            | 0                   | 0                     | 0                   | 9.8<br>7.5                | -                   |  |
| 54<br>55                          | 0                   | 0                     | 0                   | 6.2<br>8.4                | -                    | 54<br>55                            | 0                   | 0                     | 0                   | 5.1<br>7.8                | -                   |  |
| 56                                | 0                   | 0                     | 0                   | 17                        | -                    | 56                                  | 0                   | 0                     | 0                   | 7                         | -                   |  |
| 57<br>58                          | 0                   | 0                     | 0                   | 14.5<br>10.1              | -                    | 57<br>58                            | 0                   | 0                     | 0                   | 10                        | -                   |  |
| 59<br>60                          | 0                   | 0                     | 0                   | 9.6<br>3.6                | 0.5                  | 59<br>60                            | 0                   | 0                     | 0                   | 7.2<br>6.5                | 0.5                 |  |
| 61<br>62                          | 0                   | 0                     | 0                   | 3.9<br>4.1                | -                    | 61<br>62                            | 0                   | 0                     | 0                   | 4.5<br>5.6                | -                   |  |
| 63                                | 0                   | 0                     | 0                   | 11.4                      | -                    | 63                                  | 0                   | 0                     | 0                   | 4.1                       | -                   |  |
| 64<br>65                          | 0                   | 0                     | 0                   | 7.4<br>8.1                | -                    | 64<br>65                            | 0                   | 0                     | 0                   | 3<br>18                   | -                   |  |
| 66<br>67                          | 0                   | 0                     | 0                   | 12<br>7.1                 | -                    | 66<br>67                            | 0                   | 0                     | 0                   | 11<br>15                  | -                   |  |
| 68<br>69                          | 0                   | 0                     | 0                   | 7.3<br>9.5                | -                    | 68<br>69                            | 0                   | 0                     | 0                   | 7.1<br>3.5                | -                   |  |
| 70                                | 0                   | 0                     | 0                   | 9.1                       | 0.75                 | 70                                  | 0                   | 0                     | 0                   | 4.3                       | 0.75                |  |
| 71<br>72                          | 0                   | 0                     | 0                   | 6.8<br>6.2                | -                    | 71<br>72                            | 0                   | 0                     | 0                   | 7.5<br>7.6                | -                   |  |
| 73<br>74                          | 0                   | 0                     | 0                   | 11.3<br>9.8               | -                    | 73<br>74                            | 0                   | 0                     | 0                   | 3.5<br>7                  | -                   |  |
| 75<br>76                          | 0                   | 0                     | 0                   | 8.4                       | -                    | 75<br>76                            | 0                   | 0                     | 0                   | 3<br>2.6                  | -                   |  |
| 77                                | 0                   | 0                     | 0                   | 13.6                      | -                    | 77                                  | 0                   | 0                     | 0                   | 7.8                       | -                   |  |
| 78<br>79                          | 0                   | 0                     | 0                   | 8.1<br>11                 | -                    | 78<br>79                            | 0                   | 0                     | 0                   | 11<br>11.5                | -                   |  |
| 80<br>81                          | 0                   | 0                     | 0                   | 5.3<br>11                 | 0.5                  | 80<br>81                            | 0                   | 0                     | 0                   | 16<br>12                  | 0.75                |  |
| 82<br>83                          | 0                   | 0                     | 0                   | 6.4<br>6.2                | -                    | 82<br>83                            | 0                   | 0                     | 0                   | 7.6<br>7.2                | -                   |  |
| 84                                | 0                   | 0                     | 0                   | 3.1                       | -                    | 84                                  | 0                   | 0                     | 0                   | 5.9                       | -                   |  |
| 85<br>86                          | 0                   | 0                     | 0                   | 3.1<br>2.6                | -                    | 85<br>86                            | 0                   | 0                     | 0                   | 17<br>3.2                 | -                   |  |
| 87<br>88                          | 0                   | 0<br>0                | 0                   | 5.1<br>4.7                | -                    | 87<br>88                            | 0                   | 0                     | 0                   | 11<br>4.3                 | -                   |  |
| 89<br>90                          | 0                   | 0                     | 0                   | 3.2<br>15                 | 0.5                  | 89<br>90                            | 0                   | 0                     | 0                   | 7.5<br>6.4                | 0.5                 |  |
| 91                                | 0                   | 0                     | 0                   | 8.5                       | -                    | 91                                  | 0                   | 0                     | 0                   | 11.6                      | -                   |  |
| 92<br>93                          | 0                   | 0                     | 0                   | 6.3<br>21                 | -                    | 92<br>93                            | 0                   | 0                     | 0                   | 8.1<br>7.5                | -                   |  |
| 94<br>95                          | 0                   | 0                     | 0                   | 4.9<br>5.3                | -                    | 94<br>95                            | 0                   | 0                     | 0                   | 3.2<br>6.4                | -                   |  |
| 96                                | 0                   | 0                     | 0                   | 5.9                       | -                    | 96                                  | 0                   | 0                     | 0                   | 2.5                       | -                   |  |
| 97<br>98                          | 0                   | 0                     | 0                   | 5.2<br>4.5                | -                    | 97<br>98                            | 0                   | 0                     | 0                   | 4.6<br>7.5                | -                   |  |
| 99<br>100                         | 0                   | 0                     | 0                   | 4.8<br>8.5                | 0.25                 | 99<br>100                           | 0                   | 0                     | 0                   | 5.5<br>3.7                | 0.5                 |  |
| Average<br>c, Cip and<br>Embed. = | 0                   | 0.00                  | 0.01                | 7.7                       |                      | Average<br>Cic, Cip and<br>Embed. = |                     | 0                     | 0                   | 7.1                       | 0.58                |  |
|                                   |                     | İ                     |                     | 1                         | 1                    |                                     | 1                   |                       |                     | i .                       | II.                 |  |

Table I.4: Pebble Counts and Calcite Measurements at Benthic Invertebrate Sampling Locations in Dry Creek, Fording River, and Grace Creek, 2022

|                                  |                     |                       | GRCK-3<br>Sep-22    |                           |                      |                                    | LC_DCDS-1<br>30-Nov-22    |                      |                                    | LC_DCDS-2<br>30-Nov-22    |                      |
|----------------------------------|---------------------|-----------------------|---------------------|---------------------------|----------------------|------------------------------------|---------------------------|----------------------|------------------------------------|---------------------------|----------------------|
| Pebble                           | Concreted<br>Status | Calcite<br>Proportion | Calcite<br>Presence | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                             | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) | Pebble                             | Intermediate<br>Axis (cm) | Embeddedne<br>ss (%) |
| 1 2                              | 0                   | 0                     | 0                   | 6<br>16                   | -                    | 1 2                                | 12.5<br>7.5               | -                    | 1 2                                | 9<br>17                   | -                    |
| 3<br>4                           | 0                   | 0                     | 0                   | 5<br>8.5                  | -                    | 3<br>4                             | 15<br>10.5                | -                    | 3<br>4                             | 16.5<br>17.5              |                      |
| 5<br>6                           | 0                   | 0<br>0.4              | 0<br>1              | 6.6<br>14                 | -                    | 5<br>6                             | 4.5<br>9                  | -                    | 5<br>6                             | 7<br>9                    | -                    |
| 7<br>8                           | 0                   | 0.1<br>0              | 1 0                 | 10.5<br>5.6               | -                    | 7<br>8                             | 8<br>17                   | -                    | 7<br>8                             | 16<br>4.5                 |                      |
| 9                                | 0                   | 0.1<br>0.3            | 1                   | 10<br>7.8                 | 0.25                 | 9                                  | 12<br>4                   | 0.5                  | 9                                  | 13<br>13                  | 0.75                 |
| 11                               | 0                   | 0                     | 0                   | 7.3<br>5.3                | -                    | 11                                 | 5                         | -                    | 11                                 | 8 21                      | -                    |
| 13<br>14                         | 0                   | 0                     | 0                   | 6.1                       | -                    | 13<br>14                           | 5                         | -                    | 13<br>14                           | 15                        | -                    |
| 15                               | 0                   | 0.1                   | 1                   | 7.1                       | -                    | 15                                 | 4.5                       | -                    | 15                                 | 7.5                       | -                    |
| 16<br>17                         | 0                   | 0 0.2                 | 0                   | 4.2<br>6.1                | -                    | 16<br>17                           | 4<br>5.5                  | -                    | 16<br>17                           | 9.5<br>15                 | -                    |
| 18<br>19                         | 0                   | 0                     | 0                   | 7.6<br>3                  | -                    | 18<br>19                           | 4.5<br>9                  | -                    | 18<br>19                           | 8<br>12.5                 | -                    |
| 20<br>21                         | 0                   | 0                     | 0                   | 7.6<br>11.1               | 0.5                  | 20<br>21                           | 5<br>8                    | 0.25                 | 20<br>21                           | 10.5<br>6                 | 0.5                  |
| 22<br>23                         | 0                   | 0.1<br>0.5            | 1                   | 11.5<br>20.3              | -                    | 22<br>23                           | 6<br>14                   | -                    | 22<br>23                           | 7.5<br>7.5                | -                    |
| 24<br>25                         | 0                   | 0.5<br>0.1            | 1<br>1              | 9<br>14                   | -                    | 24<br>25                           | 14<br>8.5                 | -                    | 24<br>25                           | 4                         |                      |
| 26<br>27                         | 0                   | 0.5<br>0.3            | 1                   | 17<br>8                   | -                    | 26<br>27                           | 4<br>12.5                 | -                    | 26<br>27                           | 5.5<br>11.5               | -                    |
| 28<br>29                         | 0                   | 0                     | 0                   | 7                         | -                    | 28<br>29                           | 4 9                       | -                    | 28<br>29                           | 3                         | -                    |
| 30                               | 0                   | 0                     | 0                   | 3 2                       | 0.5                  | 30                                 | 9.5                       | 0.5                  | 30                                 | 11.5                      | 0                    |
| 31<br>32                         | 0                   | 0                     | 0                   | 5 4                       | -                    | 31<br>32                           | 11<br>7                   | -                    | 31<br>32                           | 8                         | -                    |
| 33<br>34                         | 0                   | 0                     | 0                   | 12<br>6                   | -                    | 33<br>34                           | 7.5<br>7.5                | -                    | 33<br>34                           | 6<br>10.5                 | -                    |
| 35<br>36                         | 0                   | 0<br>0.4              | 0<br>1              | 14<br>5                   | -                    | 35<br>36                           | 14<br>4                   | -                    | 35<br>36                           | 8.5<br>6.5                |                      |
| 37<br>38                         | 0                   | 0                     | 0                   | 9<br>5                    | -                    | 37<br>38                           | 5.5<br>8                  | -                    | 37<br>38                           | 20<br>13                  | -                    |
| 39<br>40                         | 0                   | 0.4                   | 1 0                 | 10.6                      | 0.25                 | 39<br>40                           | 14<br>10                  | - 0                  | 39<br>40                           | 5                         | 0.75                 |
| 41                               | 0                   | 0                     | 0                   | 9.3                       | -                    | 41<br>42                           | 9 8.5                     | -                    | 41<br>42                           | 9.5                       | -                    |
| 42<br>43                         | 0                   | 0 0.1                 | 0                   | 5 11                      | -                    | 43                                 | 8                         | -                    | 43                                 | 10<br>13                  | -                    |
| 44<br>45                         | 0                   | 0<br>0.3              | 0                   | 6.1<br>10                 | -                    | 44<br>45                           | 5.5<br>4                  | -                    | 44<br>45                           | 4<br>11                   | -                    |
| 46<br>47                         | 0                   | 0.4<br>0.1            | 1                   | 8<br>5                    | -                    | 46<br>47                           | 11<br>4.5<br>22           | -                    | 46<br>47                           | 4.5<br>6.5                | -                    |
| 48<br>49                         | 0                   | 0                     | 0                   | 6.6<br>7.3                | -                    | 48<br>49                           | 22<br>7.5                 | -                    | 48<br>49                           | 13<br>10                  |                      |
| 50<br>51                         | 0                   | 0                     | 0                   | 4<br>7.6                  | 0.25                 | 50<br>51                           | 10<br>15                  | 0.75                 | 50<br>51                           | 11<br>8.5                 | 0.75                 |
| 52<br>53                         | 0                   | 0                     | 0                   | 4.1                       | -                    | 52<br>53                           | 7.5<br>5                  | -                    | 52<br>53                           | 6                         | -                    |
| 54                               | 0                   | 0                     | 0                   | 5.2                       | -                    | 54                                 | 6                         | -                    | 54                                 | 10.5<br>7                 | -                    |
| 55<br>56                         | 0                   | 0                     | 0                   | 3.9<br>5.5                | -                    | 55<br>56                           | 5.5<br>4                  | -                    | 55<br>56                           | 7<br>9                    | -                    |
| 57<br>58                         | 0                   | 0                     | 0                   | 7.5<br>4.9                | -                    | 57<br>58                           | 6                         | -                    | 57<br>58                           | 16<br>11                  | -                    |
| 59<br>60                         | 0                   | 0                     | 0                   | 9.5<br>8.5                | 0.5                  | 59<br>60                           | 5.5<br>8                  | 0.25                 | 59<br>60                           | 5.5<br>7                  | 0.5                  |
| 61<br>62                         | 0                   | 0                     | 0                   | 5.6<br>5.5                | -                    | 61<br>62                           | 18<br>15                  | -                    | 61<br>62                           | 6<br>4                    |                      |
| 63<br>64                         | 0                   | 0                     | 0                   | 4.8                       | -                    | 63<br>64                           | 9 7.5                     | -                    | 63<br>64                           | 6.5<br>12                 | -                    |
| 65                               | 0                   | 0                     | 0                   | 4.1                       | -                    | 65                                 | 8                         | -                    | 65                                 | 5.5                       | -                    |
| 66<br>67                         | 0                   | 0                     | 0                   | 3.9<br>3.5                | -                    | 66<br>67                           | 10<br>8.5<br>14           | -                    | 66<br>67                           | 10<br>8                   | -                    |
| 68<br>69                         | 0                   | 0                     | 0                   | 4<br>10                   | -                    | 68<br>69                           | 7                         | -                    | 68<br>69                           | 8<br>7.5                  | -                    |
| 70<br>71                         | 0                   | 0                     | 0                   | 3<br>11.5                 | 0.5                  | 70<br>71                           | 5.5<br>5<br>6             | 0.25                 | 70<br>71                           | 16<br>13                  | 0.25                 |
| 72<br>73                         | 0                   | 0<br>0                | 0                   | 10.5<br>7                 | -                    | 72<br>73                           | 6<br>9                    | -                    | 72<br>73                           | 10<br>9.5                 |                      |
| 74<br>75                         | 0                   | 0                     | 0                   | 11<br>5.6                 | -                    | 74<br>75                           | 7<br>10                   | -                    | 74<br>75                           | 9.5<br>8                  | -                    |
| 76<br>77                         | 0                   | 0                     | 0                   | 12.3<br>10                | -                    | 76<br>77                           | 8                         | -                    | 76<br>77                           | 12<br>5                   | -                    |
| 78<br>79                         | 0                   | 0                     | 0                   | 7.5<br>7.8                | -                    | 78<br>79                           | 9<br>9<br>7.5             | -                    | 78<br>79                           | 7.5<br>6                  | -                    |
| 80                               | 0                   | 0                     | 0                   | 3.2                       | 0                    | 80                                 | 5.5<br>6                  | 0.25                 | 80                                 | 12                        | 0.5                  |
| 81<br>82                         | 0                   | 0                     | 0                   | 3.8<br>6                  | -                    | 81<br>82                           | 5.5                       | -                    | 81<br>82                           | 5<br>6.5                  | -                    |
| 83<br>84                         | 0                   | 0                     | 0                   | 4.5<br>5                  | -                    | 83<br>84                           | 4.5                       | -                    | 83<br>84                           | 10<br>4.5                 | <br>                 |
| 85<br>86                         | 0                   | 0                     | 0                   | 13.1<br>10.2              | -                    | 85<br>86                           | 5<br>8                    | -                    | 85<br>86                           | 12.5<br>8                 |                      |
| 87<br>88                         | 0                   | 0                     | 0                   | 9.8<br>7.5                | -                    | 87<br>88                           | 6<br>7.5                  | -                    | 87<br>88                           | 4<br>4.5                  |                      |
| 89<br>90                         | 0                   | 0                     | 0                   | 8 8.9                     | 0.25                 | 89<br>90                           | 12                        | 0.25                 | 89<br>90                           | 7<br>5.5                  | 0.75                 |
| 91                               | 0                   | 0                     | 0                   | 16                        | -                    | 91<br>92                           | 5                         | -                    | 91<br>92                           | 14                        | -                    |
| 92<br>93                         | 0                   | 0                     | 0                   | 6.8                       | -                    | 93                                 | 3.5<br>9                  | -                    | 93                                 | 4.5<br>9                  | -                    |
| 94<br>95                         | 0                   | 0                     | 0                   | 2.3                       | -                    | 94<br>95                           | 4.5<br>8                  | -                    | 94<br>95                           | 12.5<br>9.5               | -                    |
| 96<br>97                         | 0                   | 0                     | 0                   | 10<br>10.1                | -                    | 96<br>97                           | 1<br>19                   |                      | 96<br>97                           | 8 2                       |                      |
| 98<br>99                         | 0                   | 0                     | 0                   | 3.5<br>3.3                | -                    | 98<br>99                           | 8<br>5.5                  | -                    | 98<br>99                           | 2                         | -                    |
| 100  Average c, Cip and Embed. = | <b>0</b>            | 0.05                  | 0<br>0.19           | 7.6                       | 0.5<br><b>0.35</b>   | 100  Average Cic, Cip and Embed. = | 2.5<br>7.9                | 0.25<br>0.33         | 100  Average Cic, Cip and Embed. = | 2.5<br><b>8.9</b>         | 0.75<br><b>0.55</b>  |
| Old Calcit                       | te Index (CI) =     |                       |                     | ).19<br>).05              |                      | EIIIDEA. =                         |                           |                      | EIIIDEG. =                         |                           |                      |

# APPENDIX J LABORATORY REPORTS

# **WATER CHEMISTRY**

ALS Laboratory Report CG2205677 (Finalized 23-May-22)



## **CERTIFICATE OF ANALYSIS**

Work Order : CG2205677

Client : Teck Coal Limited

Contact : Mike Pope

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Project : LINE CREEK OPERATION

PO : VPO00816101

C-O-C number : LCO\_Dry Creek LAEMP\_ALS

Sampler : ---Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 7

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary AB Canada T1Y 7B5

Telephone : +1 403 407 1800
Date Samples Received : 12-May-2022 09:20

Date Analysis Commenced : 13-May-2022

Issue Date : 23-May-2022 11:00

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## **Signatories**

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

| Signatories      | Position                                | Laboratory Department             |  |
|------------------|---|-----------------------------------|--|
| Anthony Calero   | Team Leader - Inorganics                | Inorganics, Calgary, Alberta      |  |
| Caleb Deroche    | Lab Analyst                             | Metals, Burnaby, British Columbia |  |
| Delson Resende   | Lab Assistant                           | Metals, Burnaby, British Columbia |  |
| Elke Tabora      |   | Inorganics, Calgary, Alberta      |  |
| Harpreet Chawla  | Team Leader - Inorganics                | Inorganics, Calgary, Alberta      |  |
| Kevin Duarte     | Supervisor - Metals ICP Instrumentation | Metals, Burnaby, British Columbia |  |
| Kyle Chang       | Lab Assistant                           | Metals, Burnaby, British Columbia |  |
| Maria Tuguinay   | Lab Assistant                           | Inorganics, Calgary, Alberta      |  |
| Owen Cheng       |   | Metals, Burnaby, British Columbia |  |
| Parker Sgarbossa | Laboratory Analyst                      | Inorganics, Calgary, Alberta      |  |
| Robin Weeks      | Team Leader - Metals                    | Metals, Burnaby, British Columbia |  |
| Ruifang Zheng    | Analyst                                 | Inorganics, Calgary, Alberta      |  |
| Sara Niroomand   |   | Inorganics, Calgary, Alberta      |  |
| Shirley Li       |   | Inorganics, Calgary, Alberta      |  |



Page : 3 of 7 Work Order

: CG2205677 Client

: Teck Coal Limited

Project : LINE CREEK OPERATION



#### **General Comments**

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| Unit     | Description                   |
|----------|-------------------------------|
| -        | No Unit                       |
| %        | percent                       |
| μg/L     | micrograms per litre          |
| μS/cm    | Microsiemens per centimetre   |
| meq/L    | milliequivalents per litre    |
| mg/L     | milligrams per litre          |
| mV       | millivolts                    |
| NTU      | nephelometric turbidity units |
| pH units | pH units                      |

<sup>&</sup>lt;: less than.

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

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

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

### **Qualifiers**

| Qualifier | Description  |
|-----------|--|
| DLM       | Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity). |
|           |  |

<sup>&</sup>gt;: greater than.

Page : 4 of 7
Work Order : CG2205677
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water (Matrix: Water)   |            |                    | Cl          | lient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-05_N | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-05_N | <br> |  |
|-------------------------------------|------------|--------------------|-------------|-------------------|--|--|------|--|
|                                     |            |                    | Client samp | oling date / time | 11-May-2022<br>10:30                   | 11-May-2022<br>12:45                   | <br> |  |
| Analyte                             | CAS Number | Method             | LOR         | Unit              | CG2205677-001                          | CG2205677-002                          | <br> |  |
|                                     |            |                    |             |                   | Result                                 | Result                                 | <br> |  |
| Physical Tests                      |            |                    |             |                   |  |  |      |  |
| acidity (as CaCO3)                  |            | E283               | 2.0         | mg/L              | <2.0                                   | <2.0                                   | <br> |  |
| alkalinity, bicarbonate (as CaCO3)  |            | E290               | 1.0         | mg/L              | 188                                    | 159                                    | <br> |  |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3    | E290               | 1.0         | mg/L              | 229                                    | 194                                    | <br> |  |
| alkalinity, carbonate (as CaCO3)    |            | E290               | 1.0         | mg/L              | <1.0                                   | 7.0                                    | <br> |  |
| alkalinity, carbonate (as CO3)      | 3812-32-6  | E290               | 1.0         | mg/L              | <1.0                                   | 4.2                                    | <br> |  |
| alkalinity, hydroxide (as CaCO3)    |            | E290               | 1.0         | mg/L              | <1.0                                   | <1.0                                   | <br> |  |
| alkalinity, hydroxide (as OH)       | 14280-30-9 | E290               | 1.0         | mg/L              | <1.0                                   | <1.0                                   | <br> |  |
| alkalinity, total (as CaCO3)        |            | E290               | 1.0         | mg/L              | 188                                    | 166                                    | <br> |  |
| conductivity                        |            | E100               | 2.0         | μS/cm             | 796                                    | 365                                    | <br> |  |
| hardness (as CaCO3), dissolved      |            | EC100              | 0.50        | mg/L              | 430                                    | 193                                    | <br> |  |
| oxidation-reduction potential [ORP] |            | E125               | 0.10        | mV                | 510                                    | 518                                    | <br> |  |
| pH                                  |            | E108               | 0.10        | pH units          | 8.24                                   | 8.37                                   | <br> |  |
| solids, total dissolved [TDS]       |            | E162               | 10          | mg/L              | 535                                    | 257                                    | <br> |  |
| solids, total suspended [TSS]       |            | E160-L             | 1.0         | mg/L              | 9.0                                    | 3.7                                    | <br> |  |
| turbidity                           |            | E121               | 0.10        | NTU               | 2.53                                   | 1.06                                   | <br> |  |
| Anions and Nutrients                |            |                    |             |                   |  |  |      |  |
| ammonia, total (as N)               | 7664-41-7  | E298               | 0.0050      | mg/L              | <0.0050                                | <0.0050                                | <br> |  |
| bromide                             | 24959-67-9 | E235.Br-L          | 0.050       | mg/L              | <0.050                                 | <0.050                                 | <br> |  |
| chloride                            | 16887-00-6 | E235.CI-L          | 0.10        | mg/L              | 3.19                                   | 0.19                                   | <br> |  |
| fluoride                            | 16984-48-8 | E235.F             | 0.020       | mg/L              | 0.122                                  | 0.098                                  | <br> |  |
| Kjeldahl nitrogen, total [TKN]      |            | E318               | 0.050       | mg/L              | 1.36 DLM                               | <0.050 DLM                             | <br> |  |
| nitrate (as N)                      | 14797-55-8 | E235.NO3-L         | 0.0050      | mg/L              | 13.6                                   | 0.0453                                 | <br> |  |
| nitrite (as N)                      | 14797-55-8 | E235.NO3-L         | 0.0030      | mg/L              | 0.0040                                 | <0.0010                                | <br> |  |
| phosphate, ortho-, dissolved (as P) |            | E378-U             | 0.0010      |                   | <0.0010                                | 0.0019                                 | <br> |  |
|                                     | 14265-44-2 | E376-U<br>E372-U   | 0.0010      | mg/L              | 0.0076                                 | 0.0019                                 |      |  |
| phosphorus, total                   | 7723-14-0  | E372-0<br>E235.SO4 | 0.0020      | mg/L              | 207                                    | 42.6                                   | <br> |  |
| sulfate (as SO4)                    | 14808-79-8 | £235.3U4           | 0.30        | mg/L              | 201                                    | 42.0                                   | <br> |  |
| Organic / Inorganic Carbon          |            | E358-L             | 0.50        | me/l              | 1.31                                   | 1.23                                   |      |  |
| carbon, dissolved organic [DOC]     |            |                    | 0.50        | mg/L              |  |  | <br> |  |
| carbon, total organic [TOC]         |            | E355-L             | 0.50        | mg/L              | 1.45                                   | 1.09                                   | <br> |  |

Page : 5 of 7
Work Order : CG2205677
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           |             |                  |                                  |                                  |             | <br> |
|-----------------------------------|------------|-----------|-------------|------------------|----------------------------------|----------------------------------|-------------|------|
|                                   |            |           | Client samp | ling date / time | 022-05_N<br>11-May-2022<br>10:30 | 022-05_N<br>11-May-2022<br>12:45 |             | <br> |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2205677-001                    | CG2205677-002                    |             | <br> |
|                                   |            |           |             |                  | Result                           | Result                           |             | <br> |
| Ion Balance anion sum             |            | EC101     | 0.10        | meq/L            | 9.13                             | 4.22                             |             | <br> |
| cation sum                        |            | EC101     | 0.10        | meq/L            | 8.76                             | 4.01                             |             | <br> |
| ion balance (cations/anions)      |            | EC101     | 0.010       | %                | 95.9                             | 95.0                             |             | <br> |
| ion balance (APHA)                |            | EC101     | 0.010       | %                | 2.07                             | 2.55                             |             | <br> |
| Total Metals                      |            |           |             | ,,,              |                                  |                                  |             |      |
| aluminum, total                   | 7429-90-5  | E420      | 0.0030      | mg/L             | 0.0485                           | 0.0110                           | <del></del> | <br> |
| antimony, total                   | 7440-36-0  | E420      | 0.00010     | mg/L             | 0.00017                          | <0.00010                         |             | <br> |
| arsenic, total                    | 7440-38-2  | E420      | 0.00010     | mg/L             | 0.00019                          | 0.00016                          |             | <br> |
| barium, total                     | 7440-39-3  | E420      | 0.00010     | mg/L             | 0.0823                           | 0.0601                           |             | <br> |
| beryllium, total                  | 7440-41-7  | E420      | 0.020       | μg/L             | <0.020                           | <0.020                           |             | <br> |
| bismuth, total                    | 7440-69-9  | E420      | 0.000050    | mg/L             | <0.000050                        | <0.000050                        |             | <br> |
| boron, total                      | 7440-42-8  | E420      | 0.010       | mg/L             | <0.010                           | 0.016                            |             | <br> |
| cadmium, total                    | 7440-43-9  | E420      | 0.0050      | μg/L             | 0.0561                           | 0.0082                           |             | <br> |
| calcium, total                    | 7440-70-2  | E420      | 0.050       | mg/L             | 103                              | 47.4                             |             | <br> |
| chromium, total                   | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L             | 0.00034                          | 0.00033                          |             | <br> |
| cobalt, total                     | 7440-48-4  | E420      | 0.10        | μg/L             | 0.11                             | <0.10                            |             | <br> |
| copper, total                     | 7440-50-8  | E420      | 0.00050     | mg/L             | 0.00097                          | <0.00050                         |             | <br> |
| iron, total                       | 7439-89-6  | E420      | 0.010       | mg/L             | 0.072                            | 0.024                            |             | <br> |
| lead, total                       | 7439-92-1  | E420      | 0.000050    | mg/L             | 0.000352                         | <0.000050                        |             | <br> |
| lithium, total                    | 7439-93-2  | E420      | 0.0010      | mg/L             | 0.0314                           | 0.0070                           |             | <br> |
| magnesium, total                  | 7439-95-4  | E420      | 0.0050      | mg/L             | 44.5                             | 17.6                             |             | <br> |
| manganese, total                  | 7439-96-5  | E420      | 0.00010     | mg/L             | 0.0133                           | 0.00307                          |             | <br> |
| mercury, total                    | 7439-97-6  | E508      | 0.0000050   | mg/L             | <0.000050                        | <0.0000050                       |             | <br> |
| molybdenum, total                 | 7439-98-7  | E420      | 0.000050    | mg/L             | 0.00138                          | 0.00136                          |             | <br> |
| nickel, total                     | 7440-02-0  | E420      | 0.00050     | mg/L             | 0.00268                          | <0.00050                         |             | <br> |
| potassium, total                  | 7440-09-7  | E420      | 0.050       | mg/L             | 1.49                             | 0.699                            |             | <br> |
| selenium, total                   | 7782-49-2  | E420      | 0.050       | μg/L             | 51.5                             | 1.66                             |             | <br> |
| silicon, total                    | 7440-21-3  | E420      | 0.10        | mg/L             | 1.97                             | 2.72                             |             | <br> |
| silver, total                     | 7440-22-4  | E420      | 0.000010    | mg/L             | 0.00146                          | <0.000010                        |             | <br> |
| sodium, total                     | 7440-23-5  | E420      | 0.050       | mg/L             | 2.93                             | 2.92                             |             | <br> |

Page : 6 of 7
Work Order : CG2205677
Client : Teck Coal Limited
Project : LINE CREEK OPERATION

ALS

# Analytical Results

| Sub-Matrix: Water     |             |           | Cli          | ent sample ID    | LC_FRUS_WS_   | LC_GRCK_WS_   | <br> |     |
|-----------------------|-------------|-----------|--------------|------------------|---------------|---------------|------|-----|
| (Matrix: Water)       |             |           |              |                  | LAEMP_DRY_2   | LAEMP_DRY_2   |      |     |
|                       |             |           |              |                  | 022-05_N      | 022-05_N      |      |     |
|                       |             |           | Client sampl | ling date / time | 11-May-2022   | 11-May-2022   | <br> |     |
|                       |             |           |              |                  | 10:30         | 12:45         |      |     |
| Analyte               | CAS Number  | Method    | LOR          | Unit             | CG2205677-001 | CG2205677-002 | <br> |     |
|                       |             |           |              |                  | Result        | Result        | <br> |     |
| Total Metals          |             |           |              |                  |               |               |      |     |
| strontium, total      | 7440-24-6   | E420      | 0.00020      | mg/L             | 0.147         | 0.180         | <br> |     |
| sulfur, total         | 7704-34-9   | E420      | 0.50         | mg/L             | 72.2          | 14.5          | <br> |     |
| thallium, total       | 7440-28-0   | E420      | 0.000010     | mg/L             | <0.000010     | <0.000010     | <br> |     |
| tin, total            | 7440-31-5   | E420      | 0.00010      | mg/L             | <0.00010      | <0.00010      | <br> |     |
| titanium, total       | 7440-32-6   | E420      | 0.00030      | mg/L             | 0.00140       | <0.00030      | <br> |     |
| uranium, total        | 7440-61-1   | E420      | 0.000010     | mg/L             | 0.00258       | 0.000948      | <br> |     |
| vanadium, total       | 7440-62-2   | E420      | 0.00050      | mg/L             | 0.00062       | <0.00050      | <br> |     |
| zinc, total           | 7440-66-6   | E420      | 0.0030       | mg/L             | 0.0055        | <0.0030       | <br> |     |
| Dissolved Metals      |             |           |              |                  |               |               |      |     |
| aluminum, dissolved   | 7429-90-5   | E421      | 0.0010       | mg/L             | <0.0010       | <0.0010       | <br> |     |
| antimony, dissolved   | 7440-36-0   | E421      | 0.00010      | mg/L             | 0.00013       | <0.00010      | <br> |     |
| arsenic, dissolved    | 7440-38-2   | E421      | 0.00010      | mg/L             | <0.00010      | <0.00010      | <br> |     |
| barium, dissolved     | 7440-39-3   | E421      | 0.00010      | mg/L             | 0.0828        | 0.0596        | <br> |     |
| beryllium, dissolved  | 7440-41-7   | E421      | 0.020        | μg/L             | <0.020        | <0.020        | <br> |     |
| bismuth, dissolved    | 7440-69-9   | E421      | 0.000050     | mg/L             | <0.000050     | <0.000050     | <br> |     |
| boron, dissolved      | 7440-42-8   | E421      | 0.010        | mg/L             | <0.010        | 0.015         | <br> |     |
| cadmium, dissolved    | 7440-43-9   | E421      | 0.0050       | μg/L             | 0.0372        | <0.0050       | <br> |     |
| calcium, dissolved    | 7440-70-2   | E421      | 0.050        | mg/L             | 97.8          | 47.1          | <br> |     |
| chromium, dissolved   | 7440-47-3   | E421.Cr-L | 0.00010      | mg/L             | 0.00012       | 0.00016       | <br> |     |
| cobalt, dissolved     | 7440-48-4   | E421      | 0.10         | μg/L             | <0.10         | <0.10         | <br> |     |
| copper, dissolved     | 7440-50-8   | E421      | 0.00020      | mg/L             | 0.00026       | <0.00020      | <br> |     |
| iron, dissolved       | 7439-89-6   | E421      | 0.010        | mg/L             | 0.010         | <0.010        | <br> |     |
| lead, dissolved       | 7439-92-1   | E421      | 0.000050     | mg/L             | <0.000050     | <0.000050     | <br> |     |
| lithium, dissolved    | 7439-93-2   | E421      | 0.0010       | mg/L             | 0.0291        | 0.0065        | <br> |     |
| magnesium, dissolved  | 7439-95-4   | E421      | 0.0050       | mg/L             | 45.2          | 18.4          | <br> |     |
| manganese, dissolved  | 7439-96-5   | E421      | 0.00010      | mg/L             | 0.00312       | 0.00044       | <br> |     |
| mercury, dissolved    | 7439-97-6   | E509      | 0.0000050    | mg/L             | <0.000050     | <0.000050     | <br> |     |
| molybdenum, dissolved | 7439-98-7   | E421      | 0.000050     | mg/L             | 0.00137       | 0.00137       | <br> |     |
| nickel, dissolved     | 7440-02-0   | E421      | 0.00050      | mg/L             | 0.00236       | <0.00050      | <br> |     |
| potassium, dissolved  | 7440-09-7   | E421      | 0.050        | mg/L             | 1.38          | 0.658         | <br> |     |
| ,                     | 7 . 13-03-7 |           | 1            |                  |               |               | l    | l l |

Page : 7 of 7
Work Order : CG2205677
Client : Teck Coal Limited
Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water (Matrix: Water)     |            |        | Cl          | ient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-05_N | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-05_N | <br> |  |
|---------------------------------------|------------|--------|-------------|------------------|--|--|------|--|
|                                       |            |        | Client samp | ling date / time | 11-May-2022<br>10:30                   | 11-May-2022<br>12:45                   | <br> |  |
| Analyte                               | CAS Number | Method | LOR         | Unit             | CG2205677-001                          | CG2205677-002                          | <br> |  |
|                                       |            |        |             |                  | Result                                 | Result                                 | <br> |  |
| Dissolved Metals                      |            |        |             |                  |  |  |      |  |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050       | μg/L             | 60.8                                   | 2.23                                   | <br> |  |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050       | mg/L             | 1.84                                   | 2.64                                   | <br> |  |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010    | mg/L             | <0.000010                              | <0.000010                              | <br> |  |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050       | mg/L             | 2.81                                   | 2.92                                   | <br> |  |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020     | mg/L             | 0.142                                  | 0.175                                  | <br> |  |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50        | mg/L             | 75.8                                   | 16.2                                   | <br> |  |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010    | mg/L             | <0.000010                              | <0.000010                              | <br> |  |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010     | mg/L             | <0.00010                               | <0.00010                               | <br> |  |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030     | mg/L             | <0.00030                               | <0.00030                               | <br> |  |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010    | mg/L             | 0.00249                                | 0.000962                               | <br> |  |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050     | mg/L             | <0.00050                               | <0.00050                               | <br> |  |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010      | mg/L             | 0.0015                                 | <0.0010                                | <br> |  |
| dissolved mercury filtration location |            | EP509  | -           | -                | Field                                  | Field                                  | <br> |  |
| dissolved metals filtration location  |            | EP421  | -           | -                | Field                                  | Field                                  | <br> |  |

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



# **QUALITY CONTROL INTERPRETIVE REPORT**

**Work Order** : **CG2205677** Page : 1 of 16

 Client
 : Teck Coal Limited
 Laboratory
 : Calgary - Environmental

 Contact
 : Mike Pope
 Account Manager
 : Lyudmyla Shvets

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43 Address : 2559 29th Street NE

Sparwood BC Canada V0B 2G0 Calgary, Alberta Canada T1Y 7B5

 Telephone
 : -- Telephone
 : +1 403 407 1800

 Project
 : LINE CREEK OPERATION
 Date Samples Received
 : 12-May-2022 09:20

C-O-C number : LCO Dry Creek LAEMP ALS

Sampler : ---Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 2
No. of samples analysed : 2

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

#### Key

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

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

**DQO: Data Quality Objective.** 

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

#### **Workorder Comments**

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

## **Summary of Outliers**

## **Outliers**: Quality Control Samples

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

## Outliers: Reference Material (RM) Samples

• No Reference Material (RM) Sample outliers occur.

## **Outliers : Analysis Holding Time Compliance (Breaches)**

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

## **Outliers: Frequency of Quality Control Samples**

• No Quality Control Sample Frequency Outliers occur.



Page : 3 of 16 Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **Analysis Holding Time Compliance**

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

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

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

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

| Matrix: Water   |           |                |             |               | Ev        | /aluation: ≭ = | Holding time exce | edance ; 🔻 | = Within | Holding Time |
|---|-----------|----------------|-------------|---------------|-----------|----------------|-------------------|------------|----------|--------------|
| Analyte Group   | Method    | Sampling Date  | Ext         | raction / Pro | eparation |                |                   | Analys     | is       |              |
| Container / Client Sample ID(s)   |           |                | Preparation | Holding       | Times     | Eval           | Analysis Date     | Holding    | Times    | Eval         |
|   |           |                | Date        | Rec           | Actual    |                |                   | Rec        | Actual   |              |
| Anions and Nutrients : Ammonia by Fluorescence                                  |           |                |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)   |           |                |             |               |           |                |                   |            |          |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E298      | 11-May-2022    | 14-May-2022 |               |           |                | 14-May-2022       | 28 days    | 3 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence                                  |           |                |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)   |           |                |             |               |           |                |                   |            |          |              |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E298      | 11-May-2022    | 14-May-2022 |               |           |                | 14-May-2022       | 28 days    | 3 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level)                       |           |                |             |               |           |                |                   |            |          |              |
| HDPE  |           |                |             |               |           |                |                   |            |          |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E235.Br-L | 11-May-2022    |             |               |           |                | 13-May-2022       | 28 days    | 2 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level)                       |           |                |             |               |           |                |                   |            |          |              |
| HDPE  |           |                |             |               |           |                |                   |            |          |              |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.Br-L | 11-May-2022    |             |               |           |                | 13-May-2022       | 28 days    | 2 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |                |             |               |           |                |                   |            |          |              |
| HDPE  |           |                |             |               |           |                |                   |            |          |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E235.CI-L | 11-May-2022    |             |               |           |                | 13-May-2022       | 28 days    | 2 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |                |             |               |           |                |                   |            |          |              |
| HDPE  |           |                |             |               |           |                |                   |            |          | ,            |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.CI-L | 11-May-2022    |             |               |           |                | 13-May-2022       | 28 days    | 2 days   | ✓            |
|   |           |                |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001 |                |             |               |           |                |                   |            |          |              |
| UDDE  | I         | 1              |             |               |           |                | I                 | I          |          |              |
| HDPE LC FRUS WS LAEMP DRY 2022-05 N   | E378-U    | 11-May-2022    |             |               |           |                | 13-May-2022       | 3 days     | 2 days   | ✓            |
| LO_FROS_WS_LAEWIP_DR1_ZUZZ-US_IN  | L370-0    | 1 1-iviay-2022 |             |               |           |                | 13-iviay-2022     | 3 uays     | ∠ uays   | •            |
|   |           |                |             |               |           |                |                   |            |          |              |

Page : 4 of 16
Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Analyte Group   | Method                   | Sampling Date | Ex          | traction / Pr | reparation |      |               | Analys  | sis    |          |
|---|--------------------------|---------------|-------------|---------------|------------|------|---------------|---------|--------|----------|
| Container / Client Sample ID(s)   |                          |               | Preparation | Holdin        | g Times    | Eval | Analysis Date | Holding | Times  | Eval     |
|   |                          |               | Date        | Rec           | Actual     |      |               | Rec     | Actual |          |
| nions and Nutrients : Dissolved Orthophosphate by Colourimetry  | (Ultra Trace Level 0.001 |               |             |               |            |      |               |         |        |          |
| HDPE  |                          |               |             |               |            |      |               |         |        |          |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E378-U                   | 11-May-2022   |             |               |            |      | 13-May-2022   | 3 days  | 2 days | ✓        |
| nions and Nutrients : Fluoride in Water by IC   |                          |               |             |               |            |      |               |         |        |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-05_N   | E235.F                   | 11-May-2022   |             |               |            |      | 13-May-2022   | 28 days | 2 days | ✓        |
|   |                          |               |             |               |            |      |               |         |        |          |
| nions and Nutrients : Fluoride in Water by IC   |                          |               |             |               |            |      |               |         |        |          |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.F                   | 11-May-2022   |             |               |            |      | 13-May-2022   | 28 days | 2 days | ✓        |
| original Matrices and Matrices |                          |               |             |               |            |      |               |         |        |          |
| nions and Nutrients : Nitrate in Water by IC (Low Level) HDPE   |                          |               |             |               |            |      |               |         |        |          |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E235.NO3-L               | 11-May-2022   |             |               |            |      | 13-May-2022   | 3 days  | 2 days | ✓        |
| nions and Nutrients : Nitrate in Water by IC (Low Level)  |                          |               |             |               |            |      |               |         |        |          |
| HDPE<br>LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.NO3-L               | 11-May-2022   |             |               |            |      | 13-May-2022   | 3 days  | 2 days | <b>✓</b> |
| 121 1 2 2 2 1 112   |                          | ,             |             |               |            |      | , ,           |         |        |          |
| nions and Nutrients : Nitrite in Water by IC (Low Level)  |                          |               |             |               |            |      |               |         |        |          |
| HDPE<br>LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E235.NO2-L               | 11-May-2022   |             |               |            |      | 13-May-2022   | 3 days  | 2 days | ✓        |
|   |                          |               |             |               |            |      |               |         |        |          |
| nions and Nutrients : Nitrite in Water by IC (Low Level)  |                          |               |             |               |            |      |               |         |        |          |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.NO2-L               | 11-May-2022   |             |               |            |      | 13-May-2022   | 3 days  | 2 days | ✓        |
| nions and Nutrients : Sulfate in Water by IC  |                          |               |             |               |            |      |               |         |        |          |
| HDPE  |                          |               |             |               |            |      |               |         |        |          |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E235.SO4                 | 11-May-2022   |             |               |            |      | 13-May-2022   | 28 days | 2 days | ✓        |
| nions and Nutrients : Sulfate in Water by IC  |                          |               |             |               |            |      |               |         |        |          |
| HDPE<br>LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E235.SO4                 | 11-May-2022   |             |               |            |      | 13-May-2022   | 28 days | 2 days | <b>✓</b> |
| 20_0  | 2200.004                 |               |             |               |            |      |               |         |        | •        |

Page : 5 of 16 Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Matrix: Water  |           |               |                     |               | L\                | /aiuation. ^ = | Holding time exce | euance , •     | - vviti iiii      | nolaling Tim |
|--|-----------|---------------|---------------------|---------------|-------------------|----------------|-------------------|----------------|-------------------|--------------|
| Analyte Group  | Method    | Sampling Date | Ext                 | traction / P  | reparation        |                |                   | Analys         | is                |              |
| Container / Client Sample ID(s)  |           |               | Preparation<br>Date | Holdin<br>Rec | g Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | 7 Times<br>Actual | Eval         |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |                     |               |                   |                |                   |                |                   |              |
| Amber glass total (sulfuric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N           | E318      | 11-May-2022   | 17-May-2022         |               |                   |                | 17-May-2022       | 28 days        | 6 days            | ✓            |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |                     |               |                   |                |                   |                |                   |              |
| Amber glass total (sulfuric acid) LC_GRCK_WS_LAEMP_DRY_2022-05_N           | E318      | 11-May-2022   | 17-May-2022         |               |                   |                | 17-May-2022       | 28 days        | 6 days            | ✓            |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |                     |               |                   |                |                   |                |                   |              |
| Amber glass total (sulfuric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N           | E372-U    | 11-May-2022   | 17-May-2022         |               |                   |                | 17-May-2022       | 28 days        | 6 days            | ✓            |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |                     |               |                   |                |                   |                |                   |              |
| Amber glass total (sulfuric acid)  LC_GRCK_WS_LAEMP_DRY_2022-05_N          | E372-U    | 11-May-2022   | 17-May-2022         |               |                   |                | 17-May-2022       | 28 days        | 6 days            | ✓            |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |                     |               |                   |                |                   |                |                   |              |
| HDPE dissolved (nitric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N                | E421.Cr-L | 11-May-2022   | 17-May-2022         |               |                   |                | 18-May-2022       | 180<br>days    | 6 days            | ✓            |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |                     |               |                   |                |                   |                |                   |              |
| HDPE dissolved (nitric acid) LC_GRCK_WS_LAEMP_DRY_2022-05_N                | E421.Cr-L | 11-May-2022   | 17-May-2022         |               |                   |                | 18-May-2022       | 180<br>days    | 6 days            | ✓            |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                     |           |               |                     |               |                   |                |                   |                |                   |              |
| Glass vial dissolved (hydrochloric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N    | E509      | 11-May-2022   | 16-May-2022         |               |                   |                | 16-May-2022       | 28 days        | 5 days            | ✓            |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                     |           |               |                     |               |                   |                |                   |                |                   |              |
| Glass vial dissolved (hydrochloric acid) LC_GRCK_WS_LAEMP_DRY_2022-05_N    | E509      | 11-May-2022   | 16-May-2022         |               |                   |                | 16-May-2022       | 28 days        | 5 days            | ✓            |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                  |           |               |                     |               |                   |                |                   |                |                   |              |
| HDPE dissolved (nitric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N                | E421      | 11-May-2022   | 17-May-2022         |               |                   |                | 18-May-2022       | 180<br>days    | 6 days            | ✓            |

Page : 6 of 16
Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| viaurix: water   |                    |               |             |               |            | alaation. | nolding time exce | cuarioc , | - vvicini | Tiolaling Til |
|--|--------------------|---------------|-------------|---------------|------------|-----------|-------------------|-----------|-----------|---------------|
| Analyte Group  | Method             | Sampling Date | Ext         | traction / Pr | reparation |           |                   | Analys    | sis       |               |
| Container / Client Sample ID(s)  |                    |               | Preparation | Holding       | g Times    | Eval      | Analysis Date     | Holding   | Times     | Eval          |
|  |                    |               | Date        | Rec           | Actual     |           |                   | Rec       | Actual    |               |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                  |                    |               |             |               |            |           |                   |           |           |               |
| HDPE dissolved (nitric acid)   |                    |               |             |               |            |           |                   |           |           |               |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N   | E421               | 11-May-2022   | 17-May-2022 |               |            |           | 18-May-2022       | 180       | 6 days    | ✓             |
|  |                    |               |             |               |            |           |                   | days      |           |               |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low   | Level)             |               |             |               |            |           |                   |           |           |               |
| Amber glass dissolved (sulfuric acid)                                      |                    |               |             |               |            |           |                   |           |           |               |
| LC FRUS WS LAEMP DRY 2022-05 N   | E358-L             | 11-May-2022   | 18-May-2022 |               |            |           | 19-May-2022       | 28 days   | 8 davs    | ✓             |
|  |                    | ,             | , ,         |               |            |           |                   |           | ,         |               |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low   | Level)             |               |             |               |            |           |                   |           |           |               |
| Amber glass dissolved (sulfuric acid)                                      |                    |               |             |               |            |           |                   |           |           |               |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N   | E358-L             | 11-May-2022   | 18-May-2022 |               |            |           | 19-May-2022       | 28 days   | 8 days    | ✓             |
|  |                    | ·             | -           |               |            |           |                   |           | -         |               |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combi | ustion (Low Level) |               |             |               |            |           |                   |           |           |               |
| Amber glass total (sulfuric acid)  |                    |               |             |               |            |           |                   |           |           |               |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N   | E355-L             | 11-May-2022   | 18-May-2022 |               |            |           | 19-May-2022       | 28 days   | 8 days    | ✓             |
|  |                    | ·             |             |               |            |           |                   |           |           |               |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combi | ustion (Low Level) |               |             |               |            |           |                   |           |           |               |
| Amber glass total (sulfuric acid)  |                    |               |             |               |            |           |                   |           |           |               |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N   | E355-L             | 11-May-2022   | 18-May-2022 |               |            |           | 19-May-2022       | 28 days   | 8 days    | ✓             |
|  |                    |               |             |               |            |           |                   |           |           |               |
| Physical Tests : Acidity by Titration                                      |                    |               |             |               |            |           |                   |           |           |               |
| HDPE   |                    |               |             |               |            |           |                   |           |           |               |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N   | E283               | 11-May-2022   |             |               |            |           | 13-May-2022       | 14 days   | 2 days    | ✓             |
|  |                    |               |             |               |            |           |                   |           |           |               |
| Physical Tests : Acidity by Titration                                      |                    |               |             |               |            |           |                   |           |           |               |
| HDPE   |                    |               |             |               |            |           |                   |           |           |               |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N   | E283               | 11-May-2022   |             |               |            |           | 13-May-2022       | 14 days   | 2 days    | ✓             |
|  |                    |               |             |               |            |           |                   |           |           |               |
| Physical Tests : Alkalinity Species by Titration                           |                    |               |             |               |            |           |                   |           |           |               |
| HDPE   |                    |               |             |               |            |           |                   |           |           |               |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N   | E290               | 11-May-2022   |             |               |            |           | 13-May-2022       | 14 days   | 2 days    | ✓             |
|  |                    |               |             |               |            |           |                   |           |           |               |
| Physical Tests : Alkalinity Species by Titration                           |                    |               |             |               |            |           |                   |           |           |               |
| HDPE   |                    |               |             |               |            |           |                   |           |           |               |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N   | E290               | 11-May-2022   |             |               |            |           | 13-May-2022       | 14 days   | 2 days    | ✓             |
|  |                    |               |             |               |            |           |                   |           |           |               |

Page : 7 of 16
Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Container / Client Sample ID(s)  Preparation Date  Preparation Date  Preparation Rec Actual  Analysis Date  HOPE  HORIZON Rec Actual  Analysis Date  HOPE        | alysis ding Time Actu  ys 2 da | ual          |
|--|--------------------------------|--------------|
| Physical Tests : Conductivity in Water  HDPE LC_FRUS_WS_LAEMP_DRY_2022-05_N  E100  11-May-2022   Physical Tests : Conductivity in Water                          | Actu                           | ual          |
| Physical Tests : Conductivity in Water  HDPE LC_FRUS_WS_LAEMP_DRY_2022-05_N E100 11-May-2022 13-May-2022 28 c  Physical Tests : Conductivity in Water            |                                |              |
| HDPE         LC_FRUS_WS_LAEMP_DRY_2022-05_N         E100         11-May-2022           13-May-2022         28 c           Physical Tests : Conductivity in Water | ys 2 da                        | nus 4        |
| HDPE         LC_FRUS_WS_LAEMP_DRY_2022-05_N         E100         11-May-2022           13-May-2022         28 c           Physical Tests : Conductivity in Water | ys 2 da                        | ave 4        |
| Physical Tests : Conductivity in Water   | ys 2 da                        | nve 🗸        |
| Physical Tests : Conductivity in Water   | <b>^</b>                       | 2γ5 <b>*</b> |
|  |                                |              |
|  |                                |              |
|  |                                |              |
|  | ys 2 da                        | avs 🗸        |
| LC_GRCK_WS_LAEMP_DR1_2022_05_N   | ys Z ua                        | ays v        |
|  |                                |              |
| Physical Tests: ORP by Electrode   |                                |              |
| HDPE   |                                |              |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N E125 11-May-2022 18-May-2022 0.:  | 169 h                          |              |
|  |                                | EHTR-FM      |
| Physical Tests : ORP by Electrode  |                                |              |
| HDPE   |                                |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N E125 11-May-2022 18-May-2022 0.:  | 171 h                          | hrs *        |
|  |                                | EHTR-FM      |
|  |                                |              |
| Physical Tests : pH by Meter  HDPE   |                                |              |
|  | 49 h                           | hrs 🗶        |
| '=' ' =  |                                |              |
| h  |                                | EHTR-FM      |
| Physical Tests : pH by Meter   |                                |              |
| HDPE   |                                |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N E108 11-May-2022 13-May-2022 0.   | 51 h                           |              |
| h  |                                | EHTR-FM      |
| Physical Tests : TDS by Gravimetry   |                                | ·            |
| HDPE   |                                |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N E162 11-May-2022 17-May-2022 7 d  | s 6 da                         | ays 🗸        |
|  |                                |              |
| Physical Tests : TDS by Gravimetry   |                                |              |
|  |                                |              |
| HDPE   | rs 6 da                        | avs ✓        |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N E162 11-May-2022 17-May-2022 7 d  | o da                           | ayo 🔻        |
|  |                                |              |
| Physical Tests : TSS by Gravimetry (Low Level)   |                                |              |
| HDPE   |                                |              |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N E160-L 11-May-2022 17-May-2022 7 d  | /s 6 da                        | ays 🗸        |
|  |                                |              |

Page : 8 of 16
Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Matrix: Water   |           |               |             |               |            | aluation. ^ - | Holding time exce | euance , v  | – vviti iii i | Holding Tir |
|---|-----------|---------------|-------------|---------------|------------|---------------|-------------------|-------------|---------------|-------------|
| Analyte Group   | Method    | Sampling Date | Ex          | traction / Pi | reparation |               |                   | Analys      | sis           |             |
| Container / Client Sample ID(s)   |           |               | Preparation | Holdin        | g Times    | Eval          | Analysis Date     | Holding     | g Times       | Eval        |
|   |           |               | Date        | Rec           | Actual     |               |                   | Rec         | Actual        |             |
| Physical Tests : TSS by Gravimetry (Low Level)                                      |           |               |             |               |            |               |                   |             |               |             |
| HDPE  |           |               |             |               |            |               |                   |             |               |             |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E160-L    | 11-May-2022   |             |               |            |               | 17-May-2022       | 7 days      | 6 days        | ✓           |
|   |           |               |             |               |            |               |                   |             |               |             |
| Physical Tests : Turbidity by Nephelometry  |           |               |             |               |            |               |                   |             |               |             |
| HDPE  |           |               |             |               |            |               |                   |             |               |             |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E121      | 11-May-2022   |             |               |            |               | 14-May-2022       | 3 days      | 3 days        | ✓           |
|   |           |               |             |               |            |               |                   |             |               |             |
| Physical Tests : Turbidity by Nephelometry  |           |               |             |               |            |               |                   |             |               |             |
| HDPE  |           |               |             |               |            |               |                   |             |               |             |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E121      | 11-May-2022   |             |               |            |               | 14-May-2022       | 3 days      | 3 days        | ✓           |
|   |           |               |             |               |            |               |                   |             |               |             |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)                     |           |               |             |               |            |               |                   |             |               |             |
| HDPE total (nitric acid)  | F400 0 1  | 44 M 0000     |             |               |            |               | 40.140000         |             | 0.1           | ,           |
| LC_GRCK_WS_LAEMP_DRY_2022-05_N  | E420.Cr-L | 11-May-2022   |             |               |            |               | 19-May-2022       | 180         | 8 days        | ✓           |
|   |           |               |             |               |            |               |                   | days        |               |             |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)                     |           |               |             |               |            |               |                   |             |               |             |
| HDPE total (nitric acid)  | E420.Cr-L | 11-May-2022   |             |               |            |               | 19-May-2022       | 400         | 0 daya        | ✓           |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E420.CI-L | 11-Way-2022   |             |               |            |               | 19-Way-2022       | 180<br>days | 9 days        | •           |
|   |           |               |             |               |            |               |                   | uays        |               |             |
| Total Metals: Total Mercury in Water by CVAAS                                       |           |               |             |               |            |               | I                 |             |               |             |
| Glass vial total (hydrochloric acid) LC_FRUS_WS_LAEMP_DRY_2022-05_N                 | E508      | 11-May-2022   |             |               |            |               | 17-May-2022       | 28 days     | 6 days        | <b>√</b>    |
| EC_11(00_VVO_EAEIVII _DI(1_2022-00_IV   | 2000      | 11-Way-2022   |             |               |            |               | 17-Way-2022       | 20 days     | o days        | •           |
| Total Matala : Total Maraumi in Water by CVAAS                                      |           |               |             |               |            |               |                   |             |               |             |
| Total Metals : Total Mercury in Water by CVAAS Glass vial total (hydrochloric acid) |           |               |             |               |            |               | I                 |             |               |             |
| LC GRCK WS LAEMP DRY 2022-05 N  | E508      | 11-May-2022   |             |               |            |               | 17-May-2022       | 28 days     | 6 davs        | ✓           |
|   |           |               |             |               |            |               | ,                 |             | ,-            |             |
| Total Metals : Total Metals in Water by CRC ICPMS                                   |           |               |             |               |            |               |                   |             |               |             |
| HDPE total (nitric acid)  |           |               |             |               |            |               |                   |             |               |             |
| LC GRCK WS LAEMP DRY 2022-05 N  | E420      | 11-May-2022   |             |               |            |               | 19-May-2022       | 180         | 8 days        | ✓           |
|   |           | -             |             |               |            |               |                   | days        | -             |             |
| Total Metals : Total Metals in Water by CRC ICPMS                                   |           |               |             |               |            |               |                   |             |               |             |
| HDPE total (nitric acid)  |           |               |             |               |            |               |                   |             |               |             |
| LC_FRUS_WS_LAEMP_DRY_2022-05_N  | E420      | 11-May-2022   |             |               |            |               | 19-May-2022       | 180         | 9 days        | ✓           |
|   |           |               |             |               |            |               |                   | days        |               |             |

## **Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

 Page
 : 9 of 16

 Work Order
 : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Rec. HT: ALS recommended hold time (see units).

Page : 10 of 16 Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **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.

| Quality Control Sample Type   |            | ·        | С  | ount    |          | Frequency (% | )          |
|---|------------|----------|----|---------|----------|--------------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual   | Expected     | Evaluation |
| Laboratory Duplicates (DUP)   |            |          |    |         | <u>'</u> |              |            |
| Acidity by Titration  | E283       | 487130   | 1  | 20      | 5.0      | 5.0          | <b>✓</b>   |
| Alkalinity Species by Titration   | E290       | 487140   | 1  | 20      | 5.0      | 5.0          | ✓          |
| Ammonia by Fluorescence   | E298       | 488266   | 1  | 20      | 5.0      | 5.0          | <u>√</u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 487065   | 1  | 20      | 5.0      | 5.0          | 1          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 487066   | 1  | 20      | 5.0      | 5.0          | <u>√</u>   |
| Conductivity in Water   | E100       | 487138   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 490470   | 1  | 10      | 10.0     | 5.0          | <u>√</u>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 489577   | 1  | 20      | 5.0      | 5.0          | <u>√</u>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 490471   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 492103   | 1  | 8       | 12.5     | 5.0          | <u>√</u>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 486949   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Fluoride in Water by IC   | E235.F     | 487069   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 487067   | 1  | 20      | 5.0      | 5.0          | 1          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 487068   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| ORP by Electrode  | E125       | 492076   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| pH by Meter   | E108       | 487139   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Sulfate in Water by IC  | E235.SO4   | 487064   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| TDS by Gravimetry   | E162       | 489470   | 1  | 20      | 5.0      | 5.0          | 1          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 489088   | 1  | 19      | 5.2      | 5.0          | <b>√</b>   |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 489194   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Total Mercury in Water by CVAAS   | E508       | 490000   | 1  | 20      | 5.0      | 5.0          | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 489089   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 492104   | 1  | 8       | 12.5     | 5.0          | <b>√</b>   |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 488387   | 1  | 20      | 5.0      | 5.0          | ✓          |
| Turbidity by Nephelometry   | E121       | 487508   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Laboratory Control Samples (LCS)  |            |          |    |         |          |              |            |
| Acidity by Titration  | E283       | 487130   | 1  | 20      | 5.0      | 5.0          | 1          |
| Alkalinity Species by Titration   | E290       | 487140   | 1  | 20      | 5.0      | 5.0          | <u>√</u>   |
| Ammonia by Fluorescence   | E298       | 488266   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 487065   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 487066   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Conductivity in Water   | E100       | 487138   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 490470   | 1  | 10      | 10.0     | 5.0          | 1          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 489577   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 490471   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 492103   | 1  | 8       | 12.5     | 5.0          | <b>√</b>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 486949   | 1  | 20      | 5.0      | 5.0          | <b>√</b>   |

Page : 11 of 16 Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



| Matrix: Water   |            | Evaluatio | n: × = QC freque | ncy outside spe | cification; ✓ = 0 | QC frequency with | nin specification. |
|---|------------|-----------|------------------|-----------------|-------------------|-------------------|--------------------|
| Quality Control Sample Type   |            |           |                  | unt             |                   | Frequency (%)     |                    |
| Analytical Methods  | Method     | QC Lot #  | QC               | Regular         | Actual            | Expected          | Evaluation         |
| Laboratory Control Samples (LCS) - Continued                            |            |           |                  |                 |                   |                   |                    |
| Fluoride in Water by IC   | E235.F     | 487069    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 487067    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 487068    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| ORP by Electrode  | E125       | 492076    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| pH by Meter   | E108       | 487139    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Sulfate in Water by IC  | E235.SO4   | 487064    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| TDS by Gravimetry   | E162       | 489470    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 489088    | 1                | 19              | 5.2               | 5.0               | ✓                  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 489194    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Total Mercury in Water by CVAAS   | E508       | 490000    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Total Metals in Water by CRC ICPMS                                      | E420       | 489089    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 492104    | 1                | 8               | 12.5              | 5.0               | ✓                  |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 488387    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| TSS by Gravimetry (Low Level)   | E160-L     | 489463    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Turbidity by Nephelometry   | E121       | 487508    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Method Blanks (MB)  |            |           |                  |                 |                   |                   |                    |
| Acidity by Titration  | E283       | 487130    | 1                | 20              | 5.0               | 5.0               | ✓                  |
| Alkalinity Species by Titration   | E290       | 487140    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Ammonia by Fluorescence   | E298       | 488266    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 487065    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 487066    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Conductivity in Water   | E100       | 487138    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 490470    | 1                | 10              | 10.0              | 5.0               | <b>√</b>           |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 489577    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 490471    | 1                | 20              | 5.0               | 5.0               | <u>√</u>           |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 492103    | 1                | 8               | 12.5              | 5.0               | <b>√</b>           |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 486949    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Fluoride in Water by IC   | E235.F     | 487069    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 487067    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 487068    | 1                | 20              | 5.0               | 5.0               | <u>√</u>           |
| Sulfate in Water by IC  | E235.SO4   | 487064    | 1                | 20              | 5.0               | 5.0               | 1                  |
| TDS by Gravimetry   | E162       | 489470    | 1                | 20              | 5.0               | 5.0               | <u> </u>           |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 489088    | 1                | 19              | 5.2               | 5.0               | <b>√</b>           |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 489194    | 1                | 20              | 5.0               | 5.0               | <u> </u>           |
| Total Mercury in Water by CVAAS   | E508       | 490000    | 1                | 20              | 5.0               | 5.0               | <b>√</b>           |
| Total Metals in Water by CRC ICPMS                                      | E420       | 489089    | 1                | 20              | 5.0               | 5.0               | <u>√</u>           |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 492104    | 1                | 8               | 12.5              | 5.0               | <u>√</u>           |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 488387    | 1                | 20              | 5.0               | 5.0               | <u>√</u>           |
| TSS by Gravimetry (Low Level)   | E160-L     | 489463    | 1                | 20              | 5.0               | 5.0               | <u> </u>           |
| Turbidity by Nephelometry   | E121       | 487508    | 1                | 20              | 5.0               | 5.0               | <u>√</u>           |

Page : 12 of 16
Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

| Quality Control Sample Type   |            |          | Co | ount    |        | Frequency (%) | 6)         |  |
|---|------------|----------|----|---------|--------|---------------|------------|--|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected      | Evaluation |  |
| Matrix Spikes (MS)  |            |          |    |         |        |               |            |  |
| Ammonia by Fluorescence   | E298       | 488266   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 487065   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 487066   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 490470   | 1  | 10      | 10.0   | 5.0           | ✓          |  |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 489577   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 490471   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 492103   | 1  | 8       | 12.5   | 5.0           | ✓          |  |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 486949   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Fluoride in Water by IC   | E235.F     | 487069   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 487067   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 487068   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Sulfate in Water by IC  | E235.SO4   | 487064   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 489088   | 1  | 19      | 5.2    | 5.0           | ✓          |  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 489194   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Total Mercury in Water by CVAAS   | E508       | 490000   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Total Metals in Water by CRC ICPMS                                      | E420       | 489089   | 1  | 20      | 5.0    | 5.0           | ✓          |  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 492104   | 1  | 8       | 12.5   | 5.0           | ✓          |  |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 488387   | 1  | 20      | 5.0    | 5.0           | ✓          |  |

Page : 13 of 16 Work Order : CG2205677

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **Methodology References and Summaries**

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

| Analytical Methods                  | Method / Lab            | Matrix | Method Reference     | Method Descriptions   |
|-------------------------------------|-------------------------|--------|----------------------|---|
| Conductivity in Water               | E100                    | Water  | APHA 2510 (mod)      | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is  |
|                                     | O James Facilities      |        |                      | measured by immersion of a conductivity cell with platinum electrodes into a water  |
| mili bu Makan                       | Calgary - Environmental | 10/-4  | ADUA 4500 H (        | sample. Conductivity measurements are temperature-compensated to 25°C.  |
| pH by Meter                         | E108                    | Water  | APHA 4500-H (mod)    | pH is determined by potentiometric measurement with a pH electrode, and is conducted  |
|                                     | Calgary - Environmental |        |                      | at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time. |
| Turbidity by Nephelometry           | E121                    | Water  | APHA 2130 B (mod)    | Turbidity is measured by the nephelometric method, by measuring the intensity of light  |
| Taiblaity by Nophlolemony           | LIZI                    | Water  | 74 11/12 100 B (mod) | scatter under defined conditions.   |
|                                     | Calgary - Environmental |        |                      | Social dilasi delinod estidiatione.   |
| ORP by Electrode                    | E125                    | Water  | ASTM D1498 (mod)     | Oxidation redution potential is reported as the oxidation-reduction potential of the  |
|                                     |                         |        |                      | platinum metal-reference electrode employed, measured in mV. For high accuracy test   |
|                                     | Calgary - Environmental |        |                      | results, it is recommended that this analysis be conducted in the field.  |
| TSS by Gravimetry (Low Level)       | E160-L                  | Water  | APHA 2540 D (mod)    | Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre   |
|                                     | Calgary - Environmental |        |                      | filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the   |
|                                     | Calgary - Environmental |        |                      | filtered solids. Samples containing very high dissolved solid content (i.e. seawaters,  |
|                                     |                         |        |                      | brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.                                     |
| TDS by Gravimetry                   | E162                    | Water  | APHA 2540 C (mod)    | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre   |
| , ,                                 |                         |        |                      | filter, with evaporation of the filtrate at $180 \pm 2^{\circ}$ C for 16 hours or to constant weight,   |
|                                     | Calgary - Environmental |        |                      | with gravimetric measurement of the residue.  |
| Bromide in Water by IC (Low Level)  | E235.Br-L               | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|                                     |                         |        |                      | detection.  |
|                                     | Calgary - Environmental | 147.4  | EDA 000 4 ( 1)       |   |
| Chloride in Water by IC (Low Level) | E235.CI-L               | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|                                     | Calgary - Environmental |        |                      | detection.  |
| Fluoride in Water by IC             | E235.F                  | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
| , ,                                 | 2200.1                  |        | ,                    | detection.  |
|                                     | Calgary - Environmental |        |                      |   |
| Nitrite in Water by IC (Low Level)  | E235.NO2-L              | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|                                     |                         |        |                      | detection.  |
| Nitrate is Metallical (Level 1991)  | Calgary - Environmental | 147.4  | EDA 000 4 (*** 1)    |   |
| Nitrate in Water by IC (Low Level)  | E235.NO3-L              | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|                                     | Calgary - Environmental |        |                      | detection.  |
| Sulfate in Water by IC              | E235.SO4                | Water  | EPA 300.1 (mod)      | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
| <u> </u>                            |                         |        | , ,                  | detection.  |
|                                     | Calgary - Environmental |        |                      |   |
| Acidity by Titration                | E283                    | Water  | APHA 2310 B (mod)    | Acidity is determined by potentiometric titration to pH endpoint of 8.3   |
|                                     | 0.1                     |        |                      |   |
|                                     | Calgary - Environmental |        |                      |   |

Page : 14 of 16
Work Order : CG2205677

Client : Teck Coal Limited



| Analytical Methods  | Method / Lab                          | Matrix | Method Reference                            | Method Descriptions   |
|---|---------------------------------------|--------|---|---|
| Alkalinity Species by Titration   | E290 Calgary - Environmental          | Water  | APHA 2320 B (mod)                           | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.  |
| Ammonia by Fluorescence   | E298  Calgary - Environmental         | Water  | J. Environ. Monit.,<br>2005, 7, 37-42 (mod) | Ammonia in water is analyzed by flow-injection analysis with fluorescence detection after reaction with orthophthaldialdehyde (OPA).  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318 Calgary - Environmental          | Water  | APHA 4500-Norg D<br>(mod)                   | Total Kjeldahl Nitrogen is determined using block digestion followed by flow-injection analysis with fluorescence detection.  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L  Calgary - Environmental       | Water  | APHA 5310 B (mod)                           | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).                                       |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L Calgary - Environmental        | Water  | APHA 5310 B (mod)                           | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC). |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U  Calgary - Environmental       | Water  | APHA 4500-P E (mod).                        | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U  Calgary - Environmental       | Water  | APHA 4500-P F (mod)                         | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.   |
| Total Metals in Water by CRC ICPMS                                      | E420<br>Vancouver -<br>Environmental  | Water  | EPA 200.2/6020B<br>(mod)                    | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  Vancouver -  Environmental | Water  | EPA 200.2/6020B<br>(mod)                    | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421<br>Vancouver -<br>Environmental  | Water  | APHA 3030B/EPA<br>6020B (mod)               | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.  |

Page : 15 of 16
Work Order : CG2205677

Client : Teck Coal Limited



| Analytical Methods                                      | Method / Lab                          | Matrix | Method Reference               | Method Descriptions  |
|---|---------------------------------------|--------|--------------------------------|--|
| Dissolved Chromium in Water by CRC ICPMS (Low Level)    | E421.Cr-L  Vancouver -  Environmental | Water  | APHA 3030 B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS  |
| Total Mercury in Water by CVAAS                         | E508  Vancouver - Environmental       | Water  | EPA 1631E (mod)                | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS   |
| Dissolved Mercury in Water by CVAAS                     | E509<br>Vancouver -<br>Environmental  | Water  | APHA 3030B/EPA<br>1631E (mod)  | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.   |
| Dissolved Hardness (Calculated)                         | EC100<br>Vancouver -<br>Environmental | Water  | APHA 2340B                     | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. |
| Ion Balance using Dissolved Metals                      | EC101 Calgary - Environmental         | Water  | APHA 1030E                     | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.  Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).  |
| Preparation Methods                                     | Method / Lab                          | Matrix | Method Reference               | Method Descriptions  |
| Preparation for Ammonia                                 | EP298  Calgary - Environmental        | Water  |                                | Sample preparation for Preserved Nutrients Water Quality Analysis.   |
| Digestion for TKN in water                              | EP318  Calgary - Environmental        | Water  | APHA 4500-Norg D<br>(mod)      | Samples are digested using block digestion with Copper Sulfate Digestion Reagent.  |
| Preparation for Total Organic Carbon by Combustion      | EP355 Calgary - Environmental         | Water  |                                | Preparation for Total Organic Carbon by Combustion   |
| Preparation for Dissolved Organic Carbon for Combustion | EP358  Calgary - Environmental        | Water  | APHA 5310 B (mod)              | Preparation for Dissolved Organic Carbon   |
| Digestion for Total Phosphorus in water                 | EP372  Calgary - Environmental        | Water  | APHA 4500-P E (mod).           | Samples are heated with a persulfate digestion reagent.  |
| Dissolved Metals Water Filtration                       | EP421  Vancouver -  Environmental     | Water  | АРНА 3030В                     | Water samples are filtered (0.45 um), and preserved with HNO3.   |
| Dissolved Mercury Water Filtration                      | EP509                                 | Water  | APHA 3030B                     | Water samples are filtered (0.45 um), and preserved with HCl.  |

Page : 16 of 16 Work Order : CG2205677

Client : Teck Coal Limited



| Preparation Methods | Method / Lab  | Matrix | Method Reference | Method Descriptions |
|---------------------|---------------|--------|------------------|---------------------|
|                     | Vancouver -   |        |                  |                     |
|                     | Environmental |        |                  |                     |



# **QUALITY CONTROL REPORT**

Work Order : CG2205677

Client : Teck Coal Limited

Contact : Mike Pope

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Project : LINE CREEK OPERATION

PO : VPO00816101

C-O-C number : LCO\_Dry Creek LAEMP\_ALS

Sampler : --Site : ---

Quote number : Teck Coal Master Quote

No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 18

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary, Alberta Canada T1Y 7B5

Telephone :+1 403 407 1800

Date Samples Received : 12-May-2022 09:20
Date Analysis Commenced : 13-May-2022

Issue Date : 23-May-2022 11:00

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

This Quality Control Report contains the following information:

Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives

- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

#### Signatories

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

| Signatories      | Position                                | Laboratory Department                       |
|------------------|---|---|
| Anthony Calero   | Team Leader - Inorganics                | Calgary Inorganics, Calgary, Alberta        |
| Caleb Deroche    | Lab Analyst                             | Vancouver Metals, Burnaby, British Columbia |
| Delson Resende   | Lab Assistant                           | Vancouver Metals, Burnaby, British Columbia |
| Elke Tabora      |   | Calgary Inorganics, Calgary, Alberta        |
| Harpreet Chawla  | Team Leader - Inorganics                | Calgary Inorganics, Calgary, Alberta        |
| Kevin Duarte     | Supervisor - Metals ICP Instrumentation | Vancouver Metals, Burnaby, British Columbia |
| Kyle Chang       | Lab Assistant                           | Vancouver Metals, Burnaby, British Columbia |
| Maria Tuguinay   | Lab Assistant                           | Calgary Inorganics, Calgary, Alberta        |
| Owen Cheng       |   | Vancouver Metals, Burnaby, British Columbia |
| Parker Sgarbossa | Laboratory Analyst                      | Calgary Inorganics, Calgary, Alberta        |
| Robin Weeks      | Team Leader - Metals                    | Vancouver Metals, Burnaby, British Columbia |
| Ruifang Zheng    | Analyst                                 | Calgary Inorganics, Calgary, Alberta        |
| Sara Niroomand   |   | Calgary Inorganics, Calgary, Alberta        |
| Shirley Li       |   | Calgary Inorganics, Calgary, Alberta        |
|                  |   |   |

 Page
 : 2 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



### **General Comments**

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

#### Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

### **Workorder Comments**

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

 Page
 : 3 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



## Laboratory Duplicate (DUP) Report

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

| Sub-Matrix: Water    |                                    |                                     |            |            |        | Laboratory Duplicate (DUP) Report |                    |                     |                         |                     |           |  |  |
|----------------------|------------------------------------|-------------------------------------|------------|------------|--------|-----------------------------------|--------------------|---------------------|-------------------------|---------------------|-----------|--|--|
| Laboratory sample ID | Client sample ID                   | Analyte                             | CAS Number | Method     | LOR    | Unit                              | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |  |  |
| Physical Tests (QC   | C Lot: 487130)                     |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205638-001        | Anonymous                          | acidity (as CaCO3)                  |            | E283       | 2.0    | mg/L                              | 5.0                | 7.0                 | 2.0                     | Diff <2x LOR        |           |  |  |
| Physical Tests (QC   | C Lot: 487138)                     |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205638-001        | Anonymous                          | conductivity                        |            | E100       | 2.0    | μS/cm                             | 502                | 495                 | 1.40%                   | 10%                 |           |  |  |
| Physical Tests (QC   | C Lot: 487139)                     |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205638-001        | Anonymous                          | pH                                  |            | E108       | 0.10   | pH units                          | 7.97               | 8.01                | 0.501%                  | 4%                  |           |  |  |
| Physical Tests (QC   | C Lot: 487140)                     |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205638-001        | Anonymous                          | alkalinity, bicarbonate (as CaCO3)  |            | E290       | 2.0    | mg/L                              | 267                | 258                 | 3.69%                   | 20%                 |           |  |  |
|                      |                                    | alkalinity, carbonate (as CaCO3)    |            | E290       | 2.0    | mg/L                              | <2.0               | <2.0                | 0                       | Diff <2x LOR        |           |  |  |
|                      |                                    | alkalinity, hydroxide (as CaCO3)    |            | E290       | 2.0    | mg/L                              | <2.0               | <2.0                | 0                       | Diff <2x LOR        |           |  |  |
|                      |                                    | alkalinity, total (as CaCO3)        |            | E290       | 2.0    | mg/L                              | 267                | 258                 | 3.69%                   | 20%                 |           |  |  |
| Physical Tests (QC   | C Lot: 487508)                     |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY 2022-05 N | turbidity                           |            | E121       | 0.10   | NTU                               | 2.53               | 2.58                | 1.80%                   | 15%                 |           |  |  |
| Physical Tests (QC   |                                    |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205639-001        | Anonymous                          | solids, total dissolved [TDS]       |            | E162       | 10     | mg/L                              | <10                | <10                 | 0                       | Diff <2x LOR        |           |  |  |
| Physical Tests (QC   | C Lot: 492076)                     |                                     |            |            |        |                                   |                    | I .                 |                         |                     |           |  |  |
| CG2205658-001        | Anonymous                          | oxidation-reduction potential [ORP] |            | E125       | 0.10   | mV                                | 540                | 535                 | 0.874%                  | 15%                 |           |  |  |
| Anions and Nutrier   | nts (QC Lot: 486949)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010 | mg/L                              | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |  |  |
| Anions and Nutrier   | nts (QC Lot: 487064)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 0.30   | mg/L                              | 207                | 208                 | 0.731%                  | 20%                 |           |  |  |
| Anions and Nutrier   | nts (QC Lot: 487065)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | bromide                             | 24959-67-9 | E235.Br-L  | 0.050  | mg/L                              | <0.050             | <0.050              | 0                       | Diff <2x LOR        |           |  |  |
| Anions and Nutrier   | nts (QC Lot: 487066)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | chloride                            | 16887-00-6 | E235.CI-L  | 0.10   | mg/L                              | 3.19               | 3.15                | 1.17%                   | 20%                 |           |  |  |
|                      | nts (QC Lot: 487067)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0050 | mg/L                              | 13.6               | 13.8                | 0.924%                  | 20%                 |           |  |  |
|                      | nts (QC Lot: 487068)               |                                     |            |            |        |                                   |                    |                     |                         |                     |           |  |  |
| CG2205677-001        | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0010 | mg/L                              | 0.0040             | 0.0041              | 0.0001                  | Diff <2x LOR        |           |  |  |

 Page
 : 4 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited



| Laboratory sample ID                  |                                    | Sub-Matrix: Water               |            |           |           |      |                    | Laboratory Duplicate (DUP) Report |                         |                     |           |  |  |  |
|---------------------------------------|------------------------------------|---------------------------------|------------|-----------|-----------|------|--------------------|-----------------------------------|-------------------------|---------------------|-----------|--|--|--|
|                                       | Client sample ID                   | Analyte                         | CAS Number | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result               | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |  |  |  |
| Anions and Nutrients                  | (QC Lot: 487069)                   |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
|                                       | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | fluoride                        | 16984-48-8 | E235.F    | 0.020     | mg/L | 0.122              | 0.123                             | 0.0007                  | Diff <2x LOR        |           |  |  |  |
| Anions and Nutrients                  | (QC Lot: 488266)                   |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
|                                       | LC_FRUS_WS_LAEMP_D<br>RY_2022-05_N | ammonia, total (as N)           | 7664-41-7  | E298      | 0.0050    | mg/L | <0.0050            | <0.0050                           | 0                       | Diff <2x LOR        |           |  |  |  |
| Anions and Nutrients                  | (QC Lot: 488387)                   |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
| CG2205636-001                         | Anonymous                          | phosphorus, total               | 7723-14-0  | E372-U    | 0.0020    | mg/L | <0.0020            | <0.0020                           | 0                       | Diff <2x LOR        |           |  |  |  |
| Anions and Nutrients                  | (QC Lot: 489194)                   |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
| CG2205658-001                         | Anonymous                          | Kjeldahl nitrogen, total [TKN]  |            | E318      | 0.500     | mg/L | 2.59               | 2.53                              | 0.066                   | Diff <2x LOR        |           |  |  |  |
| Organic / Inorganic C                 | arbon (QC Lot: 492103              | 3)                              |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
|                                       | Anonymous                          | carbon, dissolved organic [DOC] |            | E358-L    | 0.50      | mg/L | 2.14               | 2.21                              | 0.08                    | Diff <2x LOR        |           |  |  |  |
| Organic / Inorganic C                 | arbon (QC Lot: 492104              | 4)                              |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
|                                       | Anonymous                          | carbon, total organic [TOC]     |            | E355-L    | 0.50      | mg/L | 1.68               | 1.63                              | 0.04                    | Diff <2x LOR        |           |  |  |  |
| Fotal Metals (QC Lot                  | ·· 480088)                         |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
|                                       | Anonymous                          | chromium, total                 | 7440-47-3  | E420.Cr-L | 0.00010   | mg/L | 0.00012            | 0.00016                           | 0.00004                 | Diff <2x LOR        |           |  |  |  |
|                                       | •                                  |                                 |            |           |           |      |                    |                                   |                         |                     |           |  |  |  |
| otal Metals (QC Lot:<br>CG2205658-001 | : 489089)<br>Anonymous             | aluminum, total                 | 7429-90-5  | E420      | 0.0030    | mg/L | 0.0035             | 0.0048                            | 0.0013                  | Diff <2x LOR        |           |  |  |  |
| JG2203030-001                         | Anonymous                          |                                 | 7429-90-3  | E420      | 0.00010   | -    | <0.00010           | <0.0040                           | 0.0013                  | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | antimony, total                 | 7440-38-2  | E420      | 0.00010   | mg/L | 0.00262            | 0.00266                           | 1.28%                   | 20%                 |           |  |  |  |
|                                       |                                    | arsenic, total                  |            |           |           | mg/L |                    |                                   |                         |                     |           |  |  |  |
|                                       |                                    | barium, total                   | 7440-39-3  | E420      | 0.00010   | mg/L | 4.24               | 4.39                              | 3.40%                   | 20%                 |           |  |  |  |
|                                       |                                    | beryllium, total                | 7440-41-7  | E420      | 0.000020  | mg/L | <0.020 µg/L        | <0.000020                         | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | bismuth, total                  | 7440-69-9  | E420      | 0.000050  | mg/L | <0.000050          | <0.000050                         | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | boron, total                    | 7440-42-8  | E420      | 0.010     | mg/L | 0.025              | 0.025                             | 0.0002                  | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | cadmium, total                  | 7440-43-9  | E420      | 0.0000100 | mg/L | <0.0100 µg/L       | <0.0000100                        | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | calcium, total                  | 7440-70-2  | E420      | 0.050     | mg/L | 60.3               | 59.2                              | 1.74%                   | 20%                 |           |  |  |  |
|                                       |                                    | cobalt, total                   | 7440-48-4  | E420      | 0.00010   | mg/L | 0.42 μg/L          | 0.00043                           | 0.000008                | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | copper, total                   | 7440-50-8  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050                          | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | iron, total                     | 7439-89-6  | E420      | 0.010     | mg/L | 2.98               | 2.99                              | 0.355%                  | 20%                 |           |  |  |  |
|                                       |                                    | lead, total                     | 7439-92-1  | E420      | 0.000050  | mg/L | <0.000050          | <0.000050                         | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | lithium, total                  | 7439-93-2  | E420      | 0.0010    | mg/L | 0.608              | 0.614                             | 0.928%                  | 20%                 |           |  |  |  |
|                                       |                                    | magnesium, total                | 7439-95-4  | E420      | 0.0050    | mg/L | 37.0               | 37.1                              | 0.469%                  | 20%                 |           |  |  |  |
|                                       |                                    | manganese, total                | 7439-96-5  | E420      | 0.00010   | mg/L | 0.0227             | 0.0232                            | 2.08%                   | 20%                 |           |  |  |  |
|                                       |                                    | molybdenum, total               | 7439-98-7  | E420      | 0.000050  | mg/L | 0.0221             | 0.0216                            | 2.62%                   | 20%                 |           |  |  |  |
|                                       |                                    | nickel, total                   | 7440-02-0  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050                          | 0                       | Diff <2x LOR        |           |  |  |  |
|                                       |                                    | potassium, total                | 7440-09-7  | E420      | 0.050     | mg/L | 25.2               | 26.1                              | 3.66%                   | 20%                 |           |  |  |  |
|                                       |                                    |                                 |            |           |           |      |                    |                                   |                         | 1                   |           |  |  |  |

 Page
 : 5 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited



| Laboratory sample ID  | Client sample ID       |                       |            |           |           |      |                    |                     |                         |                     |           |
|-----------------------|------------------------|-----------------------|------------|-----------|-----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Total Metals (QC Lo   |                        | Analyte               | CAS Number | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| rotal motalo (do 20   | t: 489089) - continued |                       |            |           |           |      |                    |                     |                         |                     |           |
| CG2205658-001 Anonymo | Anonymous              | silicon, total        | 7440-21-3  | E420      | 0.10      | mg/L | 3.04               | 2.96                | 2.47%                   | 20%                 |           |
|                       |                        | silver, total         | 7440-22-4  | E420      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                       |                        | sodium, total         | 7440-23-5  | E420      | 0.050     | mg/L | 35.6               | 35.9                | 0.999%                  | 20%                 |           |
|                       |                        | strontium, total      | 7440-24-6  | E420      | 0.00020   | mg/L | 0.246              | 0.240               | 2.16%                   | 20%                 |           |
|                       |                        | sulfur, total         | 7704-34-9  | E420      | 0.50      | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
|                       |                        | thallium, total       | 7440-28-0  | E420      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                       |                        | tin, total            | 7440-31-5  | E420      | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                       |                        | titanium, total       | 7440-32-6  | E420      | 0.00030   | mg/L | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |           |
|                       |                        | uranium, total        | 7440-61-1  | E420      | 0.000010  | mg/L | 0.000094           | 0.000092            | 0.000002                | Diff <2x LOR        |           |
|                       |                        | vanadium, total       | 7440-62-2  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                       |                        | zinc, total           | 7440-66-6  | E420      | 0.0030    | mg/L | <0.0030            | <0.0030             | 0                       | Diff <2x LOR        |           |
| Total Metals (QC Lo   | t: 490000)             |                       |            |           |           |      |                    |                     |                         |                     |           |
| CG2205635-001         | Anonymous              | mercury, total        | 7439-97-6  | E508      | 0.0000050 | mg/L | <0.000050          | <0.0000050          | 0                       | Diff <2x LOR        |           |
| Dissolved Metals (Q   | C Lot: 489577)         |                       |            |           |           |      |                    |                     |                         |                     |           |
| CG2205633-001         | Anonymous              | mercury, dissolved    | 7439-97-6  | E509      | 0.0000050 | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
| Dissolved Metals (Q   | C Lot: 490470)         |                       |            |           |           |      |                    |                     |                         |                     |           |
| CG2205658-001         | Anonymous              | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
| Dissolved Metals (Q   | C Lot: 490471)         |                       |            |           |           |      |                    |                     |                         |                     |           |
| CG2205658-001         | Anonymous              | aluminum, dissolved   | 7429-90-5  | E421      | 0.0010    | mg/L | 0.0016             | 0.0013              | 0.0003                  | Diff <2x LOR        |           |
|                       |                        | antimony, dissolved   | 7440-36-0  | E421      | 0.00010   | mg/L | 0.00020            | 0.00010             | 0.00010                 | Diff <2x LOR        |           |
|                       |                        | arsenic, dissolved    | 7440-38-2  | E421      | 0.00010   | mg/L | 0.00297            | 0.00280             | 5.84%                   | 20%                 |           |
|                       |                        | barium, dissolved     | 7440-39-3  | E421      | 0.00010   | mg/L | 4.19               | 4.23                | 0.901%                  | 20%                 |           |
|                       |                        | beryllium, dissolved  | 7440-41-7  | E421      | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |           |
|                       |                        | bismuth, dissolved    | 7440-69-9  | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                       |                        | boron, dissolved      | 7440-42-8  | E421      | 0.010     | mg/L | 0.027              | 0.028               | 0.0006                  | Diff <2x LOR        |           |
|                       |                        | cadmium, dissolved    | 7440-43-9  | E421      | 0.0000050 | mg/L | <0.0050 µg/L       | <0.0000050          | 0                       | Diff <2x LOR        |           |
|                       |                        | calcium, dissolved    | 7440-70-2  | E421      | 0.050     | mg/L | 61.0               | 63.3                | 3.72%                   | 20%                 |           |
|                       |                        | cobalt, dissolved     | 7440-48-4  | E421      | 0.00010   | mg/L | 0.42 µg/L          | 0.00043             | 0.00001                 | Diff <2x LOR        |           |
|                       |                        | copper, dissolved     | 7440-50-8  | E421      | 0.00020   | mg/L | <0.00020           | <0.00020            | 0                       | Diff <2x LOR        |           |
|                       |                        | iron, dissolved       | 7439-89-6  | E421      | 0.010     | mg/L | 2.82               | 2.91                | 2.97%                   | 20%                 |           |
|                       |                        | lead, dissolved       | 7439-92-1  | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                       |                        | lithium, dissolved    | 7439-93-2  | E421      | 0.0010    | mg/L | 0.651              | 0.688               | 5.50%                   | 20%                 |           |
|                       |                        | magnesium, dissolved  | 7439-95-4  | E421      | 0.0050    | mg/L | 35.4               | 35.8                | 1.09%                   | 20%                 |           |
|                       |                        | manganese, dissolved  | 7439-96-5  | E421      | 0.00010   | mg/L | 0.0227             | 0.0233              | 2.80%                   | 20%                 |           |
|                       |                        | molybdenum, dissolved | 7439-90-3  | E421      | 0.00010   | mg/L | 0.0227             | 0.0233              | 0.939%                  | 20%                 |           |

 Page
 : 6 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water    |                       |                      |            |        |          |      | Labora             | tory Duplicate (D   | UP) Report              |                     |           |
|----------------------|-----------------------|----------------------|------------|--------|----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID      | Analyte              | CAS Number | Method | LOR      | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Dissolved Metals (   | QC Lot: 490471) - con | inued                |            |        |          |      |                    |                     |                         |                     |           |
| CG2205658-001        | Anonymous             | nickel, dissolved    | 7440-02-0  | E421   | 0.00050  | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                       | potassium, dissolved | 7440-09-7  | E421   | 0.050    | mg/L | 24.7               | 25.6                | 3.73%                   | 20%                 |           |
|                      |                       | selenium, dissolved  | 7782-49-2  | E421   | 0.000050 | mg/L | <0.050 µg/L        | <0.000050           | 0                       | Diff <2x LOR        |           |
|                      |                       | silicon, dissolved   | 7440-21-3  | E421   | 0.050    | mg/L | 2.76               | 2.78                | 0.671%                  | 20%                 |           |
|                      |                       | silver, dissolved    | 7440-22-4  | E421   | 0.000010 | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                       | sodium, dissolved    | 7440-23-5  | E421   | 0.050    | mg/L | 34.2               | 35.0                | 2.27%                   | 20%                 |           |
|                      |                       | strontium, dissolved | 7440-24-6  | E421   | 0.00020  | mg/L | 0.239              | 0.245               | 2.14%                   | 20%                 |           |
|                      |                       | sulfur, dissolved    | 7704-34-9  | E421   | 0.50     | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
|                      |                       | thallium, dissolved  | 7440-28-0  | E421   | 0.000010 | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                       | tin, dissolved       | 7440-31-5  | E421   | 0.00010  | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                       | titanium, dissolved  | 7440-32-6  | E421   | 0.00030  | mg/L | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |           |
|                      |                       | uranium, dissolved   | 7440-61-1  | E421   | 0.000010 | mg/L | 0.000090           | 0.000090            | 0.0000008               | Diff <2x LOR        |           |
|                      |                       | vanadium, dissolved  | 7440-62-2  | E421   | 0.00050  | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                       | zinc, dissolved      | 7440-66-6  | E421   | 0.0010   | mg/L | 0.0021             | 0.0021              | 0.00003                 | Diff <2x LOR        |           |

 Page
 : 7 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



## 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.

| Analyte                              | CAS Number Method     | LOR   | Unit  | Result  | Qualifier |
|--------------------------------------|-----------------------|-------|-------|---------|-----------|
| Physical Tests (QCLot: 487130)       |                       |       |       |         |           |
| acidity (as CaCO3)                   | E283                  | 2     | mg/L  | <2.0    |           |
| Physical Tests (QCLot: 487138)       |                       |       |       |         |           |
| conductivity                         | E100                  | 1     | μS/cm | <1.0    |           |
| Physical Tests (QCLot: 487140)       |                       |       |       |         |           |
| alkalinity, bicarbonate (as CaCO3)   | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, carbonate (as CaCO3)     | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, hydroxide (as CaCO3)     | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, total (as CaCO3)         | E290                  | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 487508)       |                       |       |       |         |           |
| turbidity                            | E121                  | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 489463)       |                       |       |       |         |           |
| solids, total suspended [TSS]        | E160-L                | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 489470)       |                       |       |       |         |           |
| solids, total dissolved [TDS]        | E162                  | 10    | mg/L  | <10     |           |
| Anions and Nutrients (QCLot: 486949) |                       |       |       |         |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U     | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 487064) |                       |       |       |         |           |
| sulfate (as SO4)                     | 14808-79-8 E235.SO4   | 0.3   | mg/L  | <0.30   |           |
| Anions and Nutrients (QCLot: 487065) |                       |       |       |         |           |
| bromide                              | 24959-67-9 E235.Br-L  | 0.05  | mg/L  | <0.050  |           |
| Anions and Nutrients (QCLot: 487066) |                       |       |       |         |           |
| chloride                             | 16887-00-6 E235.CI-L  | 0.1   | mg/L  | <0.10   |           |
| Anions and Nutrients (QCLot: 487067) |                       |       |       |         |           |
| nitrate (as N)                       | 14797-55-8 E235.NO3-L | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 487068) |                       |       |       |         |           |
| nitrite (as N)                       | 14797-65-0 E235.NO2-L | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 487069) |                       |       |       |         |           |
| fluoride                             | 16984-48-8 E235.F     | 0.02  | mg/L  | <0.020  |           |
| Anions and Nutrients (QCLot: 488266) |                       |       |       |         |           |
| ammonia, total (as N)                | 7664-41-7 E298        | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 488387) |                       |       |       |         |           |
| phosphorus, total                    | 7723-14-0 E372-U      | 0.002 | mg/L  | <0.0020 |           |
| Anions and Nutrients (QCLot: 489194) |                       |       |       |         |           |

 Page
 : 8 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION

# ALS

| Analyte                            | CAS Number Method   | LOR      | Unit | Result     | Qualifier |
|------------------------------------|---------------------|----------|------|------------|-----------|
| Anions and Nutrients (QCLot: 48919 | 34) - continued     |          |      |            |           |
| Kjeldahl nitrogen, total [TKN]     | E318                | 0.05     | mg/L | <0.050     |           |
| Organic / Inorganic Carbon (QCLot: | 492103)             |          |      |            |           |
| carbon, dissolved organic [DOC]    | E358-L              | 0.5      | mg/L | <0.50      |           |
| Organic / Inorganic Carbon (QCLot: | 492104)             |          |      | '          |           |
| carbon, total organic [TOC]        | E355-L              | 0.5      | mg/L | <0.50      |           |
| Fotal Metals (QCLot: 489088)       |                     |          |      | '          |           |
| chromium, total                    | 7440-47-3 E420.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Total Metals (QCLot: 489089)       |                     |          |      | ,          |           |
| aluminum, total                    | 7429-90-5 E420      | 0.003    | mg/L | <0.0030    |           |
| antimony, total                    | 7440-36-0 E420      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, total                     | 7440-38-2 E420      | 0.0001   | mg/L | <0.00010   |           |
| parium, total                      | 7440-39-3 E420      | 0.0001   | mg/L | <0.00010   |           |
| beryllium, total                   | 7440-41-7 E420      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, total                     | 7440-69-9 E420      | 0.00005  | mg/L | <0.000050  |           |
| poron, total                       | 7440-42-8 E420      | 0.01     | mg/L | <0.010     |           |
| cadmium, total                     | 7440-43-9 E420      | 0.000005 | mg/L | <0.0000050 |           |
| calcium, total                     | 7440-70-2 E420      | 0.05     | mg/L | <0.050     |           |
| cobalt, total                      | 7440-48-4 E420      | 0.0001   | mg/L | <0.00010   |           |
| copper, total                      | 7440-50-8 E420      | 0.0005   | mg/L | <0.00050   |           |
| ron, total                         | 7439-89-6 E420      | 0.01     | mg/L | <0.010     |           |
| ead, total                         | 7439-92-1 E420      | 0.00005  | mg/L | <0.000050  |           |
| ithium, total                      | 7439-93-2 E420      | 0.001    | mg/L | <0.0010    |           |
| nagnesium, total                   | 7439-95-4 E420      | 0.005    | mg/L | <0.0050    |           |
| nanganese, total                   | 7439-96-5 E420      | 0.0001   | mg/L | <0.00010   |           |
| molybdenum, total                  | 7439-98-7 E420      | 0.00005  | mg/L | <0.000050  |           |
| nickel, total                      | 7440-02-0 E420      | 0.0005   | mg/L | <0.00050   |           |
| potassium, total                   | 7440-09-7 E420      | 0.05     | mg/L | <0.050     |           |
| selenium, total                    | 7782-49-2 E420      | 0.00005  | mg/L | <0.000050  |           |
| silicon, total                     | 7440-21-3 E420      | 0.1      | mg/L | <0.10      |           |
| silver, total                      | 7440-22-4 E420      | 0.00001  | mg/L | <0.000010  |           |
| sodium, total                      | 7440-23-5 E420      | 0.05     | mg/L | <0.050     |           |
| strontium, total                   | 7440-24-6 E420      | 0.0002   | mg/L | <0.00020   |           |
| sulfur, total                      | 7704-34-9 E420      | 0.5      | mg/L | <0.50      |           |
| thallium, total                    | 7440-28-0 E420      | 0.00001  | mg/L | <0.000010  |           |
| tin, total                         | 7440-31-5 E420      | 0.0001   | mg/L | <0.00010   |           |
| titanium, total                    | 7440-32-6 E420      | 0.0003   | mg/L | <0.00030   |           |

Page : 9 of 18
Work Order : CG2205677
Client : Teck Coal Limited

Project : LINE CREEK OPERATION

# ALS

| Analyte                           | CAS Number | Method    | LOR      | Unit | Result     | Qualifier |
|-----------------------------------|------------|-----------|----------|------|------------|-----------|
| Total Metals (QCLot: 489089) - co | ntinued    |           |          |      |            |           |
| uranium, total                    | 7440-61-1  | E420      | 0.00001  | mg/L | <0.000010  |           |
| vanadium, total                   | 7440-62-2  | E420      | 0.0005   | mg/L | <0.00050   |           |
| zinc, total                       | 7440-66-6  | E420      | 0.003    | mg/L | <0.0030    |           |
| Fotal Metals (QCLot: 490000)      |            |           |          |      |            |           |
| mercury, total                    | 7439-97-6  | E508      | 0.000005 | mg/L | <0.0000050 |           |
| Dissolved Metals (QCLot: 489577)  |            |           |          |      |            |           |
| mercury, dissolved                | 7439-97-6  | E509      | 0.000005 | mg/L | <0.0000050 |           |
| Dissolved Metals (QCLot: 490470)  |            |           |          |      |            |           |
| chromium, dissolved               | 7440-47-3  | E421.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Dissolved Metals (QCLot: 490471)  |            |           |          |      |            |           |
| aluminum, dissolved               | 7429-90-5  | E421      | 0.001    | mg/L | <0.0010    |           |
| antimony, dissolved               | 7440-36-0  | E421      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, dissolved                | 7440-38-2  | E421      | 0.0001   | mg/L | <0.00010   |           |
| parium, dissolved                 | 7440-39-3  | E421      | 0.0001   | mg/L | <0.00010   |           |
| peryllium, dissolved              | 7440-41-7  | E421      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, dissolved                | 7440-69-9  | E421      | 0.00005  | mg/L | <0.000050  |           |
| poron, dissolved                  | 7440-42-8  | E421      | 0.01     | mg/L | <0.010     |           |
| admium, dissolved                 | 7440-43-9  | E421      | 0.000005 | mg/L | <0.000050  |           |
| calcium, dissolved                | 7440-70-2  | E421      | 0.05     | mg/L | <0.050     |           |
| cobalt, dissolved                 | 7440-48-4  | E421      | 0.0001   | mg/L | <0.00010   |           |
| copper, dissolved                 | 7440-50-8  | E421      | 0.0002   | mg/L | <0.00020   |           |
| ron, dissolved                    | 7439-89-6  | E421      | 0.01     | mg/L | <0.010     |           |
| ead, dissolved                    | 7439-92-1  | E421      | 0.00005  | mg/L | <0.000050  |           |
| ithium, dissolved                 | 7439-93-2  | E421      | 0.001    | mg/L | <0.0010    |           |
| magnesium, dissolved              | 7439-95-4  | E421      | 0.005    | mg/L | <0.0050    |           |
| manganese, dissolved              | 7439-96-5  | E421      | 0.0001   | mg/L | <0.00010   |           |
| nolybdenum, dissolved             | 7439-98-7  | E421      | 0.00005  | mg/L | <0.000050  |           |
| nickel, dissolved                 | 7440-02-0  | E421      | 0.0005   | mg/L | <0.00050   |           |
| ootassium, dissolved              | 7440-09-7  | E421      | 0.05     | mg/L | <0.050     |           |
| selenium, dissolved               | 7782-49-2  | E421      | 0.00005  | mg/L | <0.000050  |           |
| silicon, dissolved                | 7440-21-3  | E421      | 0.05     | mg/L | <0.050     |           |
| silver, dissolved                 | 7440-22-4  | E421      | 0.00001  | mg/L | <0.000010  |           |
| sodium, dissolved                 | 7440-23-5  | E421      | 0.05     | mg/L | <0.050     |           |
| strontium, dissolved              | 7440-24-6  | E421      | 0.0002   | mg/L | <0.00020   |           |
| sulfur, dissolved                 | 7704-34-9  | E421      | 0.5      | mg/L | <0.50      |           |
| thallium, dissolved               | 7440-28-0  | E421      | 0.00001  | mg/L | <0.000010  |           |

 Page
 : 10 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION

# ALS

| Analyte                              | CAS Number | Method | LOR     | Unit | Result    | Qualifier |
|--------------------------------------|------------|--------|---------|------|-----------|-----------|
| Dissolved Metals (QCLot: 490471) - ( | continued  |        |         |      |           |           |
| tin, dissolved                       | 7440-31-5  | E421   | 0.0001  | mg/L | <0.00010  |           |
| titanium, dissolved                  | 7440-32-6  | E421   | 0.0003  | mg/L | <0.00030  |           |
| uranium, dissolved                   | 7440-61-1  | E421   | 0.00001 | mg/L | <0.000010 |           |
| vanadium, dissolved                  | 7440-62-2  | E421   | 0.0005  | mg/L | <0.00050  |           |
| zinc, dissolved                      | 7440-66-6  | E421   | 0.001   | mg/L | <0.0010   |           |

 Page
 : 11 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limite

Client : Teck Coal Limited
Project : LINE CREEK OPERATION



## Laboratory Control Sample (LCS) Report

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

| Sub-Matrix: Water                    |            |            |       |          |               | Laboratory Cor | ntrol Sample (LCS) | Report     |           |
|--------------------------------------|------------|------------|-------|----------|---------------|----------------|--------------------|------------|-----------|
|                                      |            |            |       |          | Spike         | Recovery (%)   | Recovery           | Limits (%) |           |
| Analyte                              | CAS Number | Method     | LOR   | Unit     | Concentration | LCS            | Low                | High       | Qualifier |
| Physical Tests (QCLot: 487130)       |            |            |       |          |               |                |                    |            |           |
| acidity (as CaCO3)                   |            | E283       | 2     | mg/L     | 50 mg/L       | 110            | 85.0               | 115        |           |
| Physical Tests (QCLot: 487138)       |            |            |       |          |               |                |                    |            |           |
| conductivity                         |            | E100       | 1     | μS/cm    | 146.9 μS/cm   | 97.8           | 90.0               | 110        |           |
| Physical Tests (QCLot: 487139)       |            |            |       |          |               |                |                    |            |           |
| рН                                   |            | E108       |       | pH units | 7 pH units    | 100            | 98.6               | 101        |           |
| Physical Tests (QCLot: 487140)       |            |            |       |          |               |                |                    |            |           |
| alkalinity, total (as CaCO3)         |            | E290       | 1     | mg/L     | 500 mg/L      | 105            | 85.0               | 115        |           |
| Physical Tests (QCLot: 487508)       |            |            |       |          |               |                |                    |            |           |
| turbidity                            |            | E121       | 0.1   | NTU      | 200 NTU       | 104            | 85.0               | 115        |           |
| Physical Tests (QCLot: 489463)       |            |            |       |          |               |                |                    |            |           |
| solids, total suspended [TSS]        |            | E160-L     | 1     | mg/L     | 150 mg/L      | 106            | 85.0               | 115        |           |
| Physical Tests (QCLot: 489470)       |            |            |       |          |               |                |                    |            |           |
| solids, total dissolved [TDS]        |            | E162       | 10    | mg/L     | 1000 mg/L     | 97.8           | 85.0               | 115        |           |
| Physical Tests (QCLot: 492076)       |            |            |       |          |               |                |                    |            |           |
| oxidation-reduction potential [ORP]  |            | E125       |       | mV       | 220 mV        | 103            | 95.4               | 104        |           |
|                                      |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 486949) |            |            |       |          |               |                |                    |            |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 | E378-U     | 0.001 | mg/L     | 0.02 mg/L     | 98.5           | 80.0               | 120        |           |
| Anions and Nutrients (QCLot: 487064) |            |            |       |          |               |                |                    |            |           |
| sulfate (as SO4)                     | 14808-79-8 | E235.SO4   | 0.3   | mg/L     | 100 mg/L      | 100            | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 487065) |            |            |       |          |               |                |                    |            |           |
| bromide                              | 24959-67-9 | E235.Br-L  | 0.05  | mg/L     | 0.5 mg/L      | 100            | 85.0               | 115        |           |
| Anions and Nutrients (QCLot: 487066) |            |            |       |          |               |                |                    |            |           |
| chloride                             | 16887-00-6 | E235.CI-L  | 0.1   | mg/L     | 100 mg/L      | 99.1           | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 487067) |            |            |       |          |               |                |                    |            |           |
| nitrate (as N)                       | 14797-55-8 | E235.NO3-L | 0.005 | mg/L     | 2.5 mg/L      | 101            | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 487068) |            |            |       |          |               |                |                    |            |           |
| nitrite (as N)                       | 14797-65-0 | E235.NO2-L | 0.001 | mg/L     | 0.5 mg/L      | 101            | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 487069) |            |            |       |          |               |                |                    |            |           |
| fluoride                             | 16984-48-8 | E235.F     | 0.02  | mg/L     | 1 mg/L        | 98.4           | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 488266) |            |            |       |          |               |                |                    |            |           |
| ammonia, total (as N)                | 7664-41-7  | F298       | 0.005 | mg/L     | 0.2 mg/L      | 97.4           | 85.0               | 115        |           |
| , , ,                                | 7004-41-7  | 2200       | 0.000 | 9/ =     | 0.2 Hg/L      | 31.4           | 00.0               |            |           |

 Page
 : 12 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

 Project
 : LINE CREEK OPERATION



Laboratory Control Sample (LCS) Report Sub-Matrix: Water Recovery (%) Spike Recovery Limits (%) CAS Number Method LOR Unit Qualifier Analyte Concentration LCS Low High Anions and Nutrients (QCLot: 488387) - continued phosphorus, total 7723-14-0 E372-U 0.002 mg/L 102 80.0 120 8.02 mg/L Anions and Nutrients (QCLot: 489194) Kjeldahl nitrogen, total [TKN] ---- E318 0.05 125 75.0 mg/L 4 mg/L 105 Organic / Inorganic Carbon (QCLot: 492103) ---- E358-L 8.57 mg/L carbon, dissolved organic [DOC] 0.5 mg/L 96.7 0.08 120 Organic / Inorganic Carbon (QCLot: 492104) ---- E355-L 0.5 80.0 120 carbon, total organic [TOC] mg/L 8.57 mg/L 99.8 Total Metals (QCLot: 489088) 7440-47-3 E420.Cr-L 0.0001 chromium, total mg/L 0.25 mg/L 99.4 80.0 120 Total Metals (QCLot: 489089) aluminum, total 7429-90-5 E420 0.003 mg/L 80.0 120 2 mg/L 105 7440-36-0 E420 antimony, total 0.0001 mg/L 1 mg/L 104 80.0 120 7440-38-2 E420 0.0001 mg/L 80.0 120 arsenic, total 1 mg/L 103 7440-39-3 E420 0.0001 mg/L 80.0 120 barium, total 0.25 mg/L 99.2 7440-41-7 E420 0.00002 beryllium, total mg/L 0.1 mg/L 99.2 80.0 120 bismuth, total 7440-69-9 E420 0.00005 mg/L 80.0 120 1 mg/L 106 7440-42-8 E420 0.01 80.0 120 boron, total mg/L 1 mg/L 92.0 7440-43-9 E420 0.000005 80.0 120 cadmium, total mg/L 0.1 mg/L 101 calcium, total 7440-70-2 E420 0.05 mg/L 50 mg/L 100 0.08 120 7440-48-4 E420 cobalt, total 0.0001 mg/L 0.25 mg/L 99.2 80.0 120 7440-50-8 E420 0.0005 mg/L 0.25 mg/L 99.8 80.0 120 copper, total 7439-89-6 E420 0.01 80.0 120 iron, total mg/L 1 mg/L 99.8 7439-92-1 E420 0.00005 lead, total mg/L 0.5 mg/L 103 80.0 120 7439-93-2 E420 lithium, total 0.001 mg/L 0.25 mg/L 105 80.0 120 7439-95-4 E420 0.005 mg/L 80.0 120 magnesium, total 50 mg/L 97.1 7439-96-5 E420 0.0001 80.0 120 mg/L 0.25 mg/L 98.8 manganese, total 7439-98-7 E420 0.00005 80.0 120 mg/L molybdenum, total 0.25 mg/L 105 7440-02-0 E420 0.0005 80.0 120 nickel, total mg/L 0.5 mg/L 100 7440-09-7 E420 0.05 80.0 120 potassium, total mg/L 50 mg/L 109 selenium, total 7782-49-2 E420 0.00005 mg/L 102 0.08 120 1 mg/L silicon, total 7440-21-3 E420 0.1 80.0 120 mg/L 10 mg/L 101 silver, total 7440-22-4 E420 0.00001 mg/L 92.6 0.08 120 0.1 mg/L 7440-23-5 E420 0.05 80.0 sodium, total mg/L 50 mg/L 106 120 strontium, total 7440-24-6 E420 0.0002 mg/L 0.25 mg/L 103 0.08 120 7704-34-9 E420 0.08 120 sulfur, total 0.5 mg/L 50 mg/L 91.3

 Page
 : 13 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited



Project : LINE CREEK OPERATION

| Sub-Matrix: Water                       |            |           |          |      |               | Laboratory Co. | ntrol Sample (LCS) | Report     |           |
|---|------------|-----------|----------|------|---------------|----------------|--------------------|------------|-----------|
|   |            |           |          |      | Spike         | Recovery (%)   | Recovery           | Limits (%) |           |
| Analyte                                 | CAS Number | Method    | LOR      | Unit | Concentration | LCS            | Low                | High       | Qualifier |
| Total Metals (QCLot: 489089) - continue | ed         |           |          |      |               |                |                    |            |           |
| thallium, total                         | 7440-28-0  | E420      | 0.00001  | mg/L | 1 mg/L        | 102            | 80.0               | 120        |           |
| tin, total                              | 7440-31-5  | E420      | 0.0001   | mg/L | 0.5 mg/L      | 102            | 80.0               | 120        |           |
| titanium, total                         | 7440-32-6  | E420      | 0.0003   | mg/L | 0.25 mg/L     | 99.1           | 80.0               | 120        |           |
| uranium, total                          | 7440-61-1  | E420      | 0.00001  | mg/L | 0.005 mg/L    | 105            | 80.0               | 120        |           |
| vanadium, total                         | 7440-62-2  | E420      | 0.0005   | mg/L | 0.5 mg/L      | 102            | 80.0               | 120        |           |
| zinc, total                             | 7440-66-6  | E420      | 0.003    | mg/L | 0.5 mg/L      | 94.0           | 80.0               | 120        |           |
| Total Metals (QCLot: 490000)            |            |           |          |      |               |                |                    |            |           |
| mercury, total                          | 7439-97-6  | E508      | 0.000005 | mg/L | 0.0001 mg/L   | 105            | 80.0               | 120        |           |
|   |            |           |          |      |               |                |                    |            |           |
| mercury, dissolved                      | 7439-97-6  | E509      | 0.000005 | mg/L | 0.0001 mg/L   | 99.0           | 80.0               | 120        |           |
| Dissolved Metals (QCLot: 490470)        |            |           |          |      |               |                |                    |            |           |
| chromium, dissolved                     | 7440-47-3  | E421.Cr-L | 0.0001   | mg/L | 0.25 mg/L     | 99.3           | 80.0               | 120        |           |
| Dissolved Metals (QCLot: 490471)        |            |           |          |      |               |                |                    |            | '         |
| aluminum, dissolved                     | 7429-90-5  | E421      | 0.001    | mg/L | 2 mg/L        | 98.3           | 80.0               | 120        |           |
| antimony, dissolved                     | 7440-36-0  | E421      | 0.0001   | mg/L | 1 mg/L        | 107            | 80.0               | 120        |           |
| arsenic, dissolved                      | 7440-38-2  | E421      | 0.0001   | mg/L | 1 mg/L        | 102            | 80.0               | 120        |           |
| barium, dissolved                       | 7440-39-3  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 98.1           | 80.0               | 120        |           |
| beryllium, dissolved                    | 7440-41-7  | E421      | 0.00002  | mg/L | 0.1 mg/L      | 112            | 80.0               | 120        |           |
| bismuth, dissolved                      | 7440-69-9  | E421      | 0.00005  | mg/L | 1 mg/L        | 100            | 80.0               | 120        |           |
| boron, dissolved                        | 7440-42-8  | E421      | 0.01     | mg/L | 1 mg/L        | 105            | 80.0               | 120        |           |
| cadmium, dissolved                      | 7440-43-9  | E421      | 0.000005 | mg/L | 0.1 mg/L      | 97.2           | 80.0               | 120        |           |
| calcium, dissolved                      | 7440-70-2  | E421      | 0.05     | mg/L | 50 mg/L       | 106            | 80.0               | 120        |           |
| cobalt, dissolved                       | 7440-48-4  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 96.7           | 80.0               | 120        |           |
| copper, dissolved                       | 7440-50-8  | E421      | 0.0002   | mg/L | 0.25 mg/L     | 97.0           | 80.0               | 120        |           |
| iron, dissolved                         | 7439-89-6  | E421      | 0.01     | mg/L | 1 mg/L        | 112            | 80.0               | 120        |           |
| lead, dissolved                         | 7439-92-1  | E421      | 0.00005  | mg/L | 0.5 mg/L      | 105            | 80.0               | 120        |           |
| lithium, dissolved                      | 7439-93-2  | E421      | 0.001    | mg/L | 0.25 mg/L     | 110            | 80.0               | 120        |           |
| magnesium, dissolved                    | 7439-95-4  | E421      | 0.005    | mg/L | 50 mg/L       | 98.0           | 80.0               | 120        |           |
| manganese, dissolved                    | 7439-96-5  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 97.2           | 80.0               | 120        |           |
| molybdenum, dissolved                   | 7439-98-7  | E421      | 0.00005  | mg/L | 0.25 mg/L     | 105            | 80.0               | 120        |           |
| nickel, dissolved                       | 7440-02-0  | E421      | 0.0005   | mg/L | 0.5 mg/L      | 97.4           | 80.0               | 120        |           |
| potassium, dissolved                    | 7440-09-7  | E421      | 0.05     | mg/L | 50 mg/L       | 102            | 80.0               | 120        |           |
| selenium, dissolved                     | 7782-49-2  | E421      | 0.00005  | mg/L | 1 mg/L        | 89.1           | 80.0               | 120        |           |
| silicon, dissolved                      | 7440-21-3  | E421      | 0.05     | mg/L | 10 mg/L       | 100            | 80.0               | 120        |           |
| silver, dissolved                       | 7440-22-4  | E421      | 0.00001  | mg/L | 0.1 mg/L      | 91.8           | 80.0               | 120        |           |
| sodium, dissolved                       | 7440-23-5  | E421      | 0.05     | mg/L | 50 mg/L       | 104            | 80.0               | 120        |           |
| strontium, dissolved                    | 7440-24-6  | E421      | 0.0002   | mg/L | 0.25 mg/L     | 98.4           | 80.0               | 120        |           |

: 14 of 18 : CG2205677 Page Work Order Client

: Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water                    |            |        |         |      |               | Laboratory Co | ntrol Sample (LCS) | Report     |           |
|--------------------------------------|------------|--------|---------|------|---------------|---------------|--------------------|------------|-----------|
|                                      |            |        |         |      | Spike         | Recovery (%)  | Recovery           | Limits (%) |           |
| Analyte                              | CAS Number | Method | LOR     | Unit | Concentration | LCS           | Low                | High       | Qualifier |
| Dissolved Metals (QCLot: 490471) - c | ontinued   |        |         |      |               |               |                    |            |           |
| sulfur, dissolved                    | 7704-34-9  | E421   | 0.5     | mg/L | 50 mg/L       | 97.3          | 80.0               | 120        |           |
| thallium, dissolved                  | 7440-28-0  | E421   | 0.00001 | mg/L | 1 mg/L        | 104           | 80.0               | 120        |           |
| tin, dissolved                       | 7440-31-5  | E421   | 0.0001  | mg/L | 0.5 mg/L      | 97.7          | 80.0               | 120        |           |
| titanium, dissolved                  | 7440-32-6  | E421   | 0.0003  | mg/L | 0.25 mg/L     | 95.9          | 80.0               | 120        |           |
| uranium, dissolved                   | 7440-61-1  | E421   | 0.00001 | mg/L | 0.005 mg/L    | 101           | 80.0               | 120        |           |
| vanadium, dissolved                  | 7440-62-2  | E421   | 0.0005  | mg/L | 0.5 mg/L      | 99.2          | 80.0               | 120        |           |
| zinc, dissolved                      | 7440-66-6  | E421   | 0.001   | mg/L | 0.5 mg/L      | 102           | 80.0               | 120        |           |
|                                      |            |        |         |      |               |               |                    |            |           |

 Page
 : 15 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



## Matrix Spike (MS) Report

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

|                         |                                    |                                     |            |            | -             |             |              |               |            |           |
|-------------------------|------------------------------------|-------------------------------------|------------|------------|---------------|-------------|--------------|---------------|------------|-----------|
| Sub-Matrix: Water       |                                    |                                     |            |            |               |             | Matrix Spik  | e (MS) Report |            |           |
|                         |                                    |                                     |            |            | Spi           | ke          | Recovery (%) | Recovery      | Limits (%) |           |
| Laboratory sample<br>ID | Client sample ID                   | Analyte                             | CAS Number | Method     | Concentration | Target      | MS           | Low           | High       | Qualifier |
| Anions and Nutr         | ients (QCLot: 486949)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0510 mg/L   | 0.05 mg/L   | 102          | 70.0          | 130        |           |
| Anions and Nutr         | ients (QCLot: 487064)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 89.0 mg/L     | 100 mg/L    | 89.0         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 487065)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | bromide                             | 24959-67-9 | E235.Br-L  | 0.472 mg/L    | 0.5 mg/L    | 94.4         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 487066)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | chloride                            | 16887-00-6 | E235.CI-L  | 91.1 mg/L     | 100 mg/L    | 91.1         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 487067)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 2.29 mg/L     | 2.5 mg/L    | 91.6         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 487068)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.470 mg/L    | 0.5 mg/L    | 94.0         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 487069)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | fluoride                            | 16984-48-8 | E235.F     | 0.920 mg/L    | 1 mg/L      | 92.0         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 488266)              |                                     |            |            |               |             |              |               |            |           |
| CG2205677-002           | LC_GRCK_WS_LAEMP_D<br>RY_2022-05_N | ammonia, total (as N)               | 7664-41-7  | E298       | 0.0986 mg/L   | 0.1 mg/L    | 98.6         | 75.0          | 125        |           |
| Anions and Nutr         | ients (QCLot: 488387)              |                                     |            |            |               |             |              |               |            |           |
| CG2205636-002           | Anonymous                          | phosphorus, total                   | 7723-14-0  | E372-U     | 0.0507 mg/L   | 0.0676 mg/L | 75.1         | 70.0          | 130        |           |
| Anions and Nutr         | ients (QCLot: 489194)              |                                     |            |            |               |             |              |               |            |           |
| CG2205658-002           | Anonymous                          | Kjeldahl nitrogen, total [TKN]      |            | E318       | 2.98 mg/L     | 2.5 mg/L    | 119          | 70.0          | 130        |           |
| Organic / Inorga        | nic Carbon (QCLot: 492             | 103)                                |            |            |               |             |              |               |            |           |
| CG2205658-001           | Anonymous                          | carbon, dissolved organic [DOC]     |            | E358-L     | 4.82 mg/L     | 5 mg/L      | 96.4         | 70.0          | 130        |           |
| Organic / Inorga        | nic Carbon (QCLot: 492             | 104)                                |            |            |               |             |              |               |            |           |
| CG2205658-001           | Anonymous                          | carbon, total organic [TOC]         |            | E355-L     | 5.13 mg/L     | 5 mg/L      | 103          | 70.0          | 130        |           |
| Total Metals (Q0        | CLot: 489088)                      |                                     |            |            |               |             |              |               |            |           |
| CG2205658-002           | Anonymous                          | chromium, total                     | 7440-47-3  | E420.Cr-L  | 0.0398 mg/L   | 0.04 mg/L   | 99.6         | 70.0          | 130        |           |
|                         | 1                                  | 1                                   |            | 1          | 1             |             |              |               | 1          | 1         |

 Page
 : 16 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water |                                    |                    |            |        |                |             | Matrix Spil  | ke (MS) Report |            |           |
|-------------------|------------------------------------|--------------------|------------|--------|----------------|-------------|--------------|----------------|------------|-----------|
|                   |                                    |                    |            |        | Spi            | ike         | Recovery (%) | Recovery       | Limits (%) |           |
| Laboratory sample | Client sample ID                   | Analyte            | CAS Number | Method | Concentration  | Target      | MS           | Low            | High       | Qualifier |
| otal Metals (QC   | Lot: 489089)                       |                    |            |        |                |             |              |                |            |           |
| CG2205658-002     | Anonymous                          | aluminum, total    | 7429-90-5  | E420   | 0.205 mg/L     | 0.2 mg/L    | 103          | 70.0           | 130        |           |
|                   |                                    | antimony, total    | 7440-36-0  | E420   | 0.0203 mg/L    | 0.02 mg/L   | 102          | 70.0           | 130        |           |
|                   |                                    | arsenic, total     | 7440-38-2  | E420   | 0.0208 mg/L    | 0.02 mg/L   | 104          | 70.0           | 130        |           |
|                   |                                    | barium, total      | 7440-39-3  | E420   | ND mg/L        | 0.02 mg/L   | ND           | 70.0           | 130        |           |
|                   |                                    | beryllium, total   | 7440-41-7  | E420   | 0.0410 mg/L    | 0.04 mg/L   | 103          | 70.0           | 130        |           |
|                   |                                    | bismuth, total     | 7440-69-9  | E420   | 0.00981 mg/L   | 0.01 mg/L   | 98.1         | 70.0           | 130        |           |
|                   |                                    | boron, total       | 7440-42-8  | E420   | 0.097 mg/L     | 0.1 mg/L    | 97.5         | 70.0           | 130        |           |
|                   |                                    | cadmium, total     | 7440-43-9  | E420   | 0.00386 mg/L   | 0.004 mg/L  | 96.6         | 70.0           | 130        |           |
|                   |                                    | calcium, total     | 7440-70-2  | E420   | ND mg/L        | 4 mg/L      | ND           | 70.0           | 130        |           |
|                   |                                    | cobalt, total      | 7440-48-4  | E420   | 0.0194 mg/L    | 0.02 mg/L   | 96.9         | 70.0           | 130        |           |
|                   |                                    | copper, total      | 7440-50-8  | E420   | 0.0191 mg/L    | 0.02 mg/L   | 95.6         | 70.0           | 130        |           |
|                   |                                    | iron, total        | 7439-89-6  | E420   | 1.91 mg/L      | 2 mg/L      | 95.4         | 70.0           | 130        |           |
|                   |                                    | lead, total        | 7439-92-1  | E420   | 0.0200 mg/L    | 0.02 mg/L   | 100          | 70.0           | 130        |           |
|                   |                                    | lithium, total     | 7439-93-2  | E420   | 0.104 mg/L     | 0.1 mg/L    | 104          | 70.0           | 130        |           |
|                   |                                    | magnesium, total   | 7439-95-4  | E420   | ND mg/L        | 1 mg/L      | ND           | 70.0           | 130        |           |
|                   |                                    | manganese, total   | 7439-96-5  | E420   | ND mg/L        | 0.02 mg/L   | ND           | 70.0           | 130        |           |
|                   |                                    | molybdenum, total  | 7439-98-7  | E420   | 0.0209 mg/L    | 0.02 mg/L   | 104          | 70.0           | 130        |           |
|                   |                                    | nickel, total      | 7440-02-0  | E420   | 0.0380 mg/L    | 0.04 mg/L   | 95.1         | 70.0           | 130        |           |
|                   |                                    | potassium, total   | 7440-09-7  | E420   | 4.30 mg/L      | 4 mg/L      | 108          | 70.0           | 130        |           |
|                   |                                    | selenium, total    | 7782-49-2  | E420   | 0.0384 mg/L    | 0.04 mg/L   | 95.9         | 70.0           | 130        |           |
|                   |                                    | silicon, total     | 7440-21-3  | E420   | 9.40 mg/L      | 10 mg/L     | 94.0         | 70.0           | 130        |           |
|                   |                                    | silver, total      | 7440-22-4  | E420   | 0.00415 mg/L   | 0.004 mg/L  | 104          | 70.0           | 130        |           |
|                   |                                    | sodium, total      | 7440-23-5  | E420   | 2.11 mg/L      | 2 mg/L      | 105          | 70.0           | 130        |           |
|                   |                                    | strontium, total   | 7440-24-6  | E420   | ND mg/L        | 0.02 mg/L   | ND           | 70.0           | 130        |           |
|                   |                                    | sulfur, total      | 7704-34-9  | E420   | 19.5 mg/L      | 20 mg/L     | 97.5         | 70.0           | 130        |           |
|                   |                                    | thallium, total    | 7440-28-0  | E420   | 0.00386 mg/L   | 0.004 mg/L  | 96.5         | 70.0           | 130        |           |
|                   |                                    | tin, total         | 7440-31-5  | E420   | 0.0198 mg/L    | 0.02 mg/L   | 98.8         | 70.0           | 130        |           |
|                   |                                    | titanium, total    | 7440-32-6  | E420   | 0.0398 mg/L    | 0.04 mg/L   | 99.4         | 70.0           | 130        |           |
|                   |                                    | uranium, total     | 7440-61-1  | E420   | 0.00406 mg/L   | 0.004 mg/L  | 101          | 70.0           | 130        |           |
|                   |                                    | vanadium, total    | 7440-62-2  | E420   | 0.100 mg/L     | 0.1 mg/L    | 100          | 70.0           | 130        |           |
|                   |                                    | zinc, total        | 7440-66-6  | E420   | 0.373 mg/L     | 0.4 mg/L    | 93.3         | 70.0           | 130        |           |
| otal Metals (QC   | Lot: 490000)                       |                    |            |        |                |             |              |                |            |           |
| G2205635-002      | Anonymous                          | mercury, total     | 7439-97-6  | E508   | 0.000102 mg/L  | 0.0001 mg/L | 102          | 70.0           | 130        |           |
| issolved Metals   | (QCLot: 489577)                    |                    |            |        |                |             |              |                |            |           |
| CG2205677-001     | LC_FRUS_WS_LAEMP_DR<br>Y_2022-05_N | mercury, dissolved | 7439-97-6  | E509   | 0.0000972 mg/L | 0.0001 mg/L | 97.2         | 70.0           | 130        |           |

 Page
 : 17 of 18

 Work Order
 : CG2205677

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water |                  |                       |            |           |               |            | Matrix Spik  | e (MS) Report |            |           |
|-------------------|------------------|-----------------------|------------|-----------|---------------|------------|--------------|---------------|------------|-----------|
|                   |                  |                       |            |           | Spi           | ke         | Recovery (%) | Recovery      | Limits (%) |           |
| Laboratory sample | Client sample ID | Analyte               | CAS Number | Method    | Concentration | Target     | MS           | Low           | High       | Qualifier |
|                   | (QCLot: 490470)  |                       |            |           |               |            |              |               |            |           |
| CG2205658-002     | Anonymous        | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.0398 mg/L   | 0.04 mg/L  | 99.6         | 70.0          | 130        |           |
| Dissolved Metals  | (QCLot: 490471)  |                       |            |           |               |            |              |               | 1          |           |
| CG2205658-002     | Anonymous        | aluminum, dissolved   | 7429-90-5  | E421      | 0.199 mg/L    | 0.2 mg/L   | 99.5         | 70.0          | 130        |           |
|                   |                  | antimony, dissolved   | 7440-36-0  | E421      | 0.0199 mg/L   | 0.02 mg/L  | 99.6         | 70.0          | 130        |           |
|                   |                  | arsenic, dissolved    | 7440-38-2  | E421      | 0.0205 mg/L   | 0.02 mg/L  | 102          | 70.0          | 130        |           |
|                   |                  | barium, dissolved     | 7440-39-3  | E421      | ND mg/L       | 0.02 mg/L  | ND           | 70.0          | 130        |           |
|                   |                  | beryllium, dissolved  | 7440-41-7  | E421      | 0.0398 mg/L   | 0.04 mg/L  | 99.4         | 70.0          | 130        |           |
|                   |                  | bismuth, dissolved    | 7440-69-9  | E421      | 0.00899 mg/L  | 0.01 mg/L  | 89.9         | 70.0          | 130        |           |
|                   |                  | boron, dissolved      | 7440-42-8  | E421      | 0.097 mg/L    | 0.1 mg/L   | 97.5         | 70.0          | 130        |           |
|                   |                  | cadmium, dissolved    | 7440-43-9  | E421      | 0.00403 mg/L  | 0.004 mg/L | 101          | 70.0          | 130        |           |
|                   |                  | calcium, dissolved    | 7440-70-2  | E421      | ND mg/L       | 4 mg/L     | ND           | 70.0          | 130        |           |
|                   |                  | cobalt, dissolved     | 7440-48-4  | E421      | 0.0192 mg/L   | 0.02 mg/L  | 96.0         | 70.0          | 130        |           |
|                   |                  | copper, dissolved     | 7440-50-8  | E421      | 0.0189 mg/L   | 0.02 mg/L  | 94.4         | 70.0          | 130        |           |
|                   |                  | iron, dissolved       | 7439-89-6  | E421      | 1.80 mg/L     | 2 mg/L     | 90.0         | 70.0          | 130        |           |
|                   |                  | lead, dissolved       | 7439-92-1  | E421      | 0.0190 mg/L   | 0.02 mg/L  | 95.1         | 70.0          | 130        |           |
|                   |                  | lithium, dissolved    | 7439-93-2  | E421      | 0.0954 mg/L   | 0.1 mg/L   | 95.4         | 70.0          | 130        |           |
|                   |                  | magnesium, dissolved  | 7439-95-4  | E421      | ND mg/L       | 1 mg/L     | ND           | 70.0          | 130        |           |
|                   |                  | manganese, dissolved  | 7439-96-5  | E421      | ND mg/L       | 0.02 mg/L  | ND           | 70.0          | 130        |           |
|                   |                  | molybdenum, dissolved | 7439-98-7  | E421      | 0.0203 mg/L   | 0.02 mg/L  | 101          | 70.0          | 130        |           |
|                   |                  | nickel, dissolved     | 7440-02-0  | E421      | 0.0382 mg/L   | 0.04 mg/L  | 95.5         | 70.0          | 130        |           |
|                   |                  | potassium, dissolved  | 7440-09-7  | E421      | 4.00 mg/L     | 4 mg/L     | 100.0        | 70.0          | 130        |           |
|                   |                  | selenium, dissolved   | 7782-49-2  | E421      | 0.0437 mg/L   | 0.04 mg/L  | 109          | 70.0          | 130        |           |
|                   |                  | silicon, dissolved    | 7440-21-3  | E421      | 8.95 mg/L     | 10 mg/L    | 89.5         | 70.0          | 130        |           |
|                   |                  | silver, dissolved     | 7440-22-4  | E421      | 0.00402 mg/L  | 0.004 mg/L | 100          | 70.0          | 130        |           |
|                   |                  | sodium, dissolved     | 7440-23-5  | E421      | 1.98 mg/L     | 2 mg/L     | 99.2         | 70.0          | 130        |           |
|                   |                  | strontium, dissolved  | 7440-24-6  | E421      | ND mg/L       | 0.02 mg/L  | ND           | 70.0          | 130        |           |
|                   |                  | sulfur, dissolved     | 7704-34-9  | E421      | 20.9 mg/L     | 20 mg/L    | 105          | 70.0          | 130        |           |
|                   |                  | thallium, dissolved   | 7440-28-0  | E421      | 0.00373 mg/L  | 0.004 mg/L | 93.2         | 70.0          | 130        |           |
|                   |                  | tin, dissolved        | 7440-31-5  | E421      | 0.0190 mg/L   | 0.02 mg/L  | 95.3         | 70.0          | 130        |           |
|                   |                  | titanium, dissolved   | 7440-32-6  | E421      | 0.0382 mg/L   | 0.04 mg/L  | 95.5         | 70.0          | 130        |           |
|                   |                  | uranium, dissolved    | 7440-61-1  | E421      | 0.00381 mg/L  | 0.004 mg/L | 95.2         | 70.0          | 130        |           |
|                   |                  | vanadium, dissolved   | 7440-62-2  | E421      | 0.102 mg/L    | 0.1 mg/L   | 102          | 70.0          | 130        |           |
|                   |                  | zinc, dissolved       | 7440-66-6  | E421      | 0.392 mg/L    | 0.4 mg/L   | 98.1         | 70.0          | 130        |           |

: 18 of 18 : CG2205677 Page Work Order Client



| Telephone : +1 403 407 1800  | obin Valleau            |                   |                             |  | Emergency (1 Rusiness Day) - 100% surcharge  | Emergency (1                                      |
|--|-------------------------|-------------------|-----------------------------|--|--|---|
|  |                         | Ro                | Sampler's Name              | fault) X   | Regular (default) X Priority (2-3 business days) - 50% surcharge   | Priority (2                                       |
|  |                         |                   |                             |  | ubject to availability)  | SERVICU REQUEST (rush - subject to availability). |
| 4  |                         |                   |                             |  |  |   |
|  |                         | -                 |                             | T  | And the second s |   |
|  | May 11, 2021            | Ī                 | Robin Valleau               | :<br>-   | :  |   |
| Telephone: +1 403 407 1800   |                         | EILIATION         | RELINQUISHED BY/AFEIDIATION |  | CIAL INSTRUCTIONS  | ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS/         |
| Telephone: +1 403 407 1800   |                         |                   |                             |  |  | :   |
| Telephone: +1 403 407 1800   |                         |                   |                             |  |  |   |
| Telephone: +1 403 407 1800   |                         |                   |                             |  |  |   |
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|  |                         |                   | and Jan                     |  |  |   |
| 1 1 1  | 1                       | G 7               | 11-May-22 12:45             | ws "n  | LC_GRCK  | LC_GRCK_WS_LAEMP_DRY_2022-05_N                    |
| work Order Heference   | 1 1 1                   | G 7               | 14 616                      | WS P   | LC_FRUS  | LC FRUS WS LAFMP DRY 2022-05 N                    |
| HG-T-U-CVAF-VA TECKCOAL-MET-D-VA TECKCOAL-METNHG T-CL TECKCOAL- ROUTINE-VA | ALS_Package-<br>TKN/TOC | G=Grab<br>C=Com # | Date                        | ×  | Sample Location (sys loc code)   | Sample ID   |
| 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1                                    | PAGE H2SO4 H2SO4 HC     |                   |                             |  |  |   |
| ANALYSIS REQUESTED   | 100 407 1777            |                   |                             | VILS -   | SAMPLE DETAILS   | I HORE LATHOUT                                    |
| try Canada Po number Provosiojui   | 71Y 7B5 Country         | Postal Code       | Country Canada              |  | 250-725-8137   | Postal Code  Postal Code                          |
| AB Email 5:  | Calgary                 | City              | 1"                          |  | Sparwood   | City  |
| Email 4:   |                         |                   | Ì                           |  |  |   |
| Email 3: Teck Lab Results@leck.com X X                                     |                         | Address           |                             |  | Address RRI HWY 3  | Address   |
| Email 2: teckcoal@equisonline;com  |                         | Email             |                             |  | Email Harman Report  | Email   |
| com X  |                         | Lab Contact       |                             |  | Mike Pope  | Project Manager Mike Pope                         |
| Report Format / Distribution   Excel   PDF   EDD                           | ALS Calgary             | Lab Name          |                             |  | Facility Name / Job# Line Creek Operation  | Facility Name / Job#                              |
| egular   | 1 -                     | TURNAROUN         | LCO_Dry Creek LAEMP_ALS     | <u>Dry Cr</u>  | COC ID: LCC  |   |
|  |                         |                   |                             | 3 ) , k  | 1  | I CK  |

# **WATER CHEMISTRY**

ALS Laboratory Report CG2208042 (Finalized 07-July-22)



## **CERTIFICATE OF ANALYSIS**

Work Order : CG2208042

: Teck Coal Limited

Contact : Nicole Zathey

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Client

Project : LINE CREEK OPERATION

PO : VPO00816101

C-O-C number : LCO\_Dry Creek LAEMP\_ALS

Sampler : ROBIN VALLEAU

Site : --

Quote number : Teck Coal Master Quote

No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 6

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary AB Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 23-Jun-2022 09:30

Date Analysis Commenced : 23-Jun-2022

Issue Date : 07-Jul-2022 17:09

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 |
| Ann Joby         | Lab Assistant                           | Metals, Burnaby, British Columbia |
| Anthony Calero   | Team Leader - Inorganics                | Inorganics, Calgary, Alberta      |
| Benjamin Oke     | Lab Assistant                           | Metals, Burnaby, British Columbia |
| Elke Tabora      |   | Inorganics, Calgary, Alberta      |
| Harpreet Chawla  | Team Leader - Inorganics                | Inorganics, Calgary, Alberta      |
| Kevin Duarte     | Supervisor - Metals ICP Instrumentation | Metals, Burnaby, British Columbia |
| Owen Cheng       |   | Metals, Burnaby, British Columbia |
| Parker Sgarbossa | Laboratory Analyst                      | Inorganics, Calgary, Alberta      |
| Ruifang Zheng    | Analyst                                 | Inorganics, Calgary, Alberta      |
| Sara Niroomand   |   | Inorganics, Calgary, Alberta      |
| Shirley Li       |   | Inorganics, Calgary, Alberta      |
| Woochan Song     | Lab Analyst                             | Metals, Burnaby, British Columbia |
|                  |   |                                   |

 Page
 : 2 of 6

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



#### **General Comments**

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| Unit     | Description                   |
|----------|-------------------------------|
| -        | No Unit                       |
| %        | percent                       |
| μg/L     | micrograms per litre          |
| μS/cm    | Microsiemens per centimetre   |
| meq/L    | milliequivalents per litre    |
| mg/L     | milligrams per litre          |
| mV       | millivolts                    |
| NTU      | nephelometric turbidity units |
| pH units | pH units                      |

<sup>&</sup>lt;: less than.

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

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

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

## Sample Comments

| Sample        | Client Id                         | Comment                 |
|---------------|-----------------------------------|-------------------------|
| CG2208042-004 | LC_RD1_WS_LAEMP_DRY_2<br>022-06_N | 004 - hg vial submitted |

### **Qualifiers**

| Qualifier | Description  |
|-----------|--|
| HTD       | Hold time exceeded for re-analysis or dilution, but initial testing was conducted within |
|           | hold time.   |
| RRV       | Reported result verified by repeat analysis.   |
| TKNI      | TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.        |

<sup>&</sup>gt;: greater than.

Page : 3 of 6
Work Order : CG2208042
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water (Matrix: Water)   |            |            | C           | lient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-06_N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-06_N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-06_N | LC_RD1_WS_L<br>AEMP_DRY_20<br>22-06_N |  |
|-------------------------------------|------------|------------|-------------|-------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|--|
|                                     |            |            | Client samp | oling date / time | 21-Jun-2022<br>14:15                   | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  |  |
| Analyte                             | CAS Number | Method     | LOR         | Unit              | CG2208042-001                          | CG2208042-002                         | CG2208042-003                         | CG2208042-004                         |  |
|                                     |            |            |             |                   | Result                                 | Result                                | Result                                | Result                                |  |
| Physical Tests                      |            |            |             |                   |  |                                       |                                       |                                       |  |
| acidity (as CaCO3)                  |            | E283       | 2.0         | mg/L              | <2.0                                   | <2.0                                  | <2.0                                  | <2.0                                  |  |
| alkalinity, bicarbonate (as CaCO3)  |            | E290       | 1.0         | mg/L              | 153                                    | <1.0                                  | 151                                   | <1.0                                  |  |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3    | E290       | 1.0         | mg/L              | 187                                    | <1.0                                  | 184                                   | <1.0                                  |  |
| alkalinity, carbonate (as CaCO3)    |            | E290       | 1.0         | mg/L              | 2.0                                    | <1.0                                  | 4.4                                   | <1.0                                  |  |
| alkalinity, carbonate (as CO3)      | 3812-32-6  | E290       | 1.0         | mg/L              | 1.2                                    | <1.0                                  | 2.6                                   | <1.0                                  |  |
| alkalinity, hydroxide (as CaCO3)    |            | E290       | 1.0         | mg/L              | <1.0                                   | <1.0                                  | <1.0                                  | <1.0                                  |  |
| alkalinity, hydroxide (as OH)       | 14280-30-9 | E290       | 1.0         | mg/L              | <1.0                                   | <1.0                                  | <1.0                                  | <1.0                                  |  |
| alkalinity, total (as CaCO3)        |            | E290       | 1.0         | mg/L              | 155                                    | <1.0                                  | 155                                   | <1.0                                  |  |
| conductivity                        |            | E100       | 2.0         | μS/cm             | 487                                    | <2.0                                  | 483                                   | <2.0                                  |  |
| hardness (as CaCO3), dissolved      |            | EC100      | 0.50        | mg/L              | 256                                    | <0.50                                 | 251                                   | <0.50                                 |  |
| oxidation-reduction potential [ORP] |            | E125       | 0.10        | mV                | 315                                    | 306                                   | 499                                   | 502                                   |  |
| pH                                  |            | E108       | 0.10        | pH units          | 8.18                                   | 5.41                                  | 8.23                                  | 5.17                                  |  |
| solids, total dissolved [TDS]       |            | E162       | 10          | mg/L              | 323                                    | <10                                   | 320                                   | <10                                   |  |
| solids, total suspended [TSS]       |            | E160-L     | 1.0         | mg/L              | 29.0                                   | <1.0                                  | 27.9                                  | <1.0                                  |  |
| turbidity                           |            | E121       | 0.10        | NTU               | 5.26                                   | <0.10                                 | 8.25                                  | <0.10                                 |  |
| Anions and Nutrients                |            |            |             |                   |  |                                       |                                       |                                       |  |
| ammonia, total (as N)               | 7664-41-7  | E298       | 0.0050      | mg/L              | <0.0050                                | <0.0050                               | <0.0050                               | 0.0074 RRV                            |  |
| bromide                             | 24959-67-9 | E235.Br-L  | 0.050       | mg/L              | <0.050                                 | <0.050                                | <0.050                                | <0.050                                |  |
| chloride                            | 16887-00-6 | E235.CI-L  | 0.10        | mg/L              | 1.27                                   | <0.10                                 | 1.13                                  | <0.10                                 |  |
| fluoride                            | 16984-48-8 | E235.F     | 0.020       | mg/L              | 0.136                                  | <0.020                                | 0.136                                 | <0.020                                |  |
| Kjeldahl nitrogen, total [TKN]      |            | E318       | 0.050       | mg/L              | 0.638                                  | <0.050                                | 0.394 TKNI                            | <0.050                                |  |
| nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0050      | mg/L              | 6.21                                   | <0.0050 HTD                           | 6.20                                  | <0.0050                               |  |
| nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0010      | mg/L              | 0.0035                                 | <0.0010                               | 0.0042                                | <0.0010                               |  |
| phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010      | mg/L              | <0.0010                                | <0.0010                               | 0.0011                                | <0.0010                               |  |
| phosphorus, total                   | 7723-14-0  | E372-U     | 0.0020      | mg/L              | 0.0218                                 | <0.0020                               | 0.0219                                | <0.0020                               |  |
| sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 0.30        | mg/L              | 77.0                                   | <0.30                                 | 76.8                                  | <0.30                                 |  |
| Organic / Inorganic Carbon          |            |            |             |                   |  |                                       |                                       |                                       |  |
| carbon, dissolved organic [DOC]     |            | E358-L     | 0.50        | mg/L              | 2.02                                   | <0.50                                 | 2.02                                  | <0.50                                 |  |
| carbon, total organic [TOC]         |            | E355-L     | 0.50        | mg/L              | 1.94                                   | <0.50                                 | 1.98                                  | <0.50                                 |  |

Page : 4 of 6
Work Order : CG2208042
Client : Teck Coal Limited
Project : LINE CREEK OPERATION

ALS

# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-06_N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-06_N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-06_N | LC_RD1_WS_L<br>AEMP_DRY_20<br>22-06_N |  |
|-----------------------------------|------------|-----------|-------------|------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|--|
|                                   |            |           | Client samp | ling date / time | 21-Jun-2022<br>14:15                   | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  |  |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2208042-001                          | CG2208042-002                         | CG2208042-003                         | CG2208042-004                         |  |
|                                   |            |           |             |                  | Result                                 | Result                                | Result                                | Result                                |  |
| Ion Balance                       |            |           |             |                  |  |                                       |                                       |                                       |  |
| anion sum                         |            | EC101     | 0.10        | meq/L            | 5.19                                   | <0.10                                 | 5.18                                  | <0.10                                 |  |
| cation sum                        |            | EC101     | 0.10        | meq/L            | 5.22                                   | <0.10                                 | 5.11                                  | <0.10                                 |  |
| ion balance (cations/anions)      |            | EC101     | 0.010       | %                | 100                                    | 100                                   | 98.6                                  | 100 RRV                               |  |
| ion balance (APHA)                |            | EC101     | 0.010       | %                | 0.288                                  | <0.010                                | 0.680                                 | <0.010                                |  |
| Total Metals                      |            |           |             |                  |  |                                       |                                       |                                       |  |
| aluminum, total                   | 7429-90-5  | E420      | 0.0030      | mg/L             | 0.136                                  | <0.0030                               | 0.168                                 | <0.0030                               |  |
| antimony, total                   | 7440-36-0  | E420      | 0.00010     | mg/L             | 0.00014                                | <0.00010                              | 0.00014                               | <0.00010                              |  |
| arsenic, total                    | 7440-38-2  | E420      | 0.00010     | mg/L             | 0.00021                                | <0.00010                              | 0.00021                               | <0.00010                              |  |
| barium, total                     | 7440-39-3  | E420      | 0.00010     | mg/L             | 0.0549                                 | <0.00010                              | 0.0545                                | <0.00010                              |  |
| beryllium, total                  | 7440-41-7  | E420      | 0.020       | μg/L             | <0.020                                 | <0.020                                | <0.020                                | <0.020                                |  |
| bismuth, total                    | 7440-69-9  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <0.000050                             |  |
| boron, total                      | 7440-42-8  | E420      | 0.010       | mg/L             | <0.010                                 | <0.010                                | <0.010                                | <0.010                                |  |
| cadmium, total                    | 7440-43-9  | E420      | 0.0050      | μg/L             | 0.0535                                 | <0.0050                               | 0.0588                                | <0.0050                               |  |
| calcium, total                    | 7440-70-2  | E420      | 0.050       | mg/L             | 61.2                                   | <0.050                                | 60.6                                  | <0.050                                |  |
| chromium, total                   | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L             | 0.00040                                | <0.00010                              | 0.00034                               | <0.00010                              |  |
| cobalt, total                     | 7440-48-4  | E420      | 0.10        | μg/L             | 0.12                                   | <0.10                                 | 0.13                                  | <0.10                                 |  |
| copper, total                     | 7440-50-8  | E420      | 0.00050     | mg/L             | 0.00050                                | <0.00050                              | 0.00050                               | <0.00050                              |  |
| iron, total                       | 7439-89-6  | E420      | 0.010       | mg/L             | 0.185                                  | <0.010                                | 0.202                                 | <0.010                                |  |
| lead, total                       | 7439-92-1  | E420      | 0.000050    | mg/L             | 0.000155                               | <0.000050                             | 0.000160                              | <0.000050                             |  |
| lithium, total                    | 7439-93-2  | E420      | 0.0010      | mg/L             | 0.0166                                 | <0.0010                               | 0.0165                                | <0.0010                               |  |
| magnesium, total                  | 7439-95-4  | E420      | 0.0050      | mg/L             | 24.1                                   | <0.0050                               | 24.5                                  | <0.0050                               |  |
| manganese, total                  | 7439-96-5  | E420      | 0.00010     | mg/L             | 0.0106                                 | <0.00010                              | 0.0110                                | <0.00010                              |  |
| mercury, total                    | 7439-97-6  | E508      | 0.0000050   | mg/L             | <0.000050                              | <0.0000050                            | <0.000050                             | <0.0000050                            |  |
| molybdenum, total                 | 7439-98-7  | E420      | 0.000050    | mg/L             | 0.00133                                | <0.000050                             | 0.000988                              | <0.000050                             |  |
| nickel, total                     | 7440-02-0  | E420      | 0.00050     | mg/L             | 0.00185                                | <0.00050                              | 0.00191                               | <0.00050                              |  |
| potassium, total                  | 7440-09-7  | E420      | 0.050       | mg/L             | 0.958                                  | <0.050                                | 0.971                                 | <0.050                                |  |
| selenium, total                   | 7782-49-2  | E420      | 0.050       | μg/L             | 25.5                                   | <0.050                                | 25.6                                  | <0.050                                |  |
| silicon, total                    | 7440-21-3  | E420      | 0.10        | mg/L             | 2.21                                   | <0.10                                 | 2.29                                  | <0.10                                 |  |
| silver, total                     | 7440-22-4  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                             | <0.000010                             | <0.000010                             |  |
| sodium, total                     | 7440-23-5  | E420      | 0.050       | mg/L             | 1.60                                   | <0.050                                | 1.60                                  | <0.050                                |  |
| ,                                 | 1 440-20-0 | 0         | 0.000       | 9, _             |  | 0.555                                 |                                       | 0.000                                 |  |

Page : 5 of 6
Work Order : CG2208042
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-06 N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-06 N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-06 N | LC_RD1_WS_L<br>AEMP_DRY_20<br>22-06 N |             |
|-----------------------------------|------------|-----------|-------------|------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|-------------|
|                                   |            |           | Client samp | ling date / time | 21-Jun-2022<br>14:15                   | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  | 21-Jun-2022<br>14:15                  |             |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2208042-001                          | CG2208042-002                         | CG2208042-003                         | CG2208042-004                         |             |
| Total Metals                      |            |           |             |                  | Result                                 | Result                                | Result                                | Result                                | <del></del> |
| strontium, total                  | 7440-24-6  | E420      | 0.00020     | mg/L             | 0.0880                                 | <0.00020                              | 0.0878                                | <0.00020                              |             |
| sulfur, total                     | 7704-34-9  | E420      | 0.50        | mg/L             | 27.5                                   | <0.50                                 | 27.6                                  | <0.50                                 |             |
| thallium, total                   | 7440-28-0  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                             | <0.000010                             | <0.000010                             |             |
| tin, total                        | 7440-31-5  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                              | <0.00010                              | <0.00010                              |             |
| titanium, total                   | 7440-32-6  | E420      | 0.00030     | mg/L             | 0.00202                                | <0.00030                              | 0.00399                               | <0.00030                              |             |
| uranium, total                    | 7440-61-1  | E420      | 0.000010    | mg/L             | 0.00148                                | <0.000010                             | 0.00146                               | <0.000010                             |             |
| vanadium, total                   | 7440-62-2  | E420      | 0.00050     | mg/L             | 0.00075                                | <0.00050                              | 0.00088                               | <0.00050                              |             |
| zinc, total                       | 7440-66-6  | E420      | 0.0030      | mg/L             | 0.0039                                 | <0.0030                               | 0.0032                                | <0.0030                               |             |
| Dissolved Metals                  |            |           |             |                  |  |                                       |                                       |                                       |             |
| aluminum, dissolved               | 7429-90-5  | E421      | 0.0010      | mg/L             | 0.0021                                 | <0.0010                               | 0.0024                                | <0.0010                               |             |
| antimony, dissolved               | 7440-36-0  | E421      | 0.00010     | mg/L             | 0.00012                                | <0.00010                              | 0.00012                               | <0.00010                              |             |
| arsenic, dissolved                | 7440-38-2  | E421      | 0.00010     | mg/L             | 0.00011                                | <0.00010                              | 0.00011                               | <0.00010                              |             |
| barium, dissolved                 | 7440-39-3  | E421      | 0.00010     | mg/L             | 0.0499                                 | <0.00010                              | 0.0503                                | <0.00010                              |             |
| beryllium, dissolved              | 7440-41-7  | E421      | 0.020       | μg/L             | <0.020                                 | <0.020                                | <0.020                                | <0.020                                |             |
| bismuth, dissolved                | 7440-69-9  | E421      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <0.000050                             |             |
| boron, dissolved                  | 7440-42-8  | E421      | 0.010       | mg/L             | <0.010                                 | <0.010                                | <0.010                                | <0.010                                |             |
| cadmium, dissolved                | 7440-43-9  | E421      | 0.0050      | μg/L             | 0.0216                                 | <0.0050                               | 0.0240                                | <0.0050                               |             |
| calcium, dissolved                | 7440-70-2  | E421      | 0.050       | mg/L             | 62.5                                   | <0.050                                | 61.0                                  | <0.050                                |             |
| chromium, dissolved               | 7440-47-3  | E421.Cr-L | 0.00010     | mg/L             | 0.00011                                | <0.00010                              | <0.00010                              | <0.00010                              |             |
| cobalt, dissolved                 | 7440-48-4  | E421      | 0.10        | μg/L             | <0.10                                  | <0.10                                 | <0.10                                 | <0.10                                 |             |
| copper, dissolved                 | 7440-50-8  | E421      | 0.00020     | mg/L             | <0.00020                               | <0.00020                              | <0.00020                              | <0.00020                              |             |
| iron, dissolved                   | 7439-89-6  | E421      | 0.010       | mg/L             | <0.010                                 | <0.010                                | <0.010                                | <0.010                                |             |
| lead, dissolved                   | 7439-92-1  | E421      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <0.000050                             |             |
| lithium, dissolved                | 7439-93-2  | E421      | 0.0010      | mg/L             | 0.0164                                 | <0.0010                               | 0.0168                                | <0.0010                               |             |
| magnesium, dissolved              | 7439-95-4  | E421      | 0.0050      | mg/L             | 24.4                                   | <0.0050                               | 24.0                                  | <0.0050                               |             |
| manganese, dissolved              | 7439-96-5  | E421      | 0.00010     | mg/L             | 0.00169                                | <0.00010                              | 0.00164                               | <0.00010                              |             |
| mercury, dissolved                | 7439-97-6  | E509      | 0.0000050   | mg/L             | <0.000050                              | <0.0000050                            | <0.0000050                            | <0.000050                             |             |
| molybdenum, dissolved             | 7439-98-7  | E421      | 0.000050    | mg/L             | 0.00110                                | <0.000050                             | 0.00112                               | <0.000050                             |             |
| nickel, dissolved                 | 7440-02-0  | E421      | 0.00050     | mg/L             | 0.00135                                | <0.00050                              | 0.00137                               | <0.00050                              |             |
| potassium, dissolved              | 7440-09-7  | E421      | 0.050       | mg/L             | 0.954                                  | <0.050                                | 0.960                                 | <0.050                                |             |

Page : 6 of 6
Work Order : CG2208042
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water                     |            |        | CI       | ient sample ID   | LC_FRUS_WS_             | LC_CC1_WS_L            | LC_MT1_WS_L            | LC_RD1_WS_L            |  |
|---------------------------------------|------------|--------|----------|------------------|-------------------------|------------------------|------------------------|------------------------|--|
| (Matrix: Water)                       |            |        |          |                  | LAEMP_DRY_2<br>022-06_N | AEMP_DRY_20<br>22-06_N | AEMP_DRY_20<br>22-06_N | AEMP_DRY_20<br>22-06_N |  |
|                                       |            |        |          | ling date / time | 21-Jun-2022<br>14:15    | 21-Jun-2022<br>14:15   | 21-Jun-2022<br>14:15   | 21-Jun-2022<br>14:15   |  |
| Analyte                               | CAS Number | Method | LOR      | Unit             | CG2208042-001           | CG2208042-002          | CG2208042-003          | CG2208042-004          |  |
|                                       |            |        |          |                  | Result                  | Result                 | Result                 | Result                 |  |
| Dissolved Metals                      |            |        |          |                  |                         |                        |                        |                        |  |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050    | μg/L             | 24.2                    | <0.050                 | 24.3                   | <0.050                 |  |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050    | mg/L             | 1.96                    | <0.050                 | 2.10                   | <0.050                 |  |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010 | mg/L             | <0.000010               | <0.000010              | <0.000010              | <0.000010              |  |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050    | mg/L             | 1.53                    | <0.050                 | 1.54                   | <0.050                 |  |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020  | mg/L             | 0.0932                  | <0.00020               | 0.0937                 | <0.00020               |  |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50     | mg/L             | 26.8                    | <0.50                  | 28.3                   | <0.50                  |  |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010 | mg/L             | <0.000010               | <0.000010              | <0.000010              | <0.000010              |  |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010  | mg/L             | <0.00010                | <0.00010               | <0.00010               | <0.00010               |  |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030  | mg/L             | <0.00030                | <0.00030               | <0.00030               | <0.00030               |  |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010 | mg/L             | 0.00150                 | <0.000010              | 0.00151                | <0.000010              |  |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050  | mg/L             | <0.00050                | <0.00050               | <0.00050               | <0.00050               |  |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010   | mg/L             | 0.0012                  | <0.0010                | 0.0013                 | <0.0010                |  |
| dissolved mercury filtration location |            | EP509  | -        | -                | Field                   | Field                  | Field                  | Field                  |  |
| dissolved metals filtration location  |            | EP421  | -        | -                | Field                   | Field                  | Field                  | Field                  |  |

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



## QUALITY CONTROL INTERPRETIVE REPORT

Work Order : CG2208042 Page : 1 of 21

Client : Teck Coal Limited Laboratory : Calgary - Environmental
Contact : Nicole Zathey Account Manager : Lyudmyla Shvets

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 Project
 : LINE CREEK OPERATION
 Date Samples Received
 : 23-Jun-2022 09:30

Project : LINE CREEK OPERATION Date Samples Received : 23-Jun-2022 09:30
PO : VPO00816101 Issue Date : 07-Jul-2022 17:10

C-O-C number : LCO\_Dry Creek LAEMP\_ALS

Sampler : ROBIN VALLEAU

Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 4
No. of samples analysed : 4

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

#### Key

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

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

**DQO: Data Quality Objective.** 

LOR: Limit of Reporting (detection limit).

**RPD: Relative Percent Difference.** 

#### Workorder Comments

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

## **Summary of Outliers**

## **Outliers: Quality Control Samples**

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

## Outliers: Reference Material (RM) Samples

• No Reference Material (RM) Sample outliers occur.

## **Outliers : Analysis Holding Time Compliance (Breaches)**

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

## **Outliers: Frequency of Quality Control Samples**

• No Quality Control Sample Frequency Outliers occur.



Page : 3 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **Analysis Holding Time Compliance**

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

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

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

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

| Matrix: Water   |           |               |             |               | Ev        | /aluation: ≭ = | Holding time exce | edance ; 🗸 | = Within | Holding Time |
|---|-----------|---------------|-------------|---------------|-----------|----------------|-------------------|------------|----------|--------------|
| Analyte Group   | Method    | Sampling Date | Ext         | raction / Pro | eparation |                |                   | Analys     | is       |              |
| Container / Client Sample ID(s)                           |           |               | Preparation | Holding       | Times     | Eval           | Analysis Date     | Holding    | Times    | Eval         |
|   |           |               | Date        | Rec           | Actual    |                |                   | Rec        | Actual   |              |
| Anions and Nutrients : Ammonia by Fluorescence            |           |               |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                         |           |               |             |               |           |                |                   |            |          |              |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                             | E298      | 21-Jun-2022   | 26-Jun-2022 |               |           |                | 26-Jun-2022       | 28 days    | 5 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence            |           |               |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                         |           |               |             |               |           |                |                   |            |          |              |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                            | E298      | 21-Jun-2022   | 26-Jun-2022 |               |           |                | 26-Jun-2022       | 28 days    | 5 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence            |           |               |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                         |           |               |             |               |           |                |                   |            |          |              |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                             | E298      | 21-Jun-2022   | 26-Jun-2022 |               |           |                | 26-Jun-2022       | 28 days    | 5 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence            |           |               |             |               |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                         |           |               |             |               |           |                |                   |            |          |              |
| LC_RD1_WS_LAEMP_DRY_2022-06_N                             | E298      | 21-Jun-2022   | 26-Jun-2022 |               |           |                | 26-Jun-2022       | 28 days    | 5 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level) |           |               |             |               |           |                |                   |            |          |              |
| HDPE  |           |               |             |               |           |                |                   |            |          | ,            |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                             | E235.Br-L | 21-Jun-2022   |             |               |           |                | 23-Jun-2022       | 28 days    | 2 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level) |           |               |             |               |           |                |                   |            |          |              |
| HDPE  | E005 D. I | 04 1 0000     |             |               |           |                |                   | 00.1       |          | ,            |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                            | E235.Br-L | 21-Jun-2022   |             |               |           |                | 23-Jun-2022       | 28 days    | 2 days   | ✓            |
|   |           |               |             |               |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level) |           |               |             |               |           |                |                   |            |          |              |
| HDPE  | F025 D- I | 04 1 2000     |             |               |           |                | 00 1 0000         | 00 4       | 0 4      | ✓            |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                             | E235.Br-L | 21-Jun-2022   |             |               |           |                | 23-Jun-2022       | 28 days    | ∠ days   | <b>∀</b>     |
|   |           |               |             |               |           |                |                   |            |          |              |

Page : 4 of 21 Work Order : CG2208042

Client : Teck Coal Limited



Project : LINE CREEK OPERATION

| Matrix: Water   |                | -             |                     |                |                   | aluation: × = | Holding time exce |                |                   | Holding <sup>-</sup> |
|---|----------------|---------------|---------------------|----------------|-------------------|---------------|-------------------|----------------|-------------------|----------------------|
| Analyte Group   | Method         | Sampling Date | Ext                 | raction / Pr   | eparation         |               |                   | Analys         |                   |                      |
| Container / Client Sample ID(s)   |                |               | Preparation<br>Date | Holding<br>Rec | g Times<br>Actual | Eval          | Analysis Date     | Holding<br>Rec | g Times<br>Actual | Eval                 |
| nions and Nutrients : Bromide in Water by IC (Low Level)                    |                |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N  | E235.Br-L      | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 28 days        | 2 days            | ✓                    |
| nions and Nutrients : Chloride in Water by IC (Low Level)                   |                |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-06_N  | E235.CI-L      | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 28 days        | 2 days            | ✓                    |
| nions and Nutrients : Chloride in Water by IC (Low Level)                   |                |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E235.CI-L      | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 28 days        | 2 days            | ✓                    |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                  |                |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N  | E235.CI-L      | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 28 days        | 2 days            | ✓                    |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                  |                |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N  | E235.CI-L      | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 28 days        | 2 days            | ✓                    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trac | ce Level 0.001 |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-06_N  | E378-U         | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 3 days         | 2 days            | ✓                    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trac | ce Level 0.001 |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E378-U         | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 3 days         | 2 days            | ✓                    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trad | ce Level 0.001 |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N  | E378-U         | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 3 days         | 2 days            | ✓                    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trad | ce Level 0.001 |               |                     |                |                   |               |                   |                |                   |                      |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N  | E378-U         | 21-Jun-2022   |                     |                |                   |               | 23-Jun-2022       | 3 days         | 2 days            | ✓                    |

 Page
 : 5 of 21

 Work Order
 : CG2208042





| nalyte Group   | Method     | Sampling Date | Ev                | traction / Pr | enaration         |      |               | Analys  | is                |          |
|--|------------|---------------|-------------------|---------------|-------------------|------|---------------|---------|-------------------|----------|
| Container / Client Sample ID(s)                          | Method     | Sampling Date | Preparation  Date |               | g Times<br>Actual | Eval | Analysis Date |         | g Times<br>Actual | Eval     |
| nions and Nutrients : Fluoride in Water by IC            |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_CC1_WS_LAEMP_DRY_2022-06_N                    | E235.F     | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 28 days | 2 days            | <b>✓</b> |
| nions and Nutrients : Fluoride in Water by IC            |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N                      | E235.F     | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 28 days | 2 days            | ✓        |
| nions and Nutrients : Fluoride in Water by IC            |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_MT1_WS_LAEMP_DRY_2022-06_N                    | E235.F     | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 28 days | 2 days            | 4        |
| nions and Nutrients : Fluoride in Water by IC            |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_RD1_WS_LAEMP_DRY_2022-06_N                    | E235.F     | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 28 days | 2 days            | ~        |
| nions and Nutrients : Nitrate in Water by IC (Low Level) |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_FRUS_WS_LAEMP_DRY_2022-06_N                   | E235.NO3-L | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 3 days  | 2 days            | 1        |
| nions and Nutrients : Nitrate in Water by IC (Low Level) |            |               |                   |               |                   |      | <u> </u>      |         |                   |          |
| HDPE<br>LC_MT1_WS_LAEMP_DRY_2022-06_N                    | E235.NO3-L | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 3 days  | 2 days            | ✓        |
| nions and Nutrients : Nitrate in Water by IC (Low Level) |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_RD1_WS_LAEMP_DRY_2022-06_N                    | E235.NO3-L | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 3 days  | 2 days            | ✓        |
| nions and Nutrients : Nitrate in Water by IC (Low Level) |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_CC1_WS_LAEMP_DRY_2022-06_N                    | E235.NO3-L | 21-Jun-2022   |                   |               |                   |      | 26-Jun-2022   | 3 days  | 5 days            | #<br>EHT |
| nions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                   |               |                   |      |               |         |                   |          |
| HDPE<br>LC_CC1_WS_LAEMP_DRY_2022-06_N                    | E235.NO2-L | 21-Jun-2022   |                   |               |                   |      | 23-Jun-2022   | 3 days  | 2 days            | ✓        |

 Page
 : 6 of 21

 Work Order
 : CG2208042





| Analyte Group  | Method     | Sampling Date | Fxt         | raction / Pr | eparation |      |                | Analys                      | is     |          |
|--|------------|---------------|-------------|--------------|-----------|------|----------------|-----------------------------|--------|----------|
| Container / Client Sample ID(s)  | Wiethod    | Camping Date  | Preparation |              | g Times   | Eval | Analysis Date  | Analysis Date Holding Times |        |          |
|  |            |               | Date        | Rec          | Actual    | 2707 | 7 maryolo Bato | Rec                         | Actual | Eval     |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N  | E235.NO2-L | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 3 days                      | 2 days | ✓        |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N   | E235.NO2-L | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 3 days                      | 2 days | ✓        |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N   | E235.NO2-L | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 3 days                      | 2 days | ✓        |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-06_N   | E235.SO4   | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 28 days                     | 2 days | ✓        |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N  | E235.SO4   | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 28 days                     | 2 days | ✓        |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N   | E235.SO4   | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 28 days                     | 2 days | <b>✓</b> |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |             |              |           |      |                |                             |        |          |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N   | E235.SO4   | 21-Jun-2022   |             |              |           |      | 23-Jun-2022    | 28 days                     | 2 days | <b>✓</b> |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |            |               |             |              |           |      |                |                             |        |          |
| Amber glass total (sulfuric acid) LC_CC1_WS_LAEMP_DRY_2022-06_N            | E318       | 21-Jun-2022   | 30-Jun-2022 |              |           |      | 30-Jun-2022    | 28 days                     | 9 days | ✓        |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |            |               |             |              |           |      |                |                             |        |          |
| Amber glass total (sulfuric acid) LC_FRUS_WS_LAEMP_DRY_2022-06_N           | E318       | 21-Jun-2022   | 30-Jun-2022 |              |           |      | 30-Jun-2022    | 28 days                     | 9 days | ✓        |

 Page
 : 7 of 21

 Work Order
 : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Matrix: water  |           |               |             |               |           | aluation. * | nolding time exce | cuarioc , | - vvicinii | riolaling rill |
|--|-----------|---------------|-------------|---------------|-----------|-------------|-------------------|-----------|------------|----------------|
| Analyte Group  | Method    | Sampling Date | Ex          | traction / Pr | eparation |             |                   |           |            |                |
| Container / Client Sample ID(s)  |           |               | Preparation | Holding       | g Times   | Eval        | Analysis Date     | Holding   | Times      | Eval           |
|  |           |               | Date        | Rec           | Actual    |             |                   | Rec       | Actual     |                |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E318      | 21-Jun-2022   | 30-Jun-2022 |               |           |             | 30-Jun-2022       | 28 days   | 9 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E318      | 21-Jun-2022   | 30-Jun-2022 |               |           |             | 30-Jun-2022       | 28 days   | 9 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E372-U    | 21-Jun-2022   | 28-Jun-2022 |               |           |             | 28-Jun-2022       | 28 days   | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E372-U    | 21-Jun-2022   | 28-Jun-2022 |               |           |             | 28-Jun-2022       | 28 days   | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E372-U    | 21-Jun-2022   | 28-Jun-2022 |               |           |             | 28-Jun-2022       | 28 days   | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |           |             |                   |           |            |                |
| Amber glass total (sulfuric acid)  |           |               |             |               |           |             |                   |           |            |                |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E372-U    | 21-Jun-2022   | 28-Jun-2022 |               |           |             | 28-Jun-2022       | 28 days   | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   |           |            |                |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |           |             |                   |           |            |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |           |             |                   |           |            |                |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E421.Cr-L | 21-Jun-2022   | 27-Jun-2022 |               |           |             | 28-Jun-2022       | 180       | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   | days      |            |                |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |           |             |                   |           |            |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |           |             |                   |           |            |                |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E421.Cr-L | 21-Jun-2022   | 27-Jun-2022 |               |           |             | 28-Jun-2022       | 180       | 7 days     | ✓              |
|  |           |               |             |               |           |             |                   | days      |            |                |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |           |             |                   |           |            |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |           |             |                   |           |            |                |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E421.Cr-L | 21-Jun-2022   | 27-Jun-2022 |               |           |             | 28-Jun-2022       | 180       | 7 days     | ✓              |
| _  |           |               |             |               |           |             |                   | days      |            |                |

 Page
 : 8 of 21

 Work Order
 : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Matrix: water  |           |               |             |               |            | uluulion. | noiding time exce | oddiioo , | *************************************** | riolaling rill |
|--|-----------|---------------|-------------|---------------|------------|-----------|-------------------|-----------|---|----------------|
| Analyte Group  | Method    | Sampling Date | Ext         | traction / Pi | reparation |           |                   | Analys    | is                                      |                |
| Container / Client Sample ID(s)                                      |           |               | Preparation | Holdin        | g Times    | Eval      | Analysis Date     | Holding   | Times                                   | Eval           |
|  |           |               | Date        | Rec           | Actual     |           |                   | Rec       | Actual                                  |                |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Lev | rel)      |               |             |               |            |           |                   |           |   |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |           |                   |           |   |                |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E421.Cr-L | 21-Jun-2022   | 27-Jun-2022 |               |            |           | 28-Jun-2022       | 180       | 7 days                                  | ✓              |
|  |           |               |             |               |            |           |                   | days      |   |                |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS               |           |               |             |               |            |           |                   |           |   |                |
| Glass vial dissolved (hydrochloric acid)                             |           |               |             |               |            |           |                   |           |   |                |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E509      | 21-Jun-2022   | 30-Jun-2022 |               |            |           | 30-Jun-2022       | 28 days   | 9 days                                  | ✓              |
|  |           |               |             |               |            |           |                   |           |   |                |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS               |           |               |             |               |            |           |                   |           |   |                |
| Glass vial dissolved (hydrochloric acid)                             |           |               |             |               |            |           |                   |           |   |                |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                                       | E509      | 21-Jun-2022   | 30-Jun-2022 |               |            |           | 30-Jun-2022       | 28 days   | 9 days                                  | ✓              |
|  |           |               |             |               |            |           |                   |           |   |                |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS               |           |               |             |               |            |           |                   | -         | 1                                       |                |
| Glass vial dissolved (hydrochloric acid)                             |           |               |             |               |            |           |                   |           |   |                |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E509      | 21-Jun-2022   | 30-Jun-2022 |               |            |           | 30-Jun-2022       | 28 days   | 9 days                                  | ✓              |
|  |           |               |             |               |            |           |                   |           |   |                |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS               |           |               |             |               |            |           |                   |           |   |                |
| Glass vial dissolved (hydrochloric acid)                             |           |               |             |               |            |           |                   |           |   |                |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E509      | 21-Jun-2022   | 30-Jun-2022 |               |            |           | 30-Jun-2022       | 28 days   | 9 days                                  | ✓              |
|  |           |               |             |               |            |           |                   |           |   |                |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS            |           |               |             |               |            |           |                   |           |   |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |           |                   |           |   |                |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E421      | 21-Jun-2022   | 27-Jun-2022 |               |            |           | 28-Jun-2022       | 180       | 7 days                                  | ✓              |
|  |           |               |             |               |            |           |                   | days      |   |                |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS            |           |               |             |               |            |           |                   |           |   |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |           |                   |           |   |                |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                                       | E421      | 21-Jun-2022   | 27-Jun-2022 |               |            |           | 28-Jun-2022       | 180       | 7 days                                  | ✓              |
|  |           |               |             |               |            |           |                   | days      |   |                |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS            |           |               |             |               |            |           |                   |           |   |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |           |                   |           |   |                |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E421      | 21-Jun-2022   | 27-Jun-2022 |               |            |           | 28-Jun-2022       | 180       | 7 days                                  | ✓              |
|  |           |               |             |               |            |           |                   | days      |   |                |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS            |           |               |             |               |            |           |                   |           |   |                |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |           |                   |           |   |                |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E421      | 21-Jun-2022   | 27-Jun-2022 |               |            |           | 28-Jun-2022       | 180       | 7 days                                  | ✓              |
|  |           |               |             |               |            |           |                   | days      |   |                |

 Page
 : 9 of 21

 Work Order
 : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Analyte Group  | Method                | Sampling Date | Ex          | traction / Pr | eparation |      |               |         |         |      |
|--|-----------------------|---------------|-------------|---------------|-----------|------|---------------|---------|---------|------|
| Container / Client Sample ID(s)  |                       |               | Preparation | Holding       | g Times   | Eval | Analysis Date | Holding | Times   | Eval |
|  |                       |               | Date        | Rec           | Actual    |      |               | Rec     | Actual  |      |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve  | I)                    |               |             |               |           |      |               |         |         |      |
| Amber glass dissolved (sulfuric acid) LC_CC1_WS_LAEMP_DRY_2022-06_N            | E358-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
|  |                       |               |             |               |           |      |               |         |         |      |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve  | I)                    |               |             |               |           |      |               |         |         |      |
| Amber glass dissolved (sulfuric acid)  |                       |               |             |               |           |      |               |         |         | ,    |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E358-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve  | I)                    |               |             |               |           |      |               |         |         |      |
| Amber glass dissolved (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E358-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve  | I)                    |               |             |               |           |      |               |         |         |      |
| Amber glass dissolved (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E358-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustio | n (Low Level)         |               |             |               |           |      |               |         |         |      |
| Amber glass total (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E355-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustio | n (Low Level)         |               |             |               |           |      |               |         |         |      |
| Amber glass total (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N   | E355-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustio | n (Low Level)         |               |             |               |           |      |               |         |         |      |
| Amber glass total (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N  | E355-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustio | n (Low L <u>evel)</u> |               |             |               |           |      |               |         |         |      |
| Amber glass total (sulfuric acid)  |                       |               |             |               |           |      |               |         |         |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N  | E355-L                | 21-Jun-2022   | 29-Jun-2022 |               |           |      | 06-Jul-2022   | 28 days | 15 days | ✓    |
| Physical Tests : Acidity by Titration  |                       |               |             |               |           |      |               |         |         |      |
| HDPE   |                       |               |             |               |           |      |               |         |         |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N  | E283                  | 21-Jun-2022   |             |               |           |      | 28-Jun-2022   | 14 days | 7 days  | ✓    |
|  |                       |               |             |               |           |      |               |         |         |      |

Page : 10 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Matrix: Water

| Evaluation: <b>x</b> = Holding time exceedance; ✓ = Within Holding Time |  |
|---|--|
|---|--|

| nalyte Group  Container / Client Sample ID(s)  hysical Tests : Acidity by Titration | Method | Sampling Date | Ext<br>Preparation | traction / Pro<br>Holding |         | Eval               | Analysis Date | Analys<br>Holding |        | Eval |
|---|--------|---------------|--------------------|---------------------------|---------|--------------------|---------------|-------------------|--------|------|
|   |        |               | Preparation        | Holding                   | g Times | Eval               | Analysis Date | Holding           | Times  | Eval |
| hysical Tests : Acidity by Titration  |        | 1 1           |                    | Preparation Holding Times |         | Eval Analysis Date |               | ate Holding Times |        |      |
| hysical Tests : Acidity by Titration  |        | 1             | Date               | Rec                       | Actual  |                    |               | Rec               | Actual |      |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N  | E283   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Acidity by Titration  |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N   | E283   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Acidity by Titration  |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N   | E283   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Alkalinity Species by Titration                                     |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N   | E290   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Alkalinity Species by Titration                                     |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N  | E290   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Alkalinity Species by Titration                                     |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N   | E290   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Alkalinity Species by Titration                                     |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N   | E290   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 14 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Conductivity in Water   |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N   | E100   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 28 days           | 7 days | ✓    |
|   |        |               |                    |                           |         |                    |               |                   |        |      |
| hysical Tests : Conductivity in Water   |        |               |                    |                           |         |                    |               |                   |        |      |
| HDPE  |        |               |                    |                           |         |                    |               |                   |        |      |
| MUFE  |        |               |                    |                           |         |                    |               |                   |        |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N  | E100   | 21-Jun-2022   |                    |                           |         |                    | 28-Jun-2022   | 28 days           | 7 days | ✓    |

Page : 11 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Matrix: water  |        |               |             |               |           | araaro | Holding time exce |         | ********* | r returning r m |
|--|--------|---------------|-------------|---------------|-----------|--------|-------------------|---------|-----------|-----------------|
| Analyte Group  | Method | Sampling Date | Ext         | traction / Pr | eparation |        |                   |         |           |                 |
| Container / Client Sample ID(s)                          |        |               | Preparation | Holding       | g Times   | Eval   | Analysis Date     | Holding | g Times   | Eval            |
|  |        |               | Date        | Rec           | Actual    |        |                   | Rec     | Actual    |                 |
| Physical Tests : Conductivity in Water                   |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                            | E100   | 21-Jun-2022   |             |               |           |        | 28-Jun-2022       | 28 days | 7 days    | ✓               |
|  |        |               |             |               |           |        |                   |         |           |                 |
| Physical Tests : Conductivity in Water                   |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   | T       |           |                 |
| LC RD1 WS LAEMP DRY 2022-06 N                            | E100   | 21-Jun-2022   |             |               |           |        | 28-Jun-2022       | 28 days | 7 days    | <b>✓</b>        |
| EO_101_WO_D/CIVII _DIVI _2022-00_W                       | 2.00   | 2 : 54 2522   |             |               |           |        | 20 ddii 2022      | 20 dayo | , dayo    |                 |
|  |        |               |             |               |           |        |                   |         |           |                 |
| Physical Tests : ORP by Electrode                        |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   | E40E   | 24 Jun 2022   |             |               |           |        | 04 11 2022        | 0.05    | 212 bro   | *               |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                            | E125   | 21-Jun-2022   |             |               |           |        | 04-Jul-2022       | 0.25    | 313 hrs   |                 |
|  |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
| Physical Tests : ORP by Electrode                        |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                           | E125   | 21-Jun-2022   |             |               |           |        | 04-Jul-2022       | 0.25    | 313 hrs   | *               |
|  |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
| Physical Tests : ORP by Electrode                        |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                            | E125   | 21-Jun-2022   |             |               |           |        | 04-Jul-2022       | 0.25    | 313 hrs   | *               |
|  |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
| Physical Tests : ORP by Electrode                        |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
| LC_RD1_WS_LAEMP_DRY_2022-06_N                            | E125   | 21-Jun-2022   |             |               |           |        | 04-Jul-2022       | 0.25    | 313 hrs   | <b>x</b>        |
| 20 <sup>7</sup> .70.71.027.72.11.72.72.00 <sup>7</sup> . |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
|  |        |               |             |               |           |        |                   | 10      |           |                 |
| Physical Tests : pH by Meter                             |        |               |             |               |           |        |                   |         | I         |                 |
| HDPE   | E400   | 24 Jun 2022   |             |               |           |        | 00 1 0000         | 0.05    | 405 5     | ×               |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                            | E108   | 21-Jun-2022   |             |               |           |        | 28-Jun-2022       | 0.25    | 165 hrs   |                 |
|  |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
| Physical Tests : pH by Meter                             |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                           | E108   | 21-Jun-2022   |             |               |           |        | 28-Jun-2022       | 0.25    | 165 hrs   | *               |
|  |        |               |             |               |           |        |                   | hrs     |           | EHTR-FM         |
| Physical Tests : pH by Meter                             |        |               |             |               |           |        |                   |         |           |                 |
| HDPE   |        |               |             |               |           |        |                   |         |           |                 |
|  | E400   | 04 1 0000     |             |               |           |        | 28-Jun-2022       | 0.05    | 16E bro   | 3c              |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                            | E108   | 21-Jun-2022   |             |               |           |        | 28-Jun-2022       | 0.25    | 165 hrs   |                 |

Page : 12 of 21
Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| Analyte Group                                  | Method | Sampling Date | Ext         | raction / Pre | paration |      | Analysis      |             |         |              |
|--|--------|---------------|-------------|---------------|----------|------|---------------|-------------|---------|--------------|
| Container / Client Sample ID(s)                |        |               | Preparation | Holding       | Times    | Eval | Analysis Date | Holding     | g Times | Eval         |
|  |        |               | Date        | Rec           | Actual   |      |               | Rec         | Actual  |              |
| Physical Tests : pH by Meter                   |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N             | E108   | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 0.25<br>hrs | 165 hrs | *<br>EHTR-FM |
| Physical Tests : TDS by Gravimetry             |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-06_N             | E162   | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TDS by Gravimetry             |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N            | E162   | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TDS by Gravimetry             |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N             | E162   | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TDS by Gravimetry             |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N             | E162   | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-06_N             | E160-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | <b>✓</b>     |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-06_N            | E160-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-06_N             | E160-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |               |          |      |               |             |         |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-06_N             | E160-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 7 days      | 7 days  | <b>√</b>     |

Page : 13 of 21
Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| viainx: water   |           |               |             |               | Analysis |      |               |         |        |      |
|---|-----------|---------------|-------------|---------------|----------|------|---------------|---------|--------|------|
| Analyte Group   | Method    | Sampling Date |             | traction / Pr | •        |      |               |         |        |      |
| Container / Client Sample ID(s)                                 |           |               | Preparation |               | g Times  | Eval | Analysis Date |         | Times  | Eval |
|   |           |               | Date        | Rec           | Actual   |      |               | Rec     | Actual |      |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |          |      |               |         |        |      |
| HDPE  |           |               |             |               |          |      |               |         |        |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                                   | E121      | 21-Jun-2022   |             |               |          |      | 23-Jun-2022   | 3 days  | 2 days | ✓    |
|   |           |               |             |               |          |      |               |         |        |      |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |          |      |               |         |        |      |
| HDPE  |           |               |             |               |          |      |               |         |        |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                                  | E121      | 21-Jun-2022   |             |               |          |      | 23-Jun-2022   | 3 days  | 2 days | ✓    |
|   |           |               |             |               |          |      |               |         |        |      |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |          |      |               |         |        |      |
| HDPE  |           |               |             |               |          |      |               |         |        |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                                   | E121      | 21-Jun-2022   |             |               |          |      | 23-Jun-2022   | 3 days  | 2 days | ✓    |
|   |           |               |             |               |          |      |               |         |        |      |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |          |      |               |         |        |      |
| HDPE  |           |               |             |               |          |      |               |         |        |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N                                   | E121      | 21-Jun-2022   |             |               |          |      | 23-Jun-2022   | 3 days  | 2 days | ✓    |
|   |           |               |             |               |          |      |               |         |        |      |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |          |      |               |         |        |      |
| HDPE total (nitric acid)  |           |               |             |               |          |      |               |         |        |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                                   | E420.Cr-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 180     | 7 days | ✓    |
|   |           |               |             |               |          |      |               | days    |        |      |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |          |      |               |         |        |      |
| HDPE total (nitric acid)  |           |               |             |               |          |      |               |         |        |      |
| LC_FRUS_WS_LAEMP_DRY_2022-06_N                                  | E420.Cr-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 180     | 7 days | ✓    |
|   |           |               |             |               |          |      |               | days    |        |      |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |          |      |               |         |        |      |
| HDPE total (nitric acid)  |           |               |             |               |          |      |               |         |        |      |
| LC_MT1_WS_LAEMP_DRY_2022-06_N                                   | E420.Cr-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 180     | 7 days | ✓    |
|   |           |               |             |               |          |      |               | days    | -      |      |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |          |      |               |         |        |      |
| HDPE total (nitric acid)  |           |               |             |               |          |      |               |         |        |      |
| LC_RD1_WS_LAEMP_DRY_2022-06_N                                   | E420.Cr-L | 21-Jun-2022   |             |               |          |      | 28-Jun-2022   | 180     | 7 days | ✓    |
|   |           |               |             |               |          |      |               | days    | ,      |      |
| Total Metals : Total Mercury in Water by CVAAS                  |           |               |             |               |          |      |               | ,       |        |      |
| Glass vial total (hydrochloric acid)                            |           |               |             |               |          |      |               |         |        |      |
| LC_CC1_WS_LAEMP_DRY_2022-06_N                                   | E508      | 21-Jun-2022   |             |               |          |      | 30-Jun-2022   | 28 days | 9 davs | ✓    |
| ==_= :_···=_= :=···· _=···· _=···-= vv_!                        |           |               |             |               |          |      |               |         | ,-     |      |

Page : 14 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

| natrix: water  |        |               |             |               |           | valuation. ^ - | Holding time exce | euance,       | - vvitiiiii | Holding |
|--|--------|---------------|-------------|---------------|-----------|----------------|-------------------|---------------|-------------|---------|
| Analyte Group  | Method | Sampling Date | Ex          | traction / Pr | eparation |                |                   | Analys        | is          |         |
| Container / Client Sample ID(s)                                      |        |               | Preparation | Holding       | g Times   | Eval           | Analysis Date     | Holding Times |             | Eva     |
|  |        |               | Date        | Rec           | Actual    |                |                   | Rec           | Actual      |         |
| otal Metals : Total Mercury in Water by CVAAS                        |        |               |             |               |           |                |                   |               |             |         |
| Glass vial total (hydrochloric acid)  LC_FRUS_WS_LAEMP_DRY_2022-06_N | E508   | 21-Jun-2022   |             |               |           |                | 30-Jun-2022       | 28 days       | 9 days      | ✓       |
| Fotal Metals : Total Mercury in Water by CVAAS                       |        |               |             |               |           |                |                   |               |             |         |
| Glass vial total (hydrochloric acid)  LC_MT1_WS_LAEMP_DRY_2022-06_N  | E508   | 21-Jun-2022   |             |               |           |                | 30-Jun-2022       | 28 days       | 9 days      | ✓       |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |             |               |           |                |                   |               |             |         |
| Glass vial total (hydrochloric acid) LC_RD1_WS_LAEMP_DRY_2022-06_N   | E508   | 21-Jun-2022   |             |               |           |                | 30-Jun-2022       | 28 days       | 9 days      | ✓       |
| Total Metals : Total Metals in Water by CRC ICPMS                    |        |               |             |               |           |                |                   |               |             |         |
| HDPE total (nitric acid) LC_CC1_WS_LAEMP_DRY_2022-06_N               | E420   | 21-Jun-2022   |             |               |           |                | 28-Jun-2022       | 180<br>days   | 7 days      | ✓       |
| otal Metals : Total Metals in Water by CRC ICPMS                     |        |               |             |               |           |                |                   |               | 1           |         |
| HDPE total (nitric acid)  LC_FRUS_WS_LAEMP_DRY_2022-06_N             | E420   | 21-Jun-2022   |             |               |           |                | 28-Jun-2022       | 180<br>days   | 7 days      | ✓       |
| otal Metals : Total Metals in Water by CRC ICPMS                     |        |               |             |               |           |                |                   |               |             |         |
| HDPE total (nitric acid) LC_MT1_WS_LAEMP_DRY_2022-06_N               | E420   | 21-Jun-2022   |             |               |           |                | 28-Jun-2022       | 180<br>days   | 7 days      | ✓       |
| otal Metals : Total Metals in Water by CRC ICPMS                     |        |               |             |               |           |                |                   |               |             |         |
| HDPE total (nitric acid)  LC_RD1_WS_LAEMP_DRY_2022-06_N              | E420   | 21-Jun-2022   |             |               |           |                | 28-Jun-2022       | 180<br>days   | 7 days      | ✓       |

### Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Page : 15 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **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.

| Quality Control Sample Type   |            |          | Co | ount    |        | Frequency (%) | )          |
|---|------------|----------|----|---------|--------|---------------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected      | Evaluation |
| Laboratory Duplicates (DUP)   |            |          |    |         |        |               |            |
| Acidity by Titration  | E283       | 541834   | 1  | 19      | 5.2    | 5.0           | 1          |
| Alkalinity Species by Titration   | E290       | 541448   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Ammonia by Fluorescence   | E298       | 539290   | 2  | 40      | 5.0    | 5.0           | 1          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 536408   | 1  | 9       | 11.1   | 5.0           | ✓          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 536409   | 1  | 9       | 11.1   | 5.0           | 1          |
| Conductivity in Water   | E100       | 541447   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 539105   | 1  | 20      | 5.0    | 5.0           | 1          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 544103   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 539104   | 2  | 20      | 10.0   | 5.0           | ✓          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 543248   | 1  | 18      | 5.5    | 5.0           | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 536138   | 1  | 8       | 12.5   | 5.0           | ✓          |
| Fluoride in Water by IC   | E235.F     | 536407   | 1  | 9       | 11.1   | 5.0           | 1          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 536410   | 1  | 9       | 11.1   | 5.0           | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 536411   | 1  | 9       | 11.1   | 5.0           | ✓          |
| ORP by Electrode  | E125       | 546132   | 1  | 20      | 5.0    | 5.0           | ✓          |
| pH by Meter   | E108       | 541446   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Sulfate in Water by IC  | E235.SO4   | 536412   | 1  | 9       | 11.1   | 5.0           | 1          |
| TDS by Gravimetry   | E162       | 540104   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 539402   | 1  | 19      | 5.2    | 5.0           | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 543342   | 2  | 32      | 6.2    | 5.0           | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 544092   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 539401   | 1  | 19      | 5.2    | 5.0           | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 543249   | 1  | 12      | 8.3    | 5.0           | ✓          |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 536291   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Turbidity by Nephelometry   | E121       | 536333   | 1  | 15      | 6.6    | 5.0           | ✓          |
| Laboratory Control Samples (LCS)  |            |          |    |         |        |               |            |
| Acidity by Titration  | E283       | 541834   | 1  | 19      | 5.2    | 5.0           | 1          |
| Alkalinity Species by Titration   | E290       | 541448   | 1  | 20      | 5.0    | 5.0           | 1          |
| Ammonia by Fluorescence   | E298       | 539290   | 2  | 40      | 5.0    | 5.0           | 1          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 536408   | 1  | 9       | 11.1   | 5.0           | 1          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 536409   | 1  | 9       | 11.1   | 5.0           | <b>√</b>   |
| Conductivity in Water   | E100       | 541447   | 1  | 20      | 5.0    | 5.0           | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 539105   | 1  | 20      | 5.0    | 5.0           | <b>√</b>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 544103   | 1  | 20      | 5.0    | 5.0           | 1          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 539104   | 1  | 20      | 5.0    | 5.0           | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 543248   | 1  | 18      | 5.5    | 5.0           | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 536138   | 1  | 8       | 12.5   | 5.0           | 1          |

Page : 16 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

| Quality Control Sample Type   |            |          | Co | ount    |        |          |            |
|---|------------|----------|----|---------|--------|----------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected | Evaluation |
| Laboratory Control Samples (LCS) - Continued                            |            |          |    |         |        |          |            |
| Fluoride in Water by IC   | E235.F     | 536407   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 536410   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 536411   | 1  | 9       | 11.1   | 5.0      | ✓          |
| ORP by Electrode  | E125       | 546132   | 1  | 20      | 5.0    | 5.0      | ✓          |
| pH by Meter   | E108       | 541446   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Sulfate in Water by IC  | E235.SO4   | 536412   | 1  | 9       | 11.1   | 5.0      | ✓          |
| TDS by Gravimetry   | E162       | 540104   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 539402   | 1  | 19      | 5.2    | 5.0      | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 543342   | 2  | 32      | 6.2    | 5.0      | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 544092   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 539401   | 1  | 19      | 5.2    | 5.0      | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 543249   | 1  | 12      | 8.3    | 5.0      | ✓          |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 536291   | 1  | 20      | 5.0    | 5.0      | ✓          |
| TSS by Gravimetry (Low Level)   | E160-L     | 540097   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Turbidity by Nephelometry   | E121       | 536333   | 1  | 15      | 6.6    | 5.0      | ✓          |
| Method Blanks (MB)  |            |          |    |         |        |          |            |
| Acidity by Titration  | E283       | 541834   | 1  | 19      | 5.2    | 5.0      | ✓          |
| Alkalinity Species by Titration   | E290       | 541448   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Ammonia by Fluorescence   | E298       | 539290   | 2  | 40      | 5.0    | 5.0      | ✓          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 536408   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 536409   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Conductivity in Water   | E100       | 541447   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 539105   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 544103   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 539104   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 543248   | 1  | 18      | 5.5    | 5.0      | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 536138   | 1  | 8       | 12.5   | 5.0      | ✓          |
| Fluoride in Water by IC   | E235.F     | 536407   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 536410   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 536411   | 1  | 9       | 11.1   | 5.0      | ✓          |
| Sulfate in Water by IC  | E235.SO4   | 536412   | 1  | 9       | 11.1   | 5.0      | ✓          |
| TDS by Gravimetry   | E162       | 540104   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 539402   | 1  | 19      | 5.2    | 5.0      | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 543342   | 2  | 32      | 6.2    | 5.0      | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 544092   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 539401   | 1  | 19      | 5.2    | 5.0      | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 543249   | 1  | 12      | 8.3    | 5.0      | ✓          |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 536291   | 1  | 20      | 5.0    | 5.0      | ✓          |
| TSS by Gravimetry (Low Level)   | E160-L     | 540097   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Turbidity by Nephelometry   | E121       | 536333   | 1  | 15      | 6.6    | 5.0      | ✓          |

Page : 17 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

|   |            |          | 40 | orres caronae epo | - Qo noquency main epocined |          |            |  |
|---|------------|----------|----|-------------------|-----------------------------|----------|------------|--|
| Quality Control Sample Type   |            |          | Co | ount              |                             |          |            |  |
| Analytical Methods  | Method     | QC Lot # | QC | Regular           | Actual                      | Expected | Evaluation |  |
| Matrix Spikes (MS)  |            |          |    |                   |                             |          |            |  |
| Ammonia by Fluorescence   | E298       | 539290   | 2  | 40                | 5.0                         | 5.0      | ✓          |  |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 536408   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 536409   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 539105   | 1  | 20                | 5.0                         | 5.0      | ✓          |  |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 544103   | 1  | 20                | 5.0                         | 5.0      | ✓          |  |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 539104   | 1  | 20                | 5.0                         | 5.0      | ✓          |  |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 543248   | 1  | 18                | 5.5                         | 5.0      | ✓          |  |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 536138   | 1  | 8                 | 12.5                        | 5.0      | ✓          |  |
| Fluoride in Water by IC   | E235.F     | 536407   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 536410   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 536411   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Sulfate in Water by IC  | E235.SO4   | 536412   | 1  | 9                 | 11.1                        | 5.0      | ✓          |  |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 539402   | 1  | 19                | 5.2                         | 5.0      | ✓          |  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 543342   | 2  | 32                | 6.2                         | 5.0      | ✓          |  |
| Total Mercury in Water by CVAAS   | E508       | 544092   | 1  | 20                | 5.0                         | 5.0      | ✓          |  |
| Total Metals in Water by CRC ICPMS                                      | E420       | 539401   | 1  | 19                | 5.2                         | 5.0      | ✓          |  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 543249   | 1  | 12                | 8.3                         | 5.0      | ✓          |  |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 536291   | 1  | 20                | 5.0                         | 5.0      | ✓          |  |
|   |            |          |    | _                 |                             |          |            |  |

Page : 18 of 21 Work Order : CG2208042

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



# **Methodology References and Summaries**

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

| Analytical Methods                     | Method / Lab              | Matrix | Method Reference  | Method Descriptions   |
|--|---------------------------|--------|-------------------|---|
| Conductivity in Water                  | E100                      | Water  | APHA 2510 (mod)   | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water |
|  | Calgary - Environmental   |        |                   | sample. Conductivity measurements are temperature-compensated to 25°C.  |
| pH by Meter                            | E108                      | Water  | APHA 4500-H (mod) | pH is determined by potentiometric measurement with a pH electrode, and is conducted  |
|  | Calgary - Environmental   |        |                   | at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results,  |
| Trushidita ha Nasahalasa 4m.           | 0 7                       | \A/-4  | A DUI A 0400 D () | pH should be measured in the field within the recommended 15 minute hold time.  |
| Turbidity by Nephelometry              | E121                      | Water  | APHA 2130 B (mod) | Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.  |
|  | Calgary - Environmental   |        |                   | scatter under defined conditions.   |
| ORP by Electrode                       | E125                      | Water  | ASTM D1498 (mod)  | Oxidation redution potential is reported as the oxidation-reduction potential of the  |
|  |                           |        |                   | platinum metal-reference electrode employed, measured in mV. For high accuracy test   |
|  | Calgary - Environmental   |        |                   | results, it is recommended that this analysis be conducted in the field.  |
| TSS by Gravimetry (Low Level)          | E160-L                    | Water  | APHA 2540 D (mod) | Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre   |
|  |                           |        |                   | filter, following by drying of the filter at $104 \pm 1^{\circ}$ C, with gravimetric measurement of the   |
|  | Calgary - Environmental   |        |                   | filtered solids. Samples containing very high dissolved solid content (i.e. seawaters,  |
|  |                           |        |                   | brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.                                       |
| TDS by Gravimetry                      | E162                      | Water  | APHA 2540 C (mod) | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre   |
|  | 2102                      |        | ,                 | filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight,   |
|  | Calgary - Environmental   |        |                   | with gravimetric measurement of the residue.  |
| Bromide in Water by IC (Low Level)     | E235.Br-L                 | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  | Colorani. Faringana antal |        |                   | detection.  |
| Chlorida in Water by IC (Levy Leval)   | Calgary - Environmental   | Water  | EDA 200.1 (mad)   |   |
| Chloride in Water by IC (Low Level)    | E235.CI-L                 | water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.  |
|  | Calgary - Environmental   |        |                   | detection.  |
| Fluoride in Water by IC                | E235.F                    | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  |                           |        |                   | detection.  |
|  | Calgary - Environmental   |        |                   |   |
| Nitrite in Water by IC (Low Level)     | E235.NO2-L                | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  | Calgary - Environmental   |        |                   | detection.  |
| Nitrate in Water by IC (Low Level)     | E235.NO3-L                | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
| I with a te in water by 10 (Low Level) | E235.NO3-L                | vvater | Li A 300.1 (mod)  | detection.  |
|  | Calgary - Environmental   |        |                   | detection.  |
| Sulfate in Water by IC                 | E235.SO4                  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  |                           |        |                   | detection.  |
|  | Calgary - Environmental   |        |                   |   |
| Acidity by Titration                   | E283                      | Water  | APHA 2310 B (mod) | Acidity is determined by potentiometric titration to pH endpoint of 8.3   |
|  | Calgary - Environmental   |        |                   |   |
|  | Jaigary - Environmental   |        |                   |   |

Page : 19 of 21 Work Order : CG2208042

Client : Teck Coal Limited



| Analytical Methods   | Method / Lab                          | Matrix | Method Reference              | Method Descriptions   |
|--|---------------------------------------|--------|-------------------------------|---|
| Alkalinity Species by Titration  | E290 Calgary - Environmental          | Water  | APHA 2320 B (mod)             | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.  |
| Ammonia by Fluorescence  | E298 Calgary - Environmental          | Water  | Method Fialab 100,<br>2018    | Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                        | E318  Calgary - Environmental         | Water  | Method Fialab 100,<br>2018    | TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)             | E355-L Calgary - Environmental        | Water  | APHA 5310 B (mod)             | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).                                       |
| Dissolved Organic Carbon by Combustion (Low Level)                         | E358-L Calgary - Environmental        | Water  | APHA 5310 B (mod)             | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC). |
| Total Phosphorus by Colourimetry (0.002 mg/L)                              | E372-U  Calgary - Environmental       | Water  | APHA 4500-P E (mod).          | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.   |
| Dissolved Orthophosphate by Colourimetry<br>(Ultra Trace Level 0.001 mg/L) | E378-U  Calgary - Environmental       | Water  | APHA 4500-P F (mod)           | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.   |
| Total Metals in Water by CRC ICPMS   | E420<br>Vancouver -<br>Environmental  | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Total Chromium in Water by CRC ICPMS (Low Level)                           | E420.Cr-L  Vancouver -  Environmental | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.   |
| Dissolved Metals in Water by CRC ICPMS                                     | E421<br>Vancouver -<br>Environmental  | Water  | APHA 3030B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.  |

Page : 20 of 21
Work Order : CG2208042

Client : Teck Coal Limited



| Analytical Methods                                      | Method / Lab                          | Matrix | Method Reference              | Method Descriptions  |
|---|---------------------------------------|--------|-------------------------------|--|
| Dissolved Chromium in Water by CRC ICPMS                | E421.Cr-L                             | Water  | APHA 3030 B/EPA               | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by  |
| (Low Level)   | .,                                    |        | 6020B (mod)                   | Collision/Reaction Cell ICPMS  |
|   | Vancouver -<br>Environmental          |        |                               |  |
| Total Mercury in Water by CVAAS                         | E508                                  | Water  | EPA 1631E (mod)               | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS   |
|   | Vancouver -<br>Environmental          |        |                               |  |
| Dissolved Mercury in Water by CVAAS                     | E509<br>Vancouver -<br>Environmental  | Water  | APHA 3030B/EPA<br>1631E (mod) | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.   |
| Dissolved Hardness (Calculated)                         | EC100<br>Vancouver -<br>Environmental | Water  | APHA 2340B                    | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. |
| Ion Balance using Dissolved Metals                      | EC101 Calgary - Environmental         | Water  | APHA 1030E                    | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).   |
| Preparation Methods                                     | Method / Lab                          | Matrix | Method Reference              | Method Descriptions  |
| Preparation for Ammonia                                 | EP298                                 | Water  |                               | Sample preparation for Preserved Nutrients Water Quality Analysis.   |
|   | Calgary - Environmental               |        |                               |  |
| Digestion for TKN in water                              | EP318  Calgary - Environmental        | Water  | APHA 4500-Norg D<br>(mod)     | Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.                                  |
| Preparation for Total Organic Carbon by Combustion      | EP355  Calgary - Environmental        | Water  |                               | Preparation for Total Organic Carbon by Combustion   |
| Preparation for Dissolved Organic Carbon for Combustion | EP358  Calgary - Environmental        | Water  | APHA 5310 B (mod)             | Preparation for Dissolved Organic Carbon   |
| Digestion for Total Phosphorus in water                 | EP372  Calgary - Environmental        | Water  | APHA 4500-P E (mod).          | Samples are heated with a persulfate digestion reagent.  |
| Dissolved Metals Water Filtration                       | EP421                                 | Water  | APHA 3030B                    | Water samples are filtered (0.45 um), and preserved with HNO3.   |
| 2.552.753 Models Fields Findalish                       | Vancouver -                           | , ac   |                               |  |
|   | Environmental                         |        |                               |  |

Page : 21 of 21 Work Order : CG2208042

Client : Teck Coal Limited



| Preparation Methods                | Method / Lab  | Matrix | Method Reference | Method Descriptions   |
|------------------------------------|---------------|--------|------------------|---|
| Dissolved Mercury Water Filtration | EP509         | Water  | APHA 3030B       | Water samples are filtered (0.45 um), and preserved with HCl. |
|                                    | Vancouver -   |        |                  |   |
|                                    | Environmental |        |                  |   |



# **QUALITY CONTROL REPORT**

Work Order : CG2208042

Client : Teck Coal Limited
Contact : Nicole Zathey

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Project : LINE CREEK OPERATION

PO : VPO00816101

C-O-C number : LCO\_Dry Creek LAEMP\_ALS

Sampler : ROBIN VALLEAU

Site :--

Quote number : Teck Coal Master Quote

No. of samples received : 4
No. of samples analysed : 4

Page : 1 of 18

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary, Alberta Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 23-Jun-2022 09:30

Date Analysis Commenced : 23-Jun-2022

Laboratory Department

Issue Date : 07-Jul-2022 17:10

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 Percent Difference (RPD) and Data Quality Objectives

Position

- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

#### Signatories

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.

| Signaturies      | FOSITION                                | Laboratory Department                       |
|------------------|---|---|
| Angela Ren       | Team Leader - Metals                    | Vancouver Metals, Burnaby, British Columbia |
| Ann Joby         | Lab Assistant                           | Vancouver Metals, Burnaby, British Columbia |
| Anthony Calero   | Team Leader - Inorganics                | Calgary Inorganics, Calgary, Alberta        |
| Benjamin Oke     | Lab Assistant                           | Vancouver Metals, Burnaby, British Columbia |
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| Harpreet Chawla  | Team Leader - Inorganics                | Calgary Inorganics, Calgary, Alberta        |
| Kevin Duarte     | Supervisor - Metals ICP Instrumentation | Vancouver Metals, Burnaby, British Columbia |
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| Parker Sgarbossa | Laboratory Analyst                      | Calgary Inorganics, Calgary, Alberta        |
| Ruifang Zheng    | Analyst                                 | Calgary Inorganics, Calgary, Alberta        |
| Sara Niroomand   |   | Calgary Inorganics, Calgary, Alberta        |
| Shirley Li       |   | Calgary Inorganics, Calgary, Alberta        |
| Woochan Song     | Lab Analyst                             | Vancouver Metals, Burnaby, British Columbia |
|                  |   |   |

 Page
 : 2 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



### **General Comments**

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

Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

### **Workorder Comments**

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

 Page
 : 3 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION



## Laboratory Duplicate (DUP) Report

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

| Sub-Matrix: Water  |                                    |                                     | Laboratory Duplicate (DUP) Report |            |        |          |                    |                     |                         |                     |           |
|--|------------------------------------|-------------------------------------|-----------------------------------|------------|--------|----------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID   | Client sample ID                   | Analyte                             | CAS Number                        | Method     | LOR    | Unit     | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Physical Tests (QC   | Lot: 536333)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2207929-002  | Anonymous                          | turbidity                           |                                   | E121       | 0.10   | NTU      | <0.10              | <0.10               | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 540104)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208014-005  | Anonymous                          | solids, total dissolved [TDS]       |                                   | E162       | 40     | mg/L     | 2720               | 2620                | 3.64%                   | 20%                 |           |
| Physical Tests (QC   | Lot: 541446)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208042-001  | LC_FRUS_WS_LAEMP_D<br>RY_2022-06_N | рН                                  |                                   | E108       | 0.10   | pH units | 8.18               | 8.23                | 0.609%                  | 4%                  |           |
| Physical Tests (QC   | Lot: 541447)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208042-001  | LC_FRUS_WS_LAEMP_D<br>RY_2022-06_N | conductivity                        |                                   | E100       | 2.0    | μS/cm    | 487                | 485                 | 0.412%                  | 10%                 |           |
| Physical Tests (QC   | Lot: 541448)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208042-001  | LC_FRUS_WS_LAEMP_D<br>RY_2022-06_N | alkalinity, bicarbonate (as CaCO3)  |                                   | E290       | 1.0    | mg/L     | 153                | 152                 | 0.720%                  | 20%                 |           |
| l  |                                    | alkalinity, carbonate (as CaCO3)    |                                   | E290       | 1.0    | mg/L     | 2.0                | <1.0                | 1.0                     | Diff <2x LOR        |           |
| l  |                                    | alkalinity, hydroxide (as CaCO3)    |                                   | E290       | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |           |
| l  |                                    | alkalinity, total (as CaCO3)        |                                   | E290       | 1.0    | mg/L     | 155                | 152                 | 2.01%                   | 20%                 |           |
| Physical Tests (QC   | Lot: 541834)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208041-006  | Anonymous                          | acidity (as CaCO3)                  |                                   | E283       | 10.0   | mg/L     | 28.8               | 19.9                | 8.9                     | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 546132)                       |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208034-001  | Anonymous                          | oxidation-reduction potential [ORP] |                                   | E125       | 0.10   | mV       | 381                | 386                 | 1.43%                   | 15%                 |           |
| Anions and Nutrien   | ts (QC Lot: 536138)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208040-001  | Anonymous                          | phosphate, ortho-, dissolved (as P) | 14265-44-2                        | E378-U     | 0.0010 | mg/L     | 0.0017             | 0.0017              | 0.00004                 | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 536291)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208041-003  | Anonymous                          | phosphorus, total                   | 7723-14-0                         | E372-U     | 0.0020 | mg/L     | <0.0020            | <0.0020             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 536407)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208023-004  | Anonymous                          | fluoride                            | 16984-48-8                        | E235.F     | 0.400  | mg/L     | <0.400             | <0.400              | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 536408)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208023-004  | Anonymous                          | bromide                             | 24959-67-9                        | E235.Br-L  | 1.00   | mg/L     | <1.00              | <1.00               | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 536409)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208023-004  | Anonymous                          | chloride                            | 16887-00-6                        | E235.CI-L  | 2.00   | mg/L     | 52.0               | 49.9                | 4.03%                   | 20%                 |           |
| Anions and Nutrien   | ts (QC Lot: 536410)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| CG2208023-004  | Anonymous                          | nitrate (as N)                      | 14797-55-8                        | E235.NO3-L | 0.100  | mg/L     | 36.4               | 35.2                | 3.41%                   | 20%                 |           |
| Anions and Nutrien   | ts (QC Lot: 536411)                |                                     |                                   |            |        |          |                    |                     |                         |                     |           |
| THE RESERVE OF THE PARTY OF THE |                                    |                                     |                                   |            |        |          |                    |                     |                         |                     |           |

Page : 4 of 18 Work Order : CG2208042 : Teck Coal Limited Client : LINE CREEK OPERATION Project



Laboratory Duplicate (DUP) Report Sub-Matrix: Water Laboratory sample ID Client sample ID CAS Number Method LOR Unit Qualifier Analyte Original Duplicate RPD(%) or Duplicate

|                     |                                   |                                 |            |          |           |      | Result      | Result    | Difference | Limits       |  |
|---------------------|-----------------------------------|---------------------------------|------------|----------|-----------|------|-------------|-----------|------------|--------------|--|
| Anions and Nutrie   | nts (QC Lot: 536412)              |                                 |            |          |           |      |             |           |            |              |  |
| CG2208023-004       | Anonymous                         | sulfate (as SO4)                | 14808-79-8 | E235.SO4 | 6.00      | mg/L | 1130        | 1090      | 3.35%      | 20%          |  |
| Anions and Nutrie   | nts (QC Lot: 539290)              |                                 |            |          |           |      |             |           |            |              |  |
| CG2207996-001       | Anonymous                         | ammonia, total (as N)           | 7664-41-7  | E298     | 0.125     | mg/L | 2.39        | 2.38      | 0.528%     | 20%          |  |
| Anions and Nutrie   | nts (QC Lot: 539291)              |                                 |            |          |           |      |             |           |            |              |  |
| CG2208042-004       | LC_RD1_WS_LAEMP_DR                | ammonia, total (as N)           | 7664-41-7  | E298     | 0.0050    | mg/L | 0.0074      | 0.0067    | 0.0007     | Diff <2x LOR |  |
|                     | Y_2022-06_N                       |                                 |            |          |           |      |             |           |            |              |  |
|                     | nts (QC Lot: 543342)              | 10.11.11.11                     |            | E040     | 0.050     |      | .0.050      | -0.050    |            | D:# +0 + OD  |  |
| CG2208014-001       | Anonymous                         | Kjeldahl nitrogen, total [TKN]  |            | E318     | 0.050     | mg/L | <0.050      | <0.050    | 0          | Diff <2x LOR |  |
|                     | nts (QC Lot: 543343)              |                                 |            |          |           |      |             |           |            |              |  |
| CG2208042-002       | LC_CC1_WS_LAEMP_DR<br>Y_2022-06_N | Kjeldahl nitrogen, total [TKN]  |            | E318     | 0.050     | mg/L | <0.050      | <0.050    | 0          | Diff <2x LOR |  |
|                     | c Carbon (QC Lot: 54324           | 18)                             |            |          |           |      |             |           |            |              |  |
| CG2208041-001       | Anonymous                         | carbon, dissolved organic [DOC] |            | E358-L   | 0.50      | mg/L | <0.50       | <0.50     | 0          | Diff <2x LOR |  |
| Organic / Inorganic | c Carbon (QC Lot: 54324           | 19)                             |            |          |           |      |             |           |            |              |  |
| CG2208041-001       | Anonymous                         | carbon, total organic [TOC]     |            | E355-L   | 0.50      | mg/L | <0.50       | <0.50     | 0          | Diff <2x LOR |  |
| otal Metals (QC L   | Lot: 539401)                      |                                 |            |          |           |      |             |           |            |              |  |
| CG2208029-002       | Anonymous                         | aluminum, total                 | 7429-90-5  | E420     | 0.0030    | mg/L | 0.0117      | 0.0095    | 0.0022     | Diff <2x LOR |  |
|                     |                                   | antimony, total                 | 7440-36-0  | E420     | 0.00010   | mg/L | 0.00036     | 0.00037   | 0.00001    | Diff <2x LOR |  |
|                     |                                   | arsenic, total                  | 7440-38-2  | E420     | 0.00010   | mg/L | 0.00016     | 0.00016   | 0.0000004  | Diff <2x LOR |  |
|                     |                                   | barium, total                   | 7440-39-3  | E420     | 0.00010   | mg/L | 0.0254      | 0.0258    | 1.26%      | 20%          |  |
|                     |                                   | beryllium, total                | 7440-41-7  | E420     | 0.000020  | mg/L | <0.020 µg/L | <0.000020 | 0          | Diff <2x LOR |  |
|                     |                                   | bismuth, total                  | 7440-69-9  | E420     | 0.000050  | mg/L | <0.000050   | <0.000050 | 0          | Diff <2x LOR |  |
|                     |                                   | boron, total                    | 7440-42-8  | E420     | 0.010     | mg/L | 0.012       | 0.013     | 0.0004     | Diff <2x LOR |  |
|                     |                                   | cadmium, total                  | 7440-43-9  | E420     | 0.0000050 | mg/L | 0.504 μg/L  | 0.000524  | 3.87%      | 20%          |  |
|                     |                                   | calcium, total                  | 7440-70-2  | E420     | 0.050     | mg/L | 73.9        | 76.0      | 2.79%      | 20%          |  |
|                     |                                   | cobalt, total                   | 7440-48-4  | E420     | 0.00010   | mg/L | 0.26 μg/L   | 0.00027   | 0.00001    | Diff <2x LOR |  |
|                     |                                   | copper, total                   | 7440-50-8  | E420     | 0.00050   | mg/L | 0.00075     | 0.00073   | 0.00002    | Diff <2x LOR |  |
|                     |                                   | iron, total                     | 7439-89-6  | E420     | 0.010     | mg/L | 0.013       | 0.013     | 0.0002     | Diff <2x LOR |  |
|                     |                                   | lead, total                     | 7439-92-1  | E420     | 0.000050  | mg/L | <0.000050   | <0.000050 | 0          | Diff <2x LOR |  |
|                     |                                   | lithium, total                  | 7439-93-2  | E420     | 0.0010    | mg/L | 0.0342      | 0.0360    | 5.18%      | 20%          |  |
|                     |                                   | magnesium, total                | 7439-95-4  | E420     | 0.0050    | mg/L | 38.7        | 39.4      | 1.71%      | 20%          |  |
|                     |                                   | manganese, total                | 7439-96-5  | E420     | 0.00010   | mg/L | 0.00222     | 0.00200   | 10.4%      | 20%          |  |
|                     |                                   | molybdenum, total               | 7439-98-7  | E420     | 0.000050  | mg/L | 0.00184     | 0.00188   | 1.70%      | 20%          |  |
|                     |                                   | nickel, total                   | 7440-02-0  | E420     | 0.00050   | mg/L | 0.00993     | 0.00985   | 0.768%     | 20%          |  |
|                     |                                   |                                 |            |          |           | •    |             |           |            | 200/         |  |
|                     |                                   | potassium, total                | 7440-09-7  | E420     | 0.050     | mg/L | 1.37        | 1.38      | 0.568%     | 20%          |  |

 Page
 : 5 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| Sub-Matrix: Water    |                         |                       | Laboratory Duplicate (DUP) Report |           |           |      |                    |                     |                         |                     |          |
|----------------------|-------------------------|-----------------------|-----------------------------------|-----------|-----------|------|--------------------|---------------------|-------------------------|---------------------|----------|
| Laboratory sample ID | Client sample ID        | Analyte               | CAS Number                        | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifie |
| Total Metals (QC Lo  | ot: 539401) - continued |                       |                                   |           |           |      |                    |                     |                         |                     |          |
| CG2208029-002        | Anonymous               | silicon, total        | 7440-21-3                         | E420      | 0.10      | mg/L | 1.84               | 1.82                | 0.832%                  | 20%                 |          |
|                      |                         | silver, total         | 7440-22-4                         | E420      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |          |
|                      |                         | sodium, total         | 7440-23-5                         | E420      | 0.050     | mg/L | 4.78               | 4.69                | 1.82%                   | 20%                 |          |
|                      |                         | strontium, total      | 7440-24-6                         | E420      | 0.00020   | mg/L | 0.139              | 0.138               | 0.681%                  | 20%                 |          |
|                      |                         | sulfur, total         | 7704-34-9                         | E420      | 0.50      | mg/L | 57.9               | 56.8                | 1.83%                   | 20%                 |          |
|                      |                         | thallium, total       | 7440-28-0                         | E420      | 0.000010  | mg/L | 0.000017           | 0.000017            | 0.0000001               | Diff <2x LOR        |          |
|                      |                         | tin, total            | 7440-31-5                         | E420      | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                         | titanium, total       | 7440-32-6                         | E420      | 0.00030   | mg/L | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |          |
|                      |                         | uranium, total        | 7440-61-1                         | E420      | 0.000010  | mg/L | 0.00284            | 0.00287             | 1.08%                   | 20%                 |          |
|                      |                         | vanadium, total       | 7440-62-2                         | E420      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |          |
|                      |                         | zinc, total           | 7440-66-6                         | E420      | 0.0030    | mg/L | 0.0228             | 0.0227              | 0.0001                  | Diff <2x LOR        |          |
| Total Metals (QC L   | ot: 539402)             |                       |                                   |           |           |      |                    |                     |                         |                     |          |
| CG2208029-002        | Anonymous               | chromium, total       | 7440-47-3                         | E420.Cr-L | 0.00010   | mg/L | 0.00012            | 0.00010             | 0.00002                 | Diff <2x LOR        |          |
| Total Metals (QC L   | ot: 544092)             |                       |                                   |           |           |      |                    |                     |                         |                     |          |
| CG2208029-002        | Anonymous               | mercury, total        | 7439-97-6                         | E508      | 0.0000050 | mg/L | <0.0000050         | <0.0000050          | 0                       | Diff <2x LOR        |          |
| Dissolved Metals (   | QC Lot: 539104)         |                       |                                   |           |           |      |                    |                     |                         |                     |          |
| CG2208029-004        | Anonymous               | nickel, dissolved     | 7440-02-0                         | E421      | 0.00050   | mg/L | 0.00154            | 0.00157             | 0.00003                 | Diff <2x LOR        |          |
| CG2208029-004        | Anonymous               | aluminum, dissolved   | 7429-90-5                         | E421      | 0.0010    | mg/L | 0.0024             | 0.0017              | 0.0006                  | Diff <2x LOR        |          |
|                      |                         | antimony, dissolved   | 7440-36-0                         | E421      | 0.00010   | mg/L | 0.00014            | 0.00014             | 0.000002                | Diff <2x LOR        |          |
|                      |                         | arsenic, dissolved    | 7440-38-2                         | E421      | 0.00010   | mg/L | 0.00013            | 0.00011             | 0.00002                 | Diff <2x LOR        |          |
|                      |                         | barium, dissolved     | 7440-39-3                         | E421      | 0.00010   | mg/L | 0.0502             | 0.0513              | 2.20%                   | 20%                 |          |
|                      |                         | beryllium, dissolved  | 7440-41-7                         | E421      | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |          |
|                      |                         | bismuth, dissolved    | 7440-69-9                         | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |
|                      |                         | boron, dissolved      | 7440-42-8                         | E421      | 0.010     | mg/L | <0.010             | <0.010              | 0                       | Diff <2x LOR        |          |
|                      |                         | cadmium, dissolved    | 7440-43-9                         | E421      | 0.0000050 | mg/L | 0.0201 µg/L        | 0.0000216           | 0.0000014               | Diff <2x LOR        |          |
|                      |                         | calcium, dissolved    | 7440-70-2                         | E421      | 0.050     | mg/L | 58.8               | 60.2                | 2.42%                   | 20%                 |          |
|                      |                         | cobalt, dissolved     | 7440-48-4                         | E421      | 0.00010   | mg/L | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                         | copper, dissolved     | 7440-50-8                         | E421      | 0.00020   | mg/L | <0.00020           | <0.00020            | 0                       | Diff <2x LOR        |          |
|                      |                         | iron, dissolved       | 7439-89-6                         | E421      | 0.010     | mg/L | <0.010             | <0.010              | 0                       | Diff <2x LOR        |          |
|                      |                         | lead, dissolved       | 7439-92-1                         | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |
|                      |                         | lithium, dissolved    | 7439-93-2                         | E421      | 0.0010    | mg/L | 0.0161             | 0.0164              | 1.84%                   | 20%                 |          |
|                      |                         | magnesium, dissolved  | 7439-95-4                         | E421      | 0.0050    | mg/L | 23.0               | 23.7                | 3.03%                   | 20%                 |          |
|                      |                         | manganese, dissolved  | 7439-96-5                         | E421      | 0.00010   | mg/L | 0.00084            | 0.00092             | 0.00008                 | Diff <2x LOR        |          |
|                      |                         | · ·                   |                                   |           |           | -    |                    |                     |                         |                     |          |
|                      |                         | molybdenum, dissolved | 7439-98-7                         | E421      | 0.000050  | mg/L | 0.00115            | 0.00114             | 0.749%                  | 20%                 |          |

 Page
 : 6 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| Sub-Matrix: Water    |                       |                      |            |           |           |      | Labora             | tory Duplicate (D   | Laboratory Duplicate (DUP) Report |                     |           |  |  |  |  |
|----------------------|-----------------------|----------------------|------------|-----------|-----------|------|--------------------|---------------------|-----------------------------------|---------------------|-----------|--|--|--|--|
| Laboratory sample ID | Client sample ID      | Analyte              | CAS Number | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference           | Duplicate<br>Limits | Qualifier |  |  |  |  |
| Dissolved Metals (   | QC Lot: 539104) - cor | ntinued              |            |           |           |      |                    |                     |                                   |                     |           |  |  |  |  |
| CG2208029-004        | Anonymous             | selenium, dissolved  | 7782-49-2  | E421      | 0.000050  | mg/L | 21.5 µg/L          | 0.0211              | 1.86%                             | 20%                 |           |  |  |  |  |
|                      |                       | silicon, dissolved   | 7440-21-3  | E421      | 0.050     | mg/L | 2.10               | 2.07                | 1.56%                             | 20%                 |           |  |  |  |  |
|                      |                       | silver, dissolved    | 7440-22-4  | E421      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                                 | Diff <2x LOR        |           |  |  |  |  |
|                      |                       | sodium, dissolved    | 7440-23-5  | E421      | 0.050     | mg/L | 1.89               | 1.95                | 3.00%                             | 20%                 |           |  |  |  |  |
|                      |                       | strontium, dissolved | 7440-24-6  | E421      | 0.00020   | mg/L | 0.102              | 0.104               | 1.78%                             | 20%                 |           |  |  |  |  |
|                      |                       | sulfur, dissolved    | 7704-34-9  | E421      | 0.50      | mg/L | 28.8               | 28.3                | 1.72%                             | 20%                 |           |  |  |  |  |
|                      |                       | thallium, dissolved  | 7440-28-0  | E421      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                                 | Diff <2x LOR        |           |  |  |  |  |
|                      |                       | tin, dissolved       | 7440-31-5  | E421      | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                                 | Diff <2x LOR        |           |  |  |  |  |
|                      |                       | titanium, dissolved  | 7440-32-6  | E421      | 0.00030   | mg/L | <0.00030           | <0.00030            | 0                                 | Diff <2x LOR        |           |  |  |  |  |
|                      |                       | uranium, dissolved   | 7440-61-1  | E421      | 0.000010  | mg/L | 0.00150            | 0.00155             | 3.20%                             | 20%                 |           |  |  |  |  |
|                      |                       | vanadium, dissolved  | 7440-62-2  | E421      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                                 | Diff <2x LOR        |           |  |  |  |  |
|                      |                       | zinc, dissolved      | 7440-66-6  | E421      | 0.0010    | mg/L | 0.0018             | 0.0018              | 0.00004                           | Diff <2x LOR        |           |  |  |  |  |
| Dissolved Metals (   | QC Lot: 539105)       |                      |            |           |           |      |                    |                     |                                   |                     |           |  |  |  |  |
| CG2208029-004        | Anonymous             | chromium, dissolved  | 7440-47-3  | E421.Cr-L | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                                 | Diff <2x LOR        |           |  |  |  |  |
| Dissolved Metals (   | QC Lot: 544103)       |                      |            |           |           |      |                    |                     |                                   |                     |           |  |  |  |  |
| CG2208029-002        | Anonymous             | mercury, dissolved   | 7439-97-6  | E509      | 0.0000050 | mg/L | <0.0000050         | <0.0000050          | 0                                 | Diff <2x LOR        |           |  |  |  |  |

 Page
 : 7 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

 Project
 : LINE CREEK OPERATION



## Method Blank (MB) Report

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

#### Sub-Matrix: Water

| Analyte                              | CAS Number Method     | LOR   | Unit  | Result                                | Qualifier |
|--------------------------------------|-----------------------|-------|-------|---------------------------------------|-----------|
| Physical Tests (QCLot: 536333)       |                       |       |       |                                       |           |
| urbidity                             | E121                  | 0.1   | NTU   | <0.10                                 |           |
| Physical Tests (QCLot: 540097)       |                       |       |       |                                       |           |
| solids, total suspended [TSS]        | E160-L                | 1     | mg/L  | <1.0                                  |           |
| Physical Tests (QCLot: 540104)       |                       |       |       |                                       |           |
| solids, total dissolved [TDS]        | E162                  | 10    | mg/L  | <10                                   |           |
| Physical Tests (QCLot: 541447)       |                       |       |       |                                       |           |
| conductivity                         | E100                  | 1     | μS/cm | 1.7                                   |           |
| Physical Tests (QCLot: 541448)       |                       |       |       |                                       |           |
| alkalinity, bicarbonate (as CaCO3)   | E290                  | 1     | mg/L  | <1.0                                  |           |
| alkalinity, carbonate (as CaCO3)     | E290                  | 1     | mg/L  | <1.0                                  |           |
| alkalinity, hydroxide (as CaCO3)     | E290                  | 1     | mg/L  | <1.0                                  |           |
| alkalinity, total (as CaCO3)         | E290                  | 1     | mg/L  | <1.0                                  |           |
| Physical Tests (QCLot: 541834)       |                       |       |       |                                       |           |
| acidity (as CaCO3)                   | E283                  | 2     | mg/L  | 2.2                                   |           |
| Anions and Nutrients (QCLot: 536138) |                       |       |       |                                       |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U     | 0.001 | mg/L  | <0.0010                               |           |
| Anions and Nutrients (QCLot: 536291) |                       |       |       |                                       |           |
| phosphorus, total                    | 7723-14-0 E372-U      | 0.002 | mg/L  | <0.0020                               |           |
| Anions and Nutrients (QCLot: 536407) |                       |       |       |                                       |           |
| luoride                              | 16984-48-8 E235.F     | 0.02  | mg/L  | <0.020                                |           |
| Anions and Nutrients (QCLot: 536408) |                       |       |       |                                       |           |
| promide                              | 24959-67-9 E235.Br-L  | 0.05  | mg/L  | <0.050                                |           |
| Anions and Nutrients (QCLot: 536409) |                       |       |       |                                       |           |
| chloride                             | 16887-00-6 E235.CI-L  | 0.1   | mg/L  | <0.10                                 |           |
| Anions and Nutrients (QCLot: 536410) |                       |       |       |                                       |           |
| nitrate (as N)                       | 14797-55-8 E235.NO3-L | 0.005 | mg/L  | <0.0050                               |           |
| Anions and Nutrients (QCLot: 536411) |                       |       |       |                                       |           |
| nitrite (as N)                       | 14797-65-0 E235.NO2-L | 0.001 | mg/L  | <0.0010                               |           |
| Anions and Nutrients (QCLot: 536412) |                       |       |       |                                       |           |
| sulfate (as SO4)                     | 14808-79-8 E235.SO4   | 0.3   | mg/L  | <0.30                                 |           |
| Anions and Nutrients (QCLot: 539290) |                       |       |       |                                       |           |
| ammonia, total (as N)                | 7664-41-7 E298        | 0.005 | mg/L  | <0.0050                               |           |
| Anions and Nutrients (QCLot: 539291) |                       |       |       | · · · · · · · · · · · · · · · · · · · |           |

Page : 8 of 18 : CG2208042 Work Order Client

: Teck Coal Limited Project : LINE CREEK OPERATION



| Analyte                            | CAS Number Method | LOR      | Unit | Result     | Qualifier |
|------------------------------------|-------------------|----------|------|------------|-----------|
| Anions and Nutrients (QCLot: 53929 | 1) - continued    |          |      |            |           |
| ammonia, total (as N)              | 7664-41-7 E298    | 0.005    | mg/L | <0.0050    |           |
| Anions and Nutrients (QCLot: 54334 | 2)                |          |      |            |           |
| Kjeldahl nitrogen, total [TKN]     | E318              | 0.05     | mg/L | <0.050     |           |
| Anions and Nutrients (QCLot: 54334 | 3)                |          |      |            |           |
| Kjeldahl nitrogen, total [TKN]     | E318              | 0.05     | mg/L | <0.050     |           |
| Organic / Inorganic Carbon (QCLot: | 543248)           |          |      |            |           |
| carbon, dissolved organic [DOC]    | E358-L            | 0.5      | mg/L | <0.50      |           |
| Organic / Inorganic Carbon (QCLot: | 543249)           |          |      |            |           |
| carbon, total organic [TOC]        | E355-L            | 0.5      | mg/L | <0.50      |           |
| Total Metals (QCLot: 539401)       |                   |          |      |            |           |
| aluminum, total                    | 7429-90-5 E420    | 0.003    | mg/L | <0.0030    |           |
| antimony, total                    | 7440-36-0 E420    | 0.0001   | mg/L | <0.00010   |           |
| arsenic, total                     | 7440-38-2 E420    | 0.0001   | mg/L | <0.00010   |           |
| barium, total                      | 7440-39-3 E420    | 0.0001   | mg/L | <0.00010   |           |
| beryllium, total                   | 7440-41-7 E420    | 0.00002  | mg/L | <0.000020  |           |
| bismuth, total                     | 7440-69-9 E420    | 0.00005  | mg/L | <0.000050  |           |
| boron, total                       | 7440-42-8 E420    | 0.01     | mg/L | <0.010     |           |
| cadmium, total                     | 7440-43-9 E420    | 0.000005 | mg/L | <0.0000050 |           |
| calcium, total                     | 7440-70-2 E420    | 0.05     | mg/L | <0.050     |           |
| cobalt, total                      | 7440-48-4 E420    | 0.0001   | mg/L | <0.00010   |           |
| copper, total                      | 7440-50-8 E420    | 0.0005   | mg/L | <0.00050   |           |
| iron, total                        | 7439-89-6 E420    | 0.01     | mg/L | <0.010     |           |
| lead, total                        | 7439-92-1 E420    | 0.00005  | mg/L | <0.000050  |           |
| lithium, total                     | 7439-93-2 E420    | 0.001    | mg/L | <0.0010    |           |
| magnesium, total                   | 7439-95-4 E420    | 0.005    | mg/L | <0.0050    |           |
| manganese, total                   | 7439-96-5 E420    | 0.0001   | mg/L | <0.00010   |           |
| molybdenum, total                  | 7439-98-7 E420    | 0.00005  | mg/L | <0.000050  |           |
| nickel, total                      | 7440-02-0 E420    | 0.0005   | mg/L | <0.00050   |           |
| potassium, total                   | 7440-09-7 E420    | 0.05     | mg/L | <0.050     |           |
| selenium, total                    | 7782-49-2 E420    | 0.00005  | mg/L | <0.000050  |           |
| silicon, total                     | 7440-21-3 E420    | 0.1      | mg/L | <0.10      |           |
| silver, total                      | 7440-22-4 E420    | 0.00001  | mg/L | <0.000010  |           |
| sodium, total                      | 7440-23-5 E420    | 0.05     | mg/L | <0.050     |           |
| strontium, total                   | 7440-24-6 E420    | 0.0002   | mg/L | <0.00020   |           |
| sulfur, total                      | 7704-34-9 E420    | 0.5      | mg/L | <0.50      |           |
| thallium, total                    | 7440-28-0 E420    | 0.00001  | mg/L | <0.000010  |           |



Page : 9 of 18
Work Order : CG2208042
Client : Teck Coal Limited

Project : LINE CREEK OPERATION

# ALS

#### Sub-Matrix: Water

| Analyte                             | CAS Number Method   | LOR      | Unit | Result     | Qualifier |
|-------------------------------------|---------------------|----------|------|------------|-----------|
| Total Metals (QCLot: 539401) - cont | inued               |          |      |            |           |
| tin, total                          | 7440-31-5 E420      | 0.0001   | mg/L | <0.00010   |           |
| titanium, total                     | 7440-32-6 E420      | 0.0003   | mg/L | <0.00030   |           |
| uranium, total                      | 7440-61-1 E420      | 0.00001  | mg/L | <0.000010  |           |
| vanadium, total                     | 7440-62-2 E420      | 0.0005   | mg/L | <0.00050   |           |
| zinc, total                         | 7440-66-6 E420      | 0.003    | mg/L | <0.0030    |           |
| Total Metals (QCLot: 539402)        |                     |          |      |            |           |
| chromium, total                     | 7440-47-3 E420.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Total Metals (QCLot: 544092)        |                     |          |      |            |           |
| mercury, total                      | 7439-97-6 E508      | 0.000005 | mg/L | <0.000050  |           |
| Dissolved Metals (QCLot: 539104)    |                     |          |      |            |           |
| aluminum, dissolved                 | 7429-90-5 E421      | 0.001    | mg/L | <0.0010    |           |
| antimony, dissolved                 | 7440-36-0 E421      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, dissolved                  | 7440-38-2 E421      | 0.0001   | mg/L | <0.00010   |           |
| barium, dissolved                   | 7440-39-3 E421      | 0.0001   | mg/L | <0.00010   |           |
| peryllium, dissolved                | 7440-41-7 E421      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, dissolved                  | 7440-69-9 E421      | 0.00005  | mg/L | <0.000050  |           |
| boron, dissolved                    | 7440-42-8 E421      | 0.01     | mg/L | <0.010     |           |
| cadmium, dissolved                  | 7440-43-9 E421      | 0.000005 | mg/L | <0.0000050 |           |
| calcium, dissolved                  | 7440-70-2 E421      | 0.05     | mg/L | <0.050     |           |
| cobalt, dissolved                   | 7440-48-4 E421      | 0.0001   | mg/L | <0.00010   |           |
| copper, dissolved                   | 7440-50-8 E421      | 0.0002   | mg/L | <0.00020   |           |
| ron, dissolved                      | 7439-89-6 E421      | 0.01     | mg/L | <0.010     |           |
| ead, dissolved                      | 7439-92-1 E421      | 0.00005  | mg/L | <0.000050  |           |
| lithium, dissolved                  | 7439-93-2 E421      | 0.001    | mg/L | <0.0010    |           |
| magnesium, dissolved                | 7439-95-4 E421      | 0.005    | mg/L | <0.0050    |           |
| manganese, dissolved                | 7439-96-5 E421      | 0.0001   | mg/L | <0.00010   |           |
| molybdenum, dissolved               | 7439-98-7 E421      | 0.00005  | mg/L | <0.000050  |           |
| nickel, dissolved                   | 7440-02-0 E421      | 0.0005   | mg/L | <0.00050   |           |
| potassium, dissolved                | 7440-09-7 E421      | 0.05     | mg/L | <0.050     |           |
| selenium, dissolved                 | 7782-49-2 E421      | 0.00005  | mg/L | <0.000050  |           |
| silicon, dissolved                  | 7440-21-3 E421      | 0.05     | mg/L | <0.050     |           |
| silver, dissolved                   | 7440-22-4 E421      | 0.00001  | mg/L | <0.000010  |           |
| sodium, dissolved                   | 7440-23-5 E421      | 0.05     | mg/L | <0.050     |           |
| strontium, dissolved                | 7440-24-6 E421      | 0.0002   | mg/L | <0.00020   |           |
| sulfur, dissolved                   | 7704-34-9 E421      | 0.5      | mg/L | <0.50      |           |
| thallium, dissolved                 | 7440-28-0 E421      | 0.00001  | mg/L | <0.00010   |           |

 Page
 : 10 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATION

# ALS

#### Sub-Matrix: Water

| Analyte                                  | CAS Number Method   | LOR      | Unit | Result     | Qualifier |
|--|---------------------|----------|------|------------|-----------|
| Dissolved Metals (QCLot: 539104) - conti | nued                |          |      |            |           |
| tin, dissolved                           | 7440-31-5 E421      | 0.0001   | mg/L | <0.00010   |           |
| titanium, dissolved                      | 7440-32-6 E421      | 0.0003   | mg/L | <0.00030   |           |
| uranium, dissolved                       | 7440-61-1 E421      | 0.00001  | mg/L | <0.000010  |           |
| vanadium, dissolved                      | 7440-62-2 E421      | 0.0005   | mg/L | <0.00050   |           |
| zinc, dissolved                          | 7440-66-6 E421      | 0.001    | mg/L | <0.0010    |           |
| Dissolved Metals (QCLot: 539105)         |                     |          |      |            |           |
| chromium, dissolved                      | 7440-47-3 E421.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Dissolved Metals (QCLot: 544103)         |                     |          |      |            |           |
| mercury, dissolved                       | 7439-97-6 E509      | 0.000005 | mg/L | <0.0000050 |           |

 Page
 : 11 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

 Project
 : LINE CREEK OPERATION



## 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.

| Triangle  | ub-Matrix: Water                     |            |            |       |          |               | Laboratory Cor | ntrol Sample (LCS) | Report     |           |
|--|--------------------------------------|------------|------------|-------|----------|---------------|----------------|--------------------|------------|-----------|
| Physical Tests (OCLot: \$48633)  |                                      |            |            |       |          | Spike         | Recovery (%)   | Recovery           | Limits (%) |           |
| Triangle  | Analyte                              | CAS Number | Method     | LOR   | Unit     | Concentration | LCS            | Low                | High       | Qualifier |
| Physical Tosts (QCLot: \$40097)  | Physical Tests (QCLot: 536333)       |            |            |       |          |               |                |                    |            |           |
| Second Second (TISS)   Figure   Figure   1   mg/L   150 mg/L   929   850   115   Figure   F   | turbidity                            |            | E121       | 0.1   | NTU      | 200 NTU       | 102            | 85.0               | 115        |           |
| Physical Tosts (QCLot: 540104) soids, foul disast/ved [TDS]  | Physical Tests (QCLot: 540097)       |            |            |       |          |               |                |                    |            |           |
| Physical Tests (QCLot: 541446)   File   Fi   | solids, total suspended [TSS]        |            | E160-L     | 1     | mg/L     | 150 mg/L      | 92.9           | 85.0               | 115        |           |
| Physical Tests (QCLot: \$41445)   Physical Tests (QCLot: \$41447)   Physical Tests (QCLot: \$41447)   Physical Tests (QCLot: \$41448)   Physical Tests (QCLot: \$41448)   Physical Tests (QCLot: \$41448)   Physical Tests (QCLot: \$41448)   Physical Tests (QCLot: \$41484)   Physical Tests (QCLot: \$41484)   Physical Tests (QCLot: \$41484)   Physical Tests (QCLot: \$41834)   Physical Tests (QCLot: \$418344)   Physical Tests (QCLot: \$418344)   Physical Tests (QCLot: \$41834 | Physical Tests (QCLot: 540104)       |            |            |       |          |               |                |                    |            |           |
| Physical Tests (QCLot: 541447)   | solids, total dissolved [TDS]        |            | E162       | 10    | mg/L     | 1000 mg/L     | 101            | 85.0               | 115        |           |
| Physical Tests (QCLot: 541447)   | Physical Tests (QCLot: 541446)       |            |            |       |          |               |                |                    |            |           |
| Physical Tests (QCLot: 541448)   Physical Tests (QCLot: 541848)   Physical Tests (QCLot: 541834)   Physical Tests (QCLot: 54184)   Physical Tests (QCLot: 541845)   | pH                                   |            | E108       |       | pH units | 7 pH units    | 99.0           | 98.6               | 101        |           |
| Physical Tests (QCLot: 541448)   Physical Tests (QCLot: 541848)   Physical Tests (QCLot: 541834)   Physical Tests (QCLot: 54184)   Physical Tests (QCLot: 541845)   | Physical Tests (QCLot: 541447)       |            |            |       |          |               |                |                    |            |           |
| Alcalinity, total (as CaCO3)   E290   1 mg/L   S00 mg/L   103   85.0   115   mg/L  | conductivity                         |            | E100       | 1     | μS/cm    | 146.9 μS/cm   | 105            | 90.0               | 110        |           |
| Physical Tosts (QCLot: 541834) acidity (as CaCO3)  | Physical Tests (QCLot: 541448)       |            |            |       |          |               |                |                    |            |           |
| Physical Tests (QCLot: 546132)   | alkalinity, total (as CaCO3)         |            | E290       | 1     | mg/L     | 500 mg/L      | 103            | 85.0               | 115        |           |
| Physical Tests (QCLot: 546132)  oxidation-reduction potential [QRP]  | Physical Tests (QCLot: 541834)       |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 536138) phosphate, orthor, dissolved (as P) 14265-44-2 [S78-U 0.001 mg/L 0.02 mg/L 102 80.0 120  Anions and Nutrients (QCLot: 536291) phosphorous, total 7723-14-0 [S37-U 0.002 mg/L 8.02 mg/L 114 80.0 120  Anions and Nutrients (QCLot: 536407) fluoride 16984-48-8 [S25.F 0.02 mg/L 1 mg/L 96.3 90.0 110  Anions and Nutrients (QCLot: 536408) tromide 24959-67-9 [S25.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 [S25.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 [S25.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) mitrate (as N) 14797-55-8 [S25.NO2-L 0.001 mg/L 0.5 mg/L 9.5 mg/L 90.0 90.0 110  Anions and Nutrients (QCLot: 536411) mitrate (as N) 14797-65-0 [S25.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536411) mitrate (as N) 14797-65-0 [S25.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) suffate (as SO4) 14808-79-8 [S25.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110  | acidity (as CaCO3)                   |            | E283       | 2     | mg/L     | 50 mg/L       | 104            | 85.0               | 115        |           |
| Anions and Nutrients (QCLot: 536418) phosphate, ortho-, dissolved (as P) 14265-44-2 878-U 0.001 mg/L 0.02 mg/L 102 80.0 120  Anions and Nutrients (QCLot: 536291) phosphorus, total 7723-14-0 837-U 0.002 mg/L 8.02 mg/L 114 80.0 120  Anions and Nutrients (QCLot: 536407) fluoride 16984-48-8 823.F 0.02 mg/L 1 mg/L 96.3 90.0 110  Anions and Nutrients (QCLot: 536408) bromide 24959-67-9 8235.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16987-006 8235.Cr-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) mitrie (as N) 14797-55-8 8235.NO3-L 0.005 mg/L 2.5 mg/L 9.05 mg/L 90.0 90.0 110  Anions and Nutrients (QCLot: 536411) mitrie (as N) 14797-65-0 8235.NO3-L 0.001 mg/L 0.5 mg/L 9.6 mg/L 99.1 90.0 110  Anions and Nutrients (QCLot: 536412) mitrie (as SO4) 14808-79-8 8235.NO3-L 0.001 mg/L 0.5 mg/L 99.1 90.0 110  Anions and Nutrients (QCLot: 536412) sufface (as SO4) 14808-79-8 8235.NO3-L 0.001 mg/L 0.5 mg/L 99.1 90.0 110  | Physical Tests (QCLot: 546132)       |            |            |       |          |               |                |                    |            |           |
| Phosphate, ortho-, dissolved (as P) 14285-44-2 [878-U 0.001 mg/L 0.02 mg/L 102 80.0 120  | oxidation-reduction potential [ORP]  |            | E125       |       | mV       | 220 mV        | 97.0           | 95.4               | 104        |           |
| Phosphate, ortho-, dissolved (as P) 14285-44-2 [878-U 0.001 mg/L 0.02 mg/L 102 80.0 120  |                                      |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 536407) phosphorus, total 7723-14-0 [872-U 0.002 mg/L 8.02 mg/L 114 80.0 120  Anions and Nutrients (QCLot: 536407) fluoride 16984-48-8 [235.F 0.02 mg/L 1 mg/L 96.3 90.0 110  Anions and Nutrients (QCLot: 536408) bromide 24959-67-9 [235.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 [235.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 [235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrate (as N) 14797-65-0 [235.NO2-L 0.01 mg/L 0.5 mg/L 9.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) nitrate (as N) 14797-85-1 [235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 [235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | Anions and Nutrients (QCLot: 536138) |            |            |       |          |               |                |                    |            |           |
| Phosphorus, total 7723-14-0 E372-U 0.002 mg/L 8.02 mg/L 114 80.0 120   | phosphate, ortho-, dissolved (as P)  | 14265-44-2 | E378-U     | 0.001 | mg/L     | 0.02 mg/L     | 102            | 80.0               | 120        |           |
| Anions and Nutrients (QCLot: 536407) ffluoride 16984-48-8  | Anions and Nutrients (QCLot: 536291) |            |            |       |          |               |                |                    |            |           |
| fluoride 16984-48-8 E235.F 0.02 mg/L 1 mg/L 96.3 90.0 110  Anions and Nutrients (QCLot: 536408) bromide 24959-67-9 E235.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 E235.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110  | phosphorus, total                    | 7723-14-0  | E372-U     | 0.002 | mg/L     | 8.02 mg/L     | 114            | 80.0               | 120        |           |
| Anions and Nutrients (QCLot: 536408) bromide 24959-67-9 E235.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 E235.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | Anions and Nutrients (QCLot: 536407) |            |            |       |          |               |                |                    |            |           |
| bromide 24959-67-9 E235.Br-L 0.05 mg/L 0.5 mg/L 91.2 85.0 115  Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 E235.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110  | fluoride                             | 16984-48-8 | E235.F     | 0.02  | mg/L     | 1 mg/L        | 96.3           | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 536409) chloride 16887-00-6 E235.Cl-L 0.1 mg/L 100 mg/L 97.7 90.0 110  Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | Anions and Nutrients (QCLot: 536408) |            |            |       |          |               |                |                    |            |           |
| chloride     16887-00-6     E235.Cl-L     0.1     mg/L     100 mg/L     97.7     90.0     110        Anions and Nutrients (QCLot: 536410)       nitrate (as N)     14797-55-8     E235.NO3-L     0.005     mg/L     2.5 mg/L     100     90.0     110        Anions and Nutrients (QCLot: 536411)       nitrite (as N)     14797-65-0     E235.NO2-L     0.001     mg/L     0.5 mg/L     96.0     90.0     110        Anions and Nutrients (QCLot: 536412)       sulfate (as SO4)     14808-79-8     E235.SO4     0.3     mg/L     100 mg/L     99.1     90.0     110  | bromide                              | 24959-67-9 | E235.Br-L  | 0.05  | mg/L     | 0.5 mg/L      | 91.2           | 85.0               | 115        |           |
| Anions and Nutrients (QCLot: 536410) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 100 90.0 110  Anions and Nutrients (QCLot: 536411) nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412) sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | Anions and Nutrients (QCLot: 536409) |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 536411)       nitrite (as N)     14797-65-0     E235.NO2-L     0.005     mg/L     2.5 mg/L     100     90.0     110        Anions and Nutrients (QCLot: 536411)       Sulfate (as SO4)     14808-79-8     E235.NO2-L     0.001     mg/L     0.5 mg/L     96.0     90.0     110        Anions and Nutrients (QCLot: 536412)       sulfate (as SO4)     14808-79-8     E235.SO4     0.3     mg/L     100 mg/L     99.1     90.0     110   | chloride                             | 16887-00-6 | E235.CI-L  | 0.1   | mg/L     | 100 mg/L      | 97.7           | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 536411)  nitrite (as N) 14797-65-0 E235.NO2-L 0.001 mg/L 0.5 mg/L 96.0 90.0 110  Anions and Nutrients (QCLot: 536412)  sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | Anions and Nutrients (QCLot: 536410) |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 536412)       sulfate (as SO4)     14808-79-8         E235.NO2-L     0.001     mg/L     0.5 mg/L     96.0     90.0     110  | nitrate (as N)                       | 14797-55-8 | E235.NO3-L | 0.005 | mg/L     | 2.5 mg/L      | 100            | 90.0               | 110        |           |
| Anions and Nutrients (QCLot: 536412) sulfate (as SO4)  14808-79-8 E235.SO4  0.3 mg/L 100 mg/L 99.1 90.0 110  | Anions and Nutrients (QCLot: 536411) |            |            |       |          |               |                |                    |            |           |
| sulfate (as SO4) 14808-79-8 E235.SO4 0.3 mg/L 100 mg/L 99.1 90.0 110   | nitrite (as N)                       | 14797-65-0 | E235.NO2-L | 0.001 | mg/L     | 0.5 mg/L      | 96.0           | 90.0               | 110        |           |
|  | Anions and Nutrients (QCLot: 536412) |            |            |       |          |               |                |                    |            |           |
| Anions and Nutrients (QCLot: 539290)   | sulfate (as SO4)                     | 14808-79-8 | E235.SO4   | 0.3   | mg/L     | 100 mg/L      | 99.1           | 90.0               | 110        |           |
|  | Anions and Nutrients (QCLot: 539290) |            |            |       |          |               |                |                    |            |           |

 Page
 : 12 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| ub-Matrix: Water                         |            |        |          |      | Laboratory Control Sample (LCS) Report |              |          |              |           |  |
|--|------------|--------|----------|------|--|--------------|----------|--------------|-----------|--|
|  |            |        |          |      | Spike                                  | Recovery (%) | Recovery | / Limits (%) |           |  |
| Analyte                                  | CAS Number | Method | LOR      | Unit | Concentration                          | LCS          | Low      | High         | Qualifier |  |
| Anions and Nutrients (QCLot: 539290) - c | ontinued   |        |          |      |  |              |          |              |           |  |
| ammonia, total (as N)                    | 7664-41-7  | E298   | 0.005    | mg/L | 0.2 mg/L                               | 101          | 85.0     | 115          |           |  |
| Anions and Nutrients (QCLot: 539291)     |            |        |          |      |  |              |          |              |           |  |
| ammonia, total (as N)                    | 7664-41-7  | E298   | 0.005    | mg/L | 0.2 mg/L                               | 112          | 85.0     | 115          |           |  |
| Anions and Nutrients (QCLot: 543342)     |            |        |          |      |  |              |          |              | •         |  |
| Kjeldahl nitrogen, total [TKN]           |            | E318   | 0.05     | mg/L | 4 mg/L                                 | 100          | 75.0     | 125          |           |  |
| Anions and Nutrients (QCLot: 543343)     |            |        |          |      |  |              |          |              |           |  |
| Kjeldahl nitrogen, total [TKN]           |            | E318   | 0.05     | mg/L | 4 mg/L                                 | 100          | 75.0     | 125          |           |  |
|  |            |        |          |      |  |              |          |              |           |  |
| Organic / Inorganic Carbon (QCLot: 54324 | 8)         |        |          |      |  |              |          |              |           |  |
| carbon, dissolved organic [DOC]          |            | E358-L | 0.5      | mg/L | 8.57 mg/L                              | 104          | 80.0     | 120          |           |  |
| Organic / Inorganic Carbon (QCLot: 54324 | 9)         |        |          |      |  |              |          |              |           |  |
| carbon, total organic [TOC]              |            | E355-L | 0.5      | mg/L | 8.57 mg/L                              | 96.7         | 80.0     | 120          |           |  |
|  |            |        |          |      |  |              |          |              |           |  |
| Total Metals (QCLot: 539401)             |            |        |          |      |  |              |          |              | •         |  |
| aluminum, total                          | 7429-90-5  | E420   | 0.003    | mg/L | 2 mg/L                                 | 102          | 80.0     | 120          |           |  |
| antimony, total                          | 7440-36-0  | E420   | 0.0001   | mg/L | 1 mg/L                                 | 105          | 80.0     | 120          |           |  |
| arsenic, total                           | 7440-38-2  | E420   | 0.0001   | mg/L | 1 mg/L                                 | 99.5         | 80.0     | 120          |           |  |
| barium, total                            | 7440-39-3  | E420   | 0.0001   | mg/L | 0.25 mg/L                              | 104          | 80.0     | 120          |           |  |
| beryllium, total                         | 7440-41-7  | E420   | 0.00002  | mg/L | 0.1 mg/L                               | 100          | 80.0     | 120          |           |  |
| bismuth, total                           | 7440-69-9  | E420   | 0.00005  | mg/L | 1 mg/L                                 | 101          | 80.0     | 120          |           |  |
| boron, total                             | 7440-42-8  | E420   | 0.01     | mg/L | 1 mg/L                                 | 96.4         | 80.0     | 120          |           |  |
| cadmium, total                           | 7440-43-9  | E420   | 0.000005 | mg/L | 0.1 mg/L                               | 99.2         | 80.0     | 120          |           |  |
| calcium, total                           | 7440-70-2  | E420   | 0.05     | mg/L | 50 mg/L                                | 102          | 80.0     | 120          |           |  |
| cobalt, total                            | 7440-48-4  | E420   | 0.0001   | mg/L | 0.25 mg/L                              | 95.9         | 80.0     | 120          |           |  |
| copper, total                            | 7440-50-8  | E420   | 0.0005   | mg/L | 0.25 mg/L                              | 97.0         | 80.0     | 120          |           |  |
| iron, total                              | 7439-89-6  | E420   | 0.01     | mg/L | 1 mg/L                                 | 98.8         | 80.0     | 120          |           |  |
| lead, total                              | 7439-92-1  | E420   | 0.00005  | mg/L | 0.5 mg/L                               | 102          | 80.0     | 120          |           |  |
| lithium, total                           | 7439-93-2  | E420   | 0.001    | mg/L | 0.25 mg/L                              | 98.0         | 80.0     | 120          |           |  |
| magnesium, total                         | 7439-95-4  | E420   | 0.005    | mg/L | 50 mg/L                                | 103          | 80.0     | 120          |           |  |
| manganese, total                         | 7439-96-5  | E420   | 0.0001   | mg/L | 0.25 mg/L                              | 98.6         | 80.0     | 120          |           |  |
| molybdenum, total                        | 7439-98-7  | E420   | 0.00005  | mg/L | 0.25 mg/L                              | 101          | 80.0     | 120          |           |  |
| nickel, total                            | 7440-02-0  | E420   | 0.0005   | mg/L | 0.5 mg/L                               | 95.6         | 80.0     | 120          |           |  |
| potassium, total                         | 7440-09-7  | E420   | 0.05     | mg/L | 50 mg/L                                | 98.5         | 80.0     | 120          |           |  |
| selenium, total                          | 7782-49-2  | E420   | 0.00005  | mg/L | 1 mg/L                                 | 101          | 80.0     | 120          |           |  |
| silicon, total                           | 7440-21-3  | E420   | 0.1      | mg/L | 10 mg/L                                | 106          | 80.0     | 120          |           |  |
| silver, total                            | 7440-22-4  | E420   | 0.00001  | mg/L | 0.1 mg/L                               | 96.9         | 80.0     | 120          |           |  |
| sodium, total                            | 7440-23-5  | E420   | 0.05     | mg/L | 50 mg/L                                | 99.6         | 80.0     | 120          |           |  |

 Page
 : 13 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

ALS

| -Matrix: Water                           |            |           |          |      | Laboratory Control Sample (LCS) Report |              |          |            |           |  |
|--|------------|-----------|----------|------|--|--------------|----------|------------|-----------|--|
|  |            |           |          |      | Spike                                  | Recovery (%) | Recovery | Limits (%) |           |  |
| Analyte                                  | CAS Number | Method    | LOR      | Unit | Concentration                          | LCS          | Low      | High       | Qualifier |  |
| Total Metals (QCLot: 539401) - continued |            |           |          |      |  |              |          |            |           |  |
| strontium, total                         | 7440-24-6  | E420      | 0.0002   | mg/L | 0.25 mg/L                              | 96.7         | 80.0     | 120        |           |  |
| sulfur, total                            | 7704-34-9  | E420      | 0.5      | mg/L | 50 mg/L                                | 98.1         | 80.0     | 120        |           |  |
| thallium, total                          | 7440-28-0  | E420      | 0.00001  | mg/L | 1 mg/L                                 | 105          | 80.0     | 120        |           |  |
| tin, total                               | 7440-31-5  | E420      | 0.0001   | mg/L | 0.5 mg/L                               | 97.9         | 80.0     | 120        |           |  |
| titanium, total                          | 7440-32-6  | E420      | 0.0003   | mg/L | 0.25 mg/L                              | 93.5         | 80.0     | 120        |           |  |
| uranium, total                           | 7440-61-1  | E420      | 0.00001  | mg/L | 0.005 mg/L                             | 102          | 80.0     | 120        |           |  |
| vanadium, total                          | 7440-62-2  | E420      | 0.0005   | mg/L | 0.5 mg/L                               | 99.3         | 80.0     | 120        |           |  |
| zinc, total                              | 7440-66-6  | E420      | 0.003    | mg/L | 0.5 mg/L                               | 93.1         | 80.0     | 120        |           |  |
| Total Metals (QCLot: 539402)             |            |           |          |      |  |              |          |            |           |  |
| chromium, total                          | 7440-47-3  | E420.Cr-L | 0.0001   | mg/L | 0.25 mg/L                              | 95.9         | 80.0     | 120        |           |  |
| Total Metals (QCLot: 544092)             |            |           |          |      |  |              |          |            |           |  |
| mercury, total                           | 7439-97-6  | E508      | 0.000005 | mg/L | 0.0001 mg/L                            | 108          | 80.0     | 120        |           |  |
|  |            |           |          |      |  |              |          |            |           |  |
| Dissolved Metals (QCLot: 539104)         |            |           |          |      |  |              |          |            |           |  |
| aluminum, dissolved                      | 7429-90-5  | E421      | 0.001    | mg/L | 2 mg/L                                 | 95.3         | 80.0     | 120        |           |  |
| antimony, dissolved                      | 7440-36-0  | E421      | 0.0001   | mg/L | 1 mg/L                                 | 96.8         | 80.0     | 120        |           |  |
| arsenic, dissolved                       | 7440-38-2  | E421      | 0.0001   | mg/L | 1 mg/L                                 | 99.6         | 80.0     | 120        |           |  |
| barium, dissolved                        | 7440-39-3  | E421      | 0.0001   | mg/L | 0.25 mg/L                              | 97.3         | 80.0     | 120        |           |  |
| beryllium, dissolved                     | 7440-41-7  | E421      | 0.00002  | mg/L | 0.1 mg/L                               | 93.1         | 80.0     | 120        |           |  |
| bismuth, dissolved                       | 7440-69-9  | E421      | 0.00005  | mg/L | 1 mg/L                                 | 104          | 80.0     | 120        |           |  |
| boron, dissolved                         | 7440-42-8  | E421      | 0.01     | mg/L | 1 mg/L                                 | 90.5         | 80.0     | 120        |           |  |
| cadmium, dissolved                       | 7440-43-9  | E421      | 0.000005 | mg/L | 0.1 mg/L                               | 97.9         | 80.0     | 120        |           |  |
| calcium, dissolved                       | 7440-70-2  | E421      | 0.05     | mg/L | 50 mg/L                                | 96.3         | 80.0     | 120        |           |  |
| cobalt, dissolved                        | 7440-48-4  | E421      | 0.0001   | mg/L | 0.25 mg/L                              | 95.0         | 80.0     | 120        |           |  |
| copper, dissolved                        | 7440-50-8  | E421      | 0.0002   | mg/L | 0.25 mg/L                              | 95.9         | 80.0     | 120        |           |  |
| iron, dissolved                          | 7439-89-6  | E421      | 0.01     | mg/L | 1 mg/L                                 | 97.5         | 80.0     | 120        |           |  |
| lead, dissolved                          | 7439-92-1  | E421      | 0.00005  | mg/L | 0.5 mg/L                               | 99.1         | 80.0     | 120        |           |  |
| lithium, dissolved                       | 7439-93-2  | E421      | 0.001    | mg/L | 0.25 mg/L                              | 92.4         | 80.0     | 120        |           |  |
| magnesium, dissolved                     | 7439-95-4  | E421      | 0.005    | mg/L | 50 mg/L                                | 95.7         | 80.0     | 120        |           |  |
| manganese, dissolved                     | 7439-96-5  | E421      | 0.0001   | mg/L | 0.25 mg/L                              | 100.0        | 80.0     | 120        |           |  |
| molybdenum, dissolved                    | 7439-98-7  | E421      | 0.00005  | mg/L | 0.25 mg/L                              | 100          | 80.0     | 120        |           |  |
| nickel, dissolved                        | 7440-02-0  | E421      | 0.0005   | mg/L | 0.5 mg/L                               | 97.4         | 80.0     | 120        |           |  |
| potassium, dissolved                     | 7440-09-7  |           | 0.05     | mg/L | 50 mg/L                                | 97.4         | 80.0     | 120        |           |  |
| selenium, dissolved                      | 7782-49-2  |           | 0.00005  | mg/L | 1 mg/L                                 | 91.4         | 80.0     | 120        |           |  |
| silicon, dissolved                       | 7440-21-3  |           | 0.05     | mg/L | 10 mg/L                                | 102          | 80.0     | 120        |           |  |
| silver, dissolved                        | 7440-22-4  |           | 0.00001  | mg/L | 0.1 mg/L                               | 93.6         | 80.0     | 120        |           |  |
| sodium, dissolved                        | 7440-23-5  |           | 0.05     | mg/L | 50 mg/L                                | 96.5         | 80.0     | 120        |           |  |

 Page
 : 14 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| Sub-Matrix: Water                     | Matrix: Water |           |          |      |               | Laboratory Co                    | ntrol Sample (LCS) | Report |           |
|---------------------------------------|---------------|-----------|----------|------|---------------|----------------------------------|--------------------|--------|-----------|
|                                       |               |           |          |      | Spike         | Recovery (%) Recovery Limits (%) |                    |        |           |
| Analyte                               | CAS Number    | Method    | LOR      | Unit | Concentration | LCS                              | Low                | High   | Qualifier |
| Dissolved Metals (QCLot: 539104) - co | ntinued       |           |          |      |               |                                  |                    |        |           |
| strontium, dissolved                  | 7440-24-6     | E421      | 0.0002   | mg/L | 0.25 mg/L     | 96.7                             | 80.0               | 120    |           |
| sulfur, dissolved                     | 7704-34-9     | E421      | 0.5      | mg/L | 50 mg/L       | 89.8                             | 80.0               | 120    |           |
| thallium, dissolved                   | 7440-28-0     | E421      | 0.00001  | mg/L | 1 mg/L        | 100                              | 80.0               | 120    |           |
| tin, dissolved                        | 7440-31-5     | E421      | 0.0001   | mg/L | 0.5 mg/L      | 97.0                             | 80.0               | 120    |           |
| titanium, dissolved                   | 7440-32-6     | E421      | 0.0003   | mg/L | 0.25 mg/L     | 96.4                             | 80.0               | 120    |           |
| uranium, dissolved                    | 7440-61-1     | E421      | 0.00001  | mg/L | 0.005 mg/L    | 103                              | 80.0               | 120    |           |
| vanadium, dissolved                   | 7440-62-2     | E421      | 0.0005   | mg/L | 0.5 mg/L      | 97.2                             | 80.0               | 120    |           |
| zinc, dissolved                       | 7440-66-6     | E421      | 0.001    | mg/L | 0.5 mg/L      | 98.7                             | 80.0               | 120    |           |
| Dissolved Metals (QCLot: 539105)      |               |           |          |      |               |                                  |                    |        | '         |
| chromium, dissolved                   | 7440-47-3     | E421.Cr-L | 0.0001   | mg/L | 0.25 mg/L     | 95.2                             | 80.0               | 120    |           |
| mercury, dissolved                    | 7439-97-6     | E509      | 0.000005 | mg/L | 0.0001 mg/L   | 99.2                             | 80.0               | 120    |           |
|                                       |               |           |          |      |               |                                  |                    |        |           |

 Page
 : 15 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited

ALS

# Project : LINE CREEK OPERATION

## Matrix Spike (MS) Report

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

| results for the assoc   | lated cample (or cirrilar can     | ipies) may be subject to bias. ND - 1 | todovory not dotom | iniou, buonground lover | TX OPINO TOVOI.          |             |              |          |            |           |  |
|-------------------------|-----------------------------------|---------------------------------------|--------------------|-------------------------|--------------------------|-------------|--------------|----------|------------|-----------|--|
| Sub-Matrix: Water       |                                   |                                       |                    |                         | Matrix Spike (MS) Report |             |              |          |            |           |  |
|                         |                                   |                                       |                    |                         | Sp                       | ike         | Recovery (%) | Recovery | Limits (%) |           |  |
| Laboratory sample<br>ID | Client sample ID                  | Analyte                               | CAS Number         | Method                  | Concentration            | Target      | MS           | Low      | High       | Qualifier |  |
| Anions and Nutr         | ents (QCLot: 536138)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208040-002           | Anonymous                         | phosphate, ortho-, dissolved (as P)   | 14265-44-2         | E378-U                  | 0.0495 mg/L              | 0.05 mg/L   | 99.0         | 70.0     | 130        |           |  |
| Anions and Nutr         | ents (QCLot: 536291)              |                                       |                    |                         |                          |             |              |          | 1          |           |  |
| CG2208041-004           | Anonymous                         | phosphorus, total                     | 7723-14-0          | E372-U                  | ND mg/L                  | 0.0676 mg/L | ND           | 70.0     | 130        |           |  |
| Anions and Nutr         | ents (QCLot: 536407)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | fluoride                              | 16984-48-8         | E235.F                  | 0.865 mg/L               | 1 mg/L      | 86.5         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 536408)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | bromide                               | 24959-67-9         | E235.Br-L               | 0.436 mg/L               | 0.5 mg/L    | 87.1         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 536409)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | chloride                              | 16887-00-6         | E235.CI-L               | 90.2 mg/L                | 100 mg/L    | 90.2         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 536410)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | nitrate (as N)                        | 14797-55-8         | E235.NO3-L              | 2.37 mg/L                | 2.5 mg/L    | 94.8         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 536411)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | nitrite (as N)                        | 14797-65-0         | E235.NO2-L              | 0.444 mg/L               | 0.5 mg/L    | 88.8         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 536412)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-004           | LC_RD1_WS_LAEMP_DRY<br>_2022-06_N | sulfate (as SO4)                      | 14808-79-8         | E235.SO4                | 92.3 mg/L                | 100 mg/L    | 92.3         | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 539290)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2207996-002           | Anonymous                         | ammonia, total (as N)                 | 7664-41-7          | E298                    | ND mg/L                  | 0.1 mg/L    | ND           | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 539291)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208046-001           | Anonymous                         | ammonia, total (as N)                 | 7664-41-7          | E298                    | ND mg/L                  | 0.1 mg/L    | ND           | 75.0     | 125        |           |  |
| Anions and Nutr         | ents (QCLot: 543342)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208014-002           | Anonymous                         | Kjeldahl nitrogen, total [TKN]        |                    | E318                    | ND mg/L                  | 2.5 mg/L    | ND           | 70.0     | 130        |           |  |
| Anions and Nutr         | ents (QCLot: 543343)              |                                       |                    |                         |                          |             |              |          |            |           |  |
| CG2208042-003           | LC_MT1_WS_LAEMP_DRY<br>_2022-06_N | Kjeldahl nitrogen, total [TKN]        |                    | E318                    | 2.51 mg/L                | 2.5 mg/L    | 100          | 70.0     | 130        |           |  |
| Organic / Inorga        | nic Carbon (QCLot: 5432           | 248)                                  |                    |                         |                          |             |              |          |            |           |  |
| CG2208041-001           | Anonymous                         | carbon, dissolved organic [DOC]       |                    | E358-L                  | 4.44 mg/L                | 5 mg/L      | 88.7         | 70.0     | 130        |           |  |

 Page
 : 16 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| ub-Matrix: Water |                     |                             |               |           | 0             | Matrix Spike (MS) Report  Spike Recovery (%) Recovery Limits (%) |              |      |       |          |  |
|------------------|---------------------|-----------------------------|---------------|-----------|---------------|--|--------------|------|-------|----------|--|
|                  | Oliant agreed ID    |                             | 040 Words and | 88-461    | -             |  | Recovery (%) |      | · · · | 0        |  |
| boratory sample  | Client sample ID    | Analyte                     | CAS Number    | Method    | Concentration | Target   | MS           | Low  | High  | Qualifie |  |
| ganic / Inorgar  | ic Carbon (QCLot: 5 | 43249)                      |               |           |               |  |              |      |       |          |  |
| G2208041-001     | Anonymous           | carbon, total organic [TOC] |               | E355-L    | 4.61 mg/L     | 5 mg/L   | 92.1         | 70.0 | 130   |          |  |
| otal Metals (QC  | Lot: 539401)        |                             |               |           |               |  |              |      |       |          |  |
| CG2208029-003    | Anonymous           | aluminum, total             | 7429-90-5     | E420      | 0.190 mg/L    | 0.2 mg/L   | 95.0         | 70.0 | 130   |          |  |
|                  |                     | antimony, total             | 7440-36-0     | E420      | 0.0198 mg/L   | 0.02 mg/L  | 99.2         | 70.0 | 130   |          |  |
|                  |                     | arsenic, total              | 7440-38-2     | E420      | 0.0193 mg/L   | 0.02 mg/L  | 96.6         | 70.0 | 130   |          |  |
|                  |                     | barium, total               | 7440-39-3     | E420      | ND mg/L       | 0.02 mg/L  | ND           | 70.0 | 130   |          |  |
|                  |                     | beryllium, total            | 7440-41-7     | E420      | 0.0392 mg/L   | 0.04 mg/L  | 97.9         | 70.0 | 130   |          |  |
|                  |                     | bismuth, total              | 7440-69-9     | E420      | 0.00944 mg/L  | 0.01 mg/L  | 94.4         | 70.0 | 130   |          |  |
|                  |                     | boron, total                | 7440-42-8     | E420      | 0.098 mg/L    | 0.1 mg/L   | 98.2         | 70.0 | 130   |          |  |
|                  |                     | cadmium, total              | 7440-43-9     | E420      | 0.00392 mg/L  | 0.004 mg/L   | 98.1         | 70.0 | 130   |          |  |
|                  |                     | calcium, total              | 7440-70-2     | E420      | ND mg/L       | 4 mg/L   | ND           | 70.0 | 130   |          |  |
|                  |                     | cobalt, total               | 7440-48-4     | E420      | 0.0185 mg/L   | 0.02 mg/L  | 92.4         | 70.0 | 130   |          |  |
|                  |                     | copper, total               | 7440-50-8     | E420      | 0.0190 mg/L   | 0.02 mg/L  | 94.8         | 70.0 | 130   |          |  |
|                  |                     | iron, total                 | 7439-89-6     | E420      | 1.90 mg/L     | 2 mg/L   | 95.2         | 70.0 | 130   |          |  |
|                  |                     | lead, total                 | 7439-92-1     | E420      | 0.0190 mg/L   | 0.02 mg/L  | 94.8         | 70.0 | 130   |          |  |
|                  |                     | lithium, total              | 7439-93-2     | E420      | 0.0941 mg/L   | 0.1 mg/L   | 94.1         | 70.0 | 130   |          |  |
|                  |                     | magnesium, total            | 7439-95-4     | E420      | ND mg/L       | 1 mg/L   | ND           | 70.0 | 130   |          |  |
|                  |                     | manganese, total            | 7439-96-5     | E420      | 0.0186 mg/L   | 0.02 mg/L  | 92.8         | 70.0 | 130   |          |  |
|                  |                     | molybdenum, total           | 7439-98-7     | E420      | 0.0207 mg/L   | 0.02 mg/L  | 104          | 70.0 | 130   |          |  |
|                  |                     | nickel, total               | 7440-02-0     | E420      | 0.0365 mg/L   | 0.04 mg/L  | 91.3         | 70.0 | 130   |          |  |
|                  |                     | potassium, total            | 7440-09-7     | E420      | 3.67 mg/L     | 4 mg/L   | 91.7         | 70.0 | 130   |          |  |
|                  |                     | selenium, total             | 7782-49-2     | E420      | 0.0417 mg/L   | 0.04 mg/L  | 104          | 70.0 | 130   |          |  |
|                  |                     | silicon, total              | 7440-21-3     | E420      | 9.21 mg/L     | 10 mg/L  | 92.1         | 70.0 | 130   |          |  |
|                  |                     | silver, total               | 7440-22-4     | E420      | 0.00390 mg/L  | 0.004 mg/L   | 97.4         | 70.0 | 130   |          |  |
|                  |                     | sodium, total               | 7440-23-5     | E420      | ND mg/L       | 2 mg/L   | ND           | 70.0 | 130   |          |  |
|                  |                     | strontium, total            | 7440-24-6     | E420      | ND mg/L       | 0.02 mg/L  | ND           | 70.0 | 130   |          |  |
|                  |                     | sulfur, total               | 7704-34-9     | E420      | ND mg/L       | 20 mg/L  | ND           | 70.0 | 130   |          |  |
|                  |                     | thallium, total             | 7440-28-0     | E420      | 0.00377 mg/L  | 0.004 mg/L   | 94.3         | 70.0 | 130   |          |  |
|                  |                     | tin, total                  | 7440-31-5     | E420      | 0.0194 mg/L   | 0.02 mg/L  | 96.8         | 70.0 | 130   |          |  |
|                  |                     | titanium, total             | 7440-32-6     | E420      | 0.0365 mg/L   | 0.04 mg/L  | 91.2         | 70.0 | 130   |          |  |
|                  |                     | uranium, total              | 7440-61-1     | E420      | 0.00390 mg/L  | 0.004 mg/L   | 97.4         | 70.0 | 130   |          |  |
|                  |                     | vanadium, total             | 7440-62-2     | E420      | 0.0962 mg/L   | 0.1 mg/L   | 96.2         | 70.0 | 130   |          |  |
|                  |                     | zinc, total                 | 7440-66-6     | E420      | 0.377 mg/L    | 0.4 mg/L   | 94.3         | 70.0 | 130   |          |  |
| otal Metals (QC  | Lot: 539402)        |                             |               |           |               |  |              |      |       |          |  |
| G2208029-003     | Anonymous           | chromium, total             | 7440-47-3     | E420.Cr-L | 0.0386 mg/L   | 0.04 mg/L  | 96.4         | 70.0 | 130   |          |  |

 Page
 : 17 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| ub-Matrix: Water |                        |                       |            |           | 0             | Matrix Spike (MS) Report  Spike Recovery (%) Recovery Limits (%) |                  |      |       |          |  |
|------------------|------------------------|-----------------------|------------|-----------|---------------|--|------------------|------|-------|----------|--|
|                  | Client comple ID       | Analista              | CAS Number | Method    | -             | Ke<br>Target   | Recovery (%)  MS |      | · · · | Qualifie |  |
| boratory sample  | Client sample ID       | Analyte               | CAS Number | Wethod    | Concentration | rarget   | IVIS             | Low  | High  | Qualific |  |
| otal Metals (QC  | Lot: 544092) - continu | ed                    |            |           |               |  |                  |      |       |          |  |
| G2208029-003     | Anonymous              | mercury, total        | 7439-97-6  | E508      | 0.000101 mg/L | 0.0001 mg/L  | 101              | 70.0 | 130   |          |  |
| issolved Metals  | (QCLot: 539104)        |                       |            |           |               |  |                  |      |       |          |  |
| CG2208029-005    | Anonymous              | aluminum, dissolved   | 7429-90-5  | E421      | 0.192 mg/L    | 0.2 mg/L   | 96.3             | 70.0 | 130   |          |  |
|                  |                        | antimony, dissolved   | 7440-36-0  | E421      | 0.0198 mg/L   | 0.02 mg/L  | 99.2             | 70.0 | 130   |          |  |
|                  |                        | arsenic, dissolved    | 7440-38-2  | E421      | 0.0195 mg/L   | 0.02 mg/L  | 97.6             | 70.0 | 130   |          |  |
|                  |                        | barium, dissolved     | 7440-39-3  | E421      | ND mg/L       | 0.02 mg/L  | ND               | 70.0 | 130   |          |  |
|                  |                        | beryllium, dissolved  | 7440-41-7  | E421      | 0.0379 mg/L   | 0.04 mg/L  | 94.7             | 70.0 | 130   |          |  |
|                  |                        | bismuth, dissolved    | 7440-69-9  | E421      | 0.00905 mg/L  | 0.01 mg/L  | 90.5             | 70.0 | 130   |          |  |
|                  |                        | boron, dissolved      | 7440-42-8  | E421      | 0.092 mg/L    | 0.1 mg/L   | 91.7             | 70.0 | 130   |          |  |
|                  |                        | cadmium, dissolved    | 7440-43-9  | E421      | 0.00390 mg/L  | 0.004 mg/L   | 97.4             | 70.0 | 130   |          |  |
|                  |                        | calcium, dissolved    | 7440-70-2  | E421      | ND mg/L       | 4 mg/L   | ND               | 70.0 | 130   |          |  |
|                  |                        | cobalt, dissolved     | 7440-48-4  | E421      | 0.0185 mg/L   | 0.02 mg/L  | 92.7             | 70.0 | 130   |          |  |
|                  |                        | copper, dissolved     | 7440-50-8  | E421      | 0.0186 mg/L   | 0.02 mg/L  | 92.9             | 70.0 | 130   |          |  |
|                  |                        | iron, dissolved       | 7439-89-6  | E421      | 1.93 mg/L     | 2 mg/L   | 96.4             | 70.0 | 130   |          |  |
|                  |                        | lead, dissolved       | 7439-92-1  | E421      | 0.0195 mg/L   | 0.02 mg/L  | 97.4             | 70.0 | 130   |          |  |
|                  |                        | lithium, dissolved    | 7439-93-2  | E421      | 0.0925 mg/L   | 0.1 mg/L   | 92.5             | 70.0 | 130   |          |  |
|                  |                        | magnesium, dissolved  | 7439-95-4  | E421      | ND mg/L       | 1 mg/L   | ND               | 70.0 | 130   |          |  |
|                  |                        | manganese, dissolved  | 7439-96-5  | E421      | 0.0194 mg/L   | 0.02 mg/L  | 97.2             | 70.0 | 130   |          |  |
|                  |                        | molybdenum, dissolved | 7439-98-7  | E421      | 0.0205 mg/L   | 0.02 mg/L  | 102              | 70.0 | 130   |          |  |
|                  |                        | nickel, dissolved     | 7440-02-0  | E421      | 0.0377 mg/L   | 0.04 mg/L  | 94.3             | 70.0 | 130   |          |  |
|                  |                        | potassium, dissolved  | 7440-09-7  | E421      | 3.79 mg/L     | 4 mg/L   | 94.8             | 70.0 | 130   |          |  |
|                  |                        | selenium, dissolved   | 7782-49-2  | E421      | 0.0368 mg/L   | 0.04 mg/L  | 92.0             | 70.0 | 130   |          |  |
|                  |                        | silicon, dissolved    | 7440-21-3  | E421      | 9.11 mg/L     | 10 mg/L  | 91.1             | 70.0 | 130   |          |  |
|                  |                        | silver, dissolved     | 7440-22-4  | E421      | 0.00383 mg/L  | 0.004 mg/L   | 95.7             | 70.0 | 130   |          |  |
|                  |                        | sodium, dissolved     | 7440-23-5  | E421      | ND mg/L       | 2 mg/L   | ND               | 70.0 | 130   |          |  |
|                  |                        | strontium, dissolved  | 7440-24-6  | E421      | ND mg/L       | 0.02 mg/L  | ND               | 70.0 | 130   |          |  |
|                  |                        | sulfur, dissolved     | 7704-34-9  | E421      | ND mg/L       | 20 mg/L  | ND               | 70.0 | 130   |          |  |
|                  |                        | thallium, dissolved   | 7440-28-0  | E421      | 0.00390 mg/L  | 0.004 mg/L   | 97.4             | 70.0 | 130   |          |  |
|                  |                        | tin, dissolved        | 7440-31-5  | E421      | 0.0197 mg/L   | 0.02 mg/L  | 98.3             | 70.0 | 130   |          |  |
|                  |                        | titanium, dissolved   | 7440-32-6  | E421      | 0.0386 mg/L   | 0.04 mg/L  | 96.5             | 70.0 | 130   |          |  |
|                  |                        | uranium, dissolved    | 7440-61-1  | E421      | 0.00392 mg/L  | 0.004 mg/L   | 98.0             | 70.0 | 130   |          |  |
|                  |                        | vanadium, dissolved   | 7440-62-2  | E421      | 0.0954 mg/L   | 0.1 mg/L   | 95.4             | 70.0 | 130   |          |  |
|                  |                        | zinc, dissolved       | 7440-66-6  | E421      | 0.393 mg/L    | 0.4 mg/L   | 98.2             | 70.0 | 130   |          |  |
| ssolved Metals   | (QCLot: 539105)        |                       |            |           |               |  |                  |      |       |          |  |
| G2208029-005     | Anonymous              | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.0384 mg/L   | 0.04 mg/L  | 96.0             | 70.0 | 130   |          |  |

 Page
 : 18 of 18

 Work Order
 : CG2208042

 Client
 : Teck Coal Limited



| Sub-Matrix: Water |  |                    | Matrix Spike (MS) Report |        |               |             |              |          |            |           |
|-------------------|--|--------------------|--------------------------|--------|---------------|-------------|--------------|----------|------------|-----------|
|                   |  |                    |                          |        | Spi           | ke          | Recovery (%) | Recovery | Limits (%) |           |
| Laboratory sample | Client sample ID                             | Analyte            | CAS Number               | Method | Concentration | Target      | MS           | Low      | High       | Qualifier |
| Dissolved Metals  | Dissolved Metals (QCLot: 544103) - continued |                    |                          |        |               |             |              |          |            |           |
| CG2208029-003     | Anonymous                                    | mercury, dissolved | 7439-97-6                | E509   | 0.000103 mg/L | 0.0001 mg/L | 103          | 70.0     | 130        |           |

V

Calgary

Sample ID

LC\_FRUS\_WS\_LAEMP\_DRY\_2022-06\_N

LC\_CC1\_WS\_LAEMP\_DRY\_2022-06\_N

LC\_MT1\_WS\_LAEMP\_DRY\_2022-06\_N

LC\_RD1\_WS\_LAEMP\_DRY\_2022-06\_N

LCO Dry Creek LAEMP ALS COC ID: TURNAROUND TIME: RUSH: N/A Regular Facility Name / Job# Line Creek Operation - Lab Contact II yudinyla Shvets Email i Email Lyudmyla.Shvets@ALSGlobal.com Email Nicole Zathey@Teck.com Email 2: Teck Lab Results@teck.com A Address RR1 HWY 3 Address 2559 29 Street NE Email 3: Email 4: City Calgary City Sparwood Province Province AB Email 5: Canada V0B 2G1 Country Canada Postal Code T1Y 7B5 Country PO number **Environmental Division** Phone Number 403 407 1794 25-8137 SAMPLE DETAILS Work Order Reference CG2208042 HNOS NONE NONE NONE H2SO4 H2SO4 Hazardous Material (Yes/No) ALS\_Package-TKN/TOC ECKCOAL-ROUTINE FECKCOAL-METINHG TECKCOAL-MET-D-VA ALS\_Package-DOC HG-T-U-CVAF-VA G-Grab C=Com #Of Sample Location Field Time (sys loc code) Matrix Date (24hr) Cont. n LC FRUS WS 21-Jun-22 14:15 G 7 1 1 1 1 1 1 LC\_CC1 WS 21-Jun-22 G 7 1 14:15 1 1 LC\_MT1 WS 21-Jun-22 14:15 G 7 1 1 1 1 1 1 LC\_RD1 WS 21-Jun-22 14:15  $\mathbf{F}\mathbf{G}$ 1 7 1 1 1 HE RELINGUISHED BY/AFPILIATION Y .. DATE/TIME Robin Valleau June 22/2022

Robin Valleau

Mobile #

Date/Time

SERVICE REQUEST COMPANDES TO ANALOGOUS AND A

Sampler's Name

Sampler's Signature

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

June 22/2022

416-970-7535

# **WATER CHEMISTRY**

ALS Laboratory Report CG2212407 (Finalized 26-Sept-22)



## **CERTIFICATE OF ANALYSIS**

Page **Work Order** : CG2212407 : 1 of 6

Amendment : 1

Client : Teck Coal Limited Laboratory : Calgary - Environmental Contact : Nicole Zathey Account Manager : Lyudmyla Shvets Address Address : 421 Pine Avenue : 2559 29th Street NE

Sparwood BC Canada V0B2G0

Telephone

**Project** : LINE CREEK OPERATIONS

PO : VPO00817033

C-O-C number : REP LAEMP DRY 2022-09 ALS

Sampler : Jennifer Ings

Site

: Teck Coal Master Quote Quote number

No. of samples received : 2 : 2 No. of samples analysed

Calgary AB Canada T1Y 7B5

Telephone : +1 403 407 1800 Date Samples Received : 13-Sep-2022 09:11

**Date Analysis Commenced** : 13-Sep-2022

Issue Date : 26-Sep-2022 08:57

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

## Signatories

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

| Signatories      | Position           | Laboratory Department        |
|------------------|--------------------|------------------------------|
| Elke Tabora      |                    | Inorganics, Calgary, Alberta |
| Kevin Baxter     |                    | Metals, Calgary, Alberta     |
| Parker Sgarbossa | Laboratory Analyst | Inorganics, Calgary, Alberta |
| Ruifang Zheng    | Analyst            | Inorganics, Calgary, Alberta |
| Sara Niroomand   |                    | Inorganics, Calgary, Alberta |
| Sara Niroomand   |                    | Metals, Calgary, Alberta     |
| Sonthuong Bui    | Laboratory Analyst | Metals, Calgary, Alberta     |
| Vladka Stamenova | Analyst            | Inorganics, Calgary, Alberta |

Page : 2 of 6

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



#### **General Comments**

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| Unit     | Description                   |
|----------|-------------------------------|
| -        | No Unit                       |
| %        | percent                       |
| μg/L     | micrograms per litre          |
| μS/cm    | Microsiemens per centimetre   |
| meq/L    | milliequivalents per litre    |
| mg/L     | milligrams per litre          |
| mV       | millivolts                    |
| NTU      | nephelometric turbidity units |
| pH units | pH units                      |

<sup>&</sup>lt;: less than.

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

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

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

### **Qualifiers**

| Qualifier | Description   |
|-----------|---|
| HTA       | Analytical holding time was exceeded.   |
| TKNI      | TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN. |

<sup>&</sup>gt;: greater than.

Page

: 3 of 6 : CG2212407 Amendment 1 Work Order

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water)   |             |            | CI          | lient sample ID   | LC_FRB_WS_L<br>AEMP_DRY_20 | LC_FRUS_WS_<br>LAEMP_DRY_2 | <br> |  |
|-------------------------------------|-------------|------------|-------------|-------------------|----------------------------|----------------------------|------|--|
| (Wattis. Water)                     |             |            |             |                   | 22-09_N                    | 022-09_N                   |      |  |
|                                     |             |            | Client samp | oling date / time | 10-Sep-2022<br>14:00       | 10-Sep-2022<br>09:00       | <br> |  |
| Analyte                             | CAS Number  | Method     | LOR         | Unit              | CG2212407-001              | CG2212407-002              | <br> |  |
|                                     |             |            |             |                   | Result                     | Result                     | <br> |  |
| Physical Tests                      |             | F000       | 0.0         |                   | -0.0                       | -0.0                       |      |  |
| acidity (as CaCO3)                  |             | E283       | 2.0         | mg/L              | <2.0                       | <2.0                       | <br> |  |
| alkalinity, bicarbonate (as CaCO3)  |             | E290       | 1.0         | mg/L              | 202                        | 201                        | <br> |  |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3     | E290       | 1.0         | mg/L              | 247                        | 246                        | <br> |  |
| alkalinity, carbonate (as CaCO3)    |             | E290       | 1.0         | mg/L              | 7.8                        | 4.2                        | <br> |  |
| alkalinity, carbonate (as CO3)      | 3812-32-6   | E290       | 1.0         | mg/L              | 4.7                        | 2.5                        | <br> |  |
| alkalinity, hydroxide (as CaCO3)    |             | E290       | 1.0         | mg/L              | <1.0                       | <1.0                       | <br> |  |
| alkalinity, hydroxide (as OH)       | 14280-30-9  | E290       | 1.0         | mg/L              | <1.0                       | <1.0                       | <br> |  |
| alkalinity, total (as CaCO3)        | <del></del> | E290       | 1.0         | mg/L              | 210                        | 206                        | <br> |  |
| conductivity                        |             | E100       | 2.0         | μS/cm             | 769                        | 742                        | <br> |  |
| hardness (as CaCO3), dissolved      |             | EC100      | 0.50        | mg/L              | 410                        | 395                        | <br> |  |
| oxidation-reduction potential [ORP] |             | E125       | 0.10        | mV                | 327                        | 328                        | <br> |  |
| рН                                  |             | E108       | 0.10        | pH units          | 8.38                       | 8.30                       | <br> |  |
| solids, total dissolved [TDS]       |             | E162       | 10          | mg/L              | 590                        | 569                        | <br> |  |
| solids, total suspended [TSS]       |             | E160-L     | 1.0         | mg/L              | <1.0                       | <1.0                       | <br> |  |
| turbidity                           |             | E121       | 0.10        | NTU               | 0.17 HTA                   | 0.23 HTA                   | <br> |  |
| Anions and Nutrients                |             |            |             |                   |                            |                            |      |  |
| ammonia, total (as N)               | 7664-41-7   | E298       | 0.0050      | mg/L              | <0.0050                    | <0.0050                    | <br> |  |
| bromide                             | 24959-67-9  | E235.Br-L  | 0.050       | mg/L              | <0.050                     | <0.050                     | <br> |  |
| chloride                            | 16887-00-6  | E235.CI-L  | 0.10        | mg/L              | 2.89                       | 2.49                       | <br> |  |
| fluoride                            | 16984-48-8  | E235.F     | 0.020       | mg/L              | 0.171                      | 0.176                      | <br> |  |
| Kjeldahl nitrogen, total [TKN]      |             | E318       | 0.050       | mg/L              | 0.546 TKNI                 | 0.782 TKNI                 | <br> |  |
| nitrate (as N)                      | 14797-55-8  | E235.NO3-L | 0.0050      | mg/L              | 12.4                       | 11.7                       | <br> |  |
| nitrite (as N)                      | 14797-65-0  | E235.NO2-L | 0.0010      | mg/L              | 0.0079                     | 0.0041                     | <br> |  |
| phosphate, ortho-, dissolved (as P) | 14265-44-2  | E378-U     | 0.0010      | mg/L              | 0.0017                     | 0.0021                     | <br> |  |
| phosphorus, total                   | 7723-14-0   | E372-U     | 0.0020      | mg/L              | 0.0026                     | 0.0024                     | <br> |  |
| sulfate (as SO4)                    | 14808-79-8  | E235.SO4   | 0.30        | mg/L              | 197                        | 194                        | <br> |  |
| Organic / Inorganic Carbon          |             |            |             |                   |                            |                            |      |  |
| carbon, dissolved organic [DOC]     |             | E358-L     | 0.50        | mg/L              | <0.50                      | 0.62                       | <br> |  |
| carbon, total organic [TOC]         |             | E355-L     | 0.50        | mg/L              | <0.50                      | 0.53                       | <br> |  |

Page

: 4 of 6 : CG2212407 Amendment 1 Work Order

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

|                              |            |           |             | LC_FRB_WS_L<br>AEMP_DRY_20<br>22-09 N  | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-09 N | <br>                 |      |   |
|------------------------------|------------|-----------|-------------|--|--|----------------------|------|---|
|                              |            |           | Client samp | ling date / time                       | 10-Sep-2022<br>14:00                   | 10-Sep-2022<br>09:00 | <br> |   |
| Analyte                      | CAS Number | Method    | LOR         | Unit                                   | CG2212407-001                          | CG2212407-002        | <br> |   |
| Jan Balanca                  |            |           |             |  | Result                                 | Result               | <br> |   |
| lon Balance anion sum        |            | EC101     | 0.10        | meg/L                                  | 9.27                                   | 9.07                 | <br> | l |
| cation sum                   |            | EC101     | 0.10        | meq/L                                  | 8.36                                   | 8.05                 | <br> |   |
| ion balance (cations/anions) |            | EC101     | 0.010       | // // // // // // // // // // // // // | 90.2                                   | 88.8                 | <br> |   |
| ion balance (APHA)           |            | EC101     | 0.010       | %                                      | 5.16                                   | 5.96                 | <br> |   |
|                              |            | 20101     | 0.010       | 70                                     | 0.10                                   | 0.00                 |      |   |
| Total Metals aluminum, total | 7429-90-5  | E420      | 0.0030      | mg/L                                   | 0.0046                                 | 0.0062               | <br> |   |
| antimony, total              | 7440-36-0  | E420      | 0.0030      | mg/L                                   | 0.0040                                 | <0.0002              | <br> |   |
| arsenic, total               | 7440-38-2  | E420      | 0.00010     | mg/L                                   | <0.00011                               | 0.00010              | <br> |   |
| barium, total                | 7440-39-3  | E420      | 0.00010     | mg/L                                   | 0.109                                  | 0.101                | <br> |   |
| beryllium, total             |            | E420      | 0.00010     | μg/L                                   | <0.020                                 | <0.020               | <br> |   |
| •                            | 7440-41-7  | E420      | 0.00050     |  | <0.00050                               | <0.0000              | <br> |   |
| bismuth, total               | 7440-69-9  |           | 0.00030     | mg/L                                   | 0.000                                  | <0.000               |      |   |
| boron, total                 | 7440-42-8  | E420      |             | mg/L                                   |  |                      | <br> |   |
| cadmium, total               | 7440-43-9  | E420      | 0.0050      | μg/L                                   | 0.0284                                 | 0.0217               | <br> |   |
| calcium, total               | 7440-70-2  | E420      | 0.050       | mg/L                                   | 97.2                                   | 78.6                 | <br> |   |
| chromium, total              | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L                                   | 0.00012                                | 0.00013              | <br> |   |
| cobalt, total                | 7440-48-4  | E420      | 0.10        | μg/L<br>                               | <0.10                                  | <0.10                | <br> |   |
| copper, total                | 7440-50-8  | E420      | 0.00050     | mg/L                                   | <0.00050                               | <0.00050             | <br> |   |
| iron, total                  | 7439-89-6  | E420      | 0.010       | mg/L                                   | <0.010                                 | 0.010                | <br> |   |
| lead, total                  | 7439-92-1  | E420      | 0.000050    | mg/L                                   | <0.000050                              | <0.000050            | <br> |   |
| lithium, total               | 7439-93-2  | E420      | 0.0010      | mg/L                                   | 0.0322                                 | 0.0250               | <br> |   |
| magnesium, total             | 7439-95-4  | E420      | 0.0050      | mg/L                                   | 45.2                                   | 45.6                 | <br> |   |
| manganese, total             | 7439-96-5  | E420      | 0.00010     | mg/L                                   | 0.00160                                | 0.00178              | <br> |   |
| mercury, total               | 7439-97-6  | E508      | 0.0000050   | mg/L                                   | <0.0000050                             | <0.0000050           | <br> |   |
| molybdenum, total            | 7439-98-7  | E420      | 0.000050    | mg/L                                   | 0.00128                                | 0.000998             | <br> |   |
| nickel, total                | 7440-02-0  | E420      | 0.00050     | mg/L                                   | 0.00096                                | 0.00087              | <br> |   |
| potassium, total             | 7440-09-7  | E420      | 0.050       | mg/L                                   | 1.30                                   | 1.24                 | <br> |   |
| selenium, total              | 7782-49-2  | E420      | 0.050       | μg/L                                   | 50.0                                   | 45.0                 | <br> |   |
| silicon, total               | 7440-21-3  | E420      | 0.10        | mg/L                                   | 2.17                                   | 2.21                 | <br> |   |
| silver, total                | 7440-22-4  | E420      | 0.000010    | mg/L                                   | <0.000010                              | 0.000013             | <br> |   |
| sodium, total                | 7440-23-5  | E420      | 0.050       | mg/L                                   | 2.80                                   | 2.77                 | <br> |   |

Page

: 5 of 6 : CG2212407 Amendment 1 Work Order

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           | Cli       | ient sample ID   | LC_FRB_WS_L<br>AEMP_DRY_20<br>22-09_N | LC_FRUS_WS_<br>LAEMP_DRY_2<br>022-09_N | <br>            |  |
|-----------------------------------|------------|-----------|-----------|------------------|---------------------------------------|--|-----------------|--|
|                                   |            |           | ·         | ling date / time | 10-Sep-2022<br>14:00                  | 10-Sep-2022<br>09:00                   | <br>            |  |
| Analyte                           | CAS Number | Method    | LOR       | Unit             | CG2212407-001<br>Result               | CG2212407-002<br>Result                | <br>            |  |
| Total Metals                      |            |           |           |                  | Nesuit                                | Result                                 | <br><del></del> |  |
| strontium, total                  | 7440-24-6  | E420      | 0.00020   | mg/L             | 0.145                                 | 0.122                                  | <br>            |  |
| sulfur, total                     | 7704-34-9  | E420      | 0.50      | mg/L             | 68.2                                  | 67.6                                   | <br>            |  |
| thallium, total                   | 7440-28-0  | E420      | 0.000010  | mg/L             | <0.000010                             | <0.000010                              | <br>            |  |
| tin, total                        | 7440-31-5  | E420      | 0.00010   | mg/L             | <0.00010                              | <0.00010                               | <br>            |  |
| titanium, total                   | 7440-32-6  | E420      | 0.00030   | mg/L             | <0.00030                              | <0.00030                               | <br>            |  |
| uranium, total                    | 7440-61-1  | E420      | 0.000010  | mg/L             | 0.00220                               | 0.00185                                | <br>            |  |
| vanadium, total                   | 7440-62-2  | E420      | 0.00050   | mg/L             | <0.00050                              | <0.00050                               | <br>            |  |
| zinc, total                       | 7440-66-6  | E420      | 0.0030    | mg/L             | <0.0030                               | <0.0030                                | <br>            |  |
| Dissolved Metals                  |            |           |           |                  |                                       |  |                 |  |
| aluminum, dissolved               | 7429-90-5  | E421      | 0.0010    | mg/L             | <0.0010                               | <0.0010                                | <br>            |  |
| antimony, dissolved               | 7440-36-0  | E421      | 0.00010   | mg/L             | 0.00011                               | <0.00010                               | <br>            |  |
| arsenic, dissolved                | 7440-38-2  | E421      | 0.00010   | mg/L             | <0.00010                              | <0.00010                               | <br>            |  |
| barium, dissolved                 | 7440-39-3  | E421      | 0.00010   | mg/L             | 0.0951                                | 0.0868                                 | <br>            |  |
| beryllium, dissolved              | 7440-41-7  | E421      | 0.020     | μg/L             | <0.020                                | <0.020                                 | <br>            |  |
| bismuth, dissolved                | 7440-69-9  | E421      | 0.000050  | mg/L             | <0.000050                             | <0.000050                              | <br>            |  |
| boron, dissolved                  | 7440-42-8  | E421      | 0.010     | mg/L             | <0.010                                | <0.010                                 | <br>            |  |
| cadmium, dissolved                | 7440-43-9  | E421      | 0.0050    | μg/L             | 0.0277                                | 0.0208                                 | <br>            |  |
| calcium, dissolved                | 7440-70-2  | E421      | 0.050     | mg/L             | 94.4                                  | 91.4                                   | <br>            |  |
| chromium, dissolved               | 7440-47-3  | E421.Cr-L | 0.00010   | mg/L             | 0.00010                               | <0.00010                               | <br>            |  |
| cobalt, dissolved                 | 7440-48-4  | E421      | 0.10      | μg/L             | <0.10                                 | <0.10                                  | <br>            |  |
| copper, dissolved                 | 7440-50-8  | E421      | 0.00020   | mg/L             | <0.00020                              | <0.00020                               | <br>            |  |
| iron, dissolved                   | 7439-89-6  | E421      | 0.010     | mg/L             | <0.010                                | <0.010                                 | <br>            |  |
| lead, dissolved                   | 7439-92-1  | E421      | 0.000050  | mg/L             | <0.000050                             | <0.000050                              | <br>            |  |
| lithium, dissolved                | 7439-93-2  | E421      | 0.0010    | mg/L             | 0.0264                                | 0.0260                                 | <br>            |  |
| magnesium, dissolved              | 7439-95-4  | E421      | 0.0050    | mg/L             | 42.4                                  | 40.6                                   | <br>            |  |
| manganese, dissolved              | 7439-96-5  | E421      | 0.00010   | mg/L             | 0.00121                               | 0.00137                                | <br>            |  |
| mercury, dissolved                | 7439-97-6  | E509      | 0.0000050 | mg/L             | <0.0000050                            | <0.0000050                             | <br>            |  |
| molybdenum, dissolved             | 7439-98-7  | E421      | 0.000050  | mg/L             | 0.00126                               | 0.00110                                | <br>            |  |
| nickel, dissolved                 | 7440-02-0  | E421      | 0.00050   | mg/L             | 0.00086                               | 0.00082                                | <br>            |  |
| potassium, dissolved              | 7440-09-7  | E421      | 0.050     | mg/L             | 1.34                                  | 1.25                                   | <br>            |  |

Page : 6 of 6

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water                     |            |        | CI          | ient sample ID   | LC_FRB_WS_L            | LC_FRUS_WS_             | <br> |  |
|---------------------------------------|------------|--------|-------------|------------------|------------------------|-------------------------|------|--|
| (Matrix: Water)                       |            |        |             |                  | AEMP_DRY_20<br>22-09 N | LAEMP_DRY_2<br>022-09 N |      |  |
|                                       |            |        | Client samp | ling date / time | 10-Sep-2022<br>14:00   | 10-Sep-2022<br>09:00    | <br> |  |
| Analyte                               | CAS Number | Method | LOR         | Unit             | CG2212407-001          | CG2212407-002           | <br> |  |
|                                       |            |        |             |                  | Result                 | Result                  | <br> |  |
| Dissolved Metals                      |            |        |             |                  |                        |                         |      |  |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050       | μg/L             | 46.8                   | 51.1                    | <br> |  |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050       | mg/L             | 2.20                   | 2.25                    | <br> |  |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010    | mg/L             | <0.000010              | <0.000010               | <br> |  |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050       | mg/L             | 2.91                   | 2.71                    | <br> |  |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020     | mg/L             | 0.153                  | 0.146                   | <br> |  |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50        | mg/L             | 63.8                   | 66.2                    | <br> |  |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010    | mg/L             | <0.000010              | <0.000010               | <br> |  |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010     | mg/L             | <0.00010               | <0.00010                | <br> |  |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030     | mg/L             | <0.00030               | <0.00030                | <br> |  |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010    | mg/L             | 0.00235                | 0.00222                 | <br> |  |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050     | mg/L             | <0.00050               | <0.00050                | <br> |  |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010      | mg/L             | <0.0010                | 0.0027                  | <br> |  |
| dissolved mercury filtration location |            | EP509  | -           | -                | Field                  | Field                   | <br> |  |
| dissolved metals filtration location  |            | EP421  | -           | -                | Field                  | Field                   | <br> |  |

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



## **QUALITY CONTROL INTERPRETIVE REPORT**

**Work Order** : **CG2212407** Page : 1 of 15

Amendment : 1

 Client
 : Teck Coal Limited
 Laboratory
 : Calgary - Environmental

 Contact
 : Nicole Zathey
 Account Manager
 : Lyudmyla Shvets

 Address
 : 421 Pine Avenue
 Address
 : 2559 29th Street NE

Sparwood BC Canada V0B2G0

Calgary, Alberta Canada T1Y 7B5

 Telephone
 : -- Telephone
 : +1 403 407 1800

 Project
 : LINE CREEK OPERATIONS
 Date Samples Received
 : 13-Sep-2022 09:11

 PO
 : VPO00817033
 Issue Date
 : 26-Sep-2022 08:57

C-O-C number : REP LAEMP DRY 2022-09 ALS

Sampler : Jennifer Ings

Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 2
No. of samples analysed : 2

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

#### Key

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

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

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

### **Workorder Comments**

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

## **Summary of Outliers**

## **Outliers: Quality Control Samples**

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

### Outliers: Reference Material (RM) Samples

• No Reference Material (RM) Sample outliers occur.

## Outliers : Analysis Holding Time Compliance (Breaches)

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

**Outliers : Frequency of Quality Control Samples** 

| <u>No</u> Quality Control Sample Frequency Outliers occur. |  |  |
|--|--|--|
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Page : 3 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **Analysis Holding Time Compliance**

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

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

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

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

| Matrix: Water   |           |               |             |         | Ev       | aluation: 🗴 =      | Holding time exce | edance ; •    | / = Within | Holding Time |
|---|-----------|---------------|-------------|---------|----------|--------------------|-------------------|---------------|------------|--------------|
| Analyte Group   | Method    | Sampling Date | Ext         |         | Analysis |                    |                   |               |            |              |
| Container / Client Sample ID(s)   |           |               | Preparation | Holding | g Times  | Eval Analysis Date |                   | Holding Times |            | Eval         |
|   |           |               | Date        | Rec     | Actual   |                    |                   | Rec           | Actual     |              |
| Anions and Nutrients : Ammonia by Fluorescence                                  |           |               |             |         |          |                    |                   |               |            |              |
| Amber glass total (sulfuric acid)  LC_FRB_WS_LAEMP_DRY_2022-09_N                | E298      | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Ammonia by Fluorescence                                  |           |               |             |         |          |                    |                   |               |            |              |
| Amber glass total (sulfuric acid) LC_FRUS_WS_LAEMP_DRY_2022-09_N                | E298      | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Bromide in Water by IC (Low Level)                       |           |               |             |         |          |                    |                   |               |            |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N  | E235.Br-L | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Bromide in Water by IC (Low Level)                       |           |               |             |         |          |                    |                   |               |            |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N   | E235.Br-L | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |         |          |                    |                   |               |            |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N  | E235.CI-L | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |         |          |                    |                   |               |            |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N   | E235.CI-L | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 28 days       | 3 days     | ✓            |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001 |               |             |         |          |                    | 1                 |               |            |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N  | E378-U    | 10-Sep-2022   | 13-Sep-2022 |         |          |                    | 13-Sep-2022       | 3 days        | 3 days     | 1            |

Page : 4 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited



| latrix: Water   |                   |               |                     |                |                   | aluation: × = | Holding time exce |                |                   | Holding T |
|---|-------------------|---------------|---------------------|----------------|-------------------|---------------|-------------------|----------------|-------------------|-----------|
| Analyte Group   | Method            | Sampling Date | Ex                  | traction / Pr  |                   |               | -                 | Analys         |                   |           |
| Container / Client Sample ID(s)                                       |                   |               | Preparation<br>Date | Holding<br>Rec | 7 Times<br>Actual | Eval          | Analysis Date     | Holding<br>Rec | g Times<br>Actual | Eval      |
| nions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra | Trace Level 0.001 |               | Date                | Nec            | Actual            |               |                   | rec            | Actual            |           |
| HDPE  |                   |               |                     |                |                   |               |                   |                |                   |           |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N  | E378-U            | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 3 days         | 3 days            | ✓         |
| nions and Nutrients : Fluoride in Water by IC                         |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N                                    | E235.F            | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 28 days        | 3 days            | ✓         |
| nions and Nutrients : Fluoride in Water by IC                         |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N                                   | E235.F            | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 28 days        | 3 days            | ✓         |
| nions and Nutrients : Nitrate in Water by IC (Low Level)              |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE<br>LC_FRB_WS_LAEMP_DRY_2022-09_N                                 | E235.NO3-L        | 10-Sep-2022   | 13-Sep-2022         | 3 days         | 3 days            | ✓             | 13-Sep-2022       | 3 days         | 0 days            | ✓         |
| nions and Nutrients : Nitrate in Water by IC (Low Level)              |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N                                   | E235.NO3-L        | 10-Sep-2022   | 13-Sep-2022         | 3 days         | 3 days            | ✓             | 13-Sep-2022       | 3 days         | 0 days            | ✓         |
| nions and Nutrients : Nitrite in Water by IC (Low Level)              |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N                                    | E235.NO2-L        | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 3 days         | 3 days            | ✓         |
| nions and Nutrients : Nitrite in Water by IC (Low Level)              |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE<br>LC_FRUS_WS_LAEMP_DRY_2022-09_N                                | E235.NO2-L        | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 3 days         | 3 days            | ✓         |
| nions and Nutrients : Sulfate in Water by IC                          |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N                                    | E235.SO4          | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 28 days        | 3 days            | ✓         |
| nions and Nutrients : Sulfate in Water by IC                          |                   |               |                     |                |                   |               |                   |                |                   |           |
| HDPE<br>LC_FRUS_WS_LAEMP_DRY_2022-09_N                                | E235.SO4          | 10-Sep-2022   | 13-Sep-2022         |                |                   |               | 13-Sep-2022       | 28 days        | 3 days            | ✓         |

Page : 5 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



 Matrix: Water
 Evaluation: x = Holding time exceedance; √ = Within Holding Time

 Analyte Group
 Method
 Sampling Date
 Extraction / Preparation
 Analysis

| Analyte Group  | Method    | Sampling Date | Ex           | raction / Pi | reparation |      |               | Analys  | sis     |          |
|--|-----------|---------------|--------------|--------------|------------|------|---------------|---------|---------|----------|
| Container / Client Sample ID(s)  |           |               | Preparation  | Holdin       | g Times    | Eval | Analysis Date | Holding | g Times | Eval     |
|  |           |               | Date         | Rec          | Actual     |      | -             | Rec     | Actual  |          |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |              |              |            |      |               |         |         |          |
| Amber glass total (sulfuric acid)  |           |               |              |              |            |      |               |         |         |          |
| LC FRB WS LAEMP DRY 2022-09 N  | E318      | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 28 days | 4 days  | ✓        |
| LO_111B_VVO_B1ENII _B111_2022-00_1V  | 2010      | 10 00p 2022   | 11 COP 2022  |              |            |      | 11 000 2022   | 20 dayo | ladyo   | •        |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |              |              |            |      |               |         |         |          |
| Amber glass total (sulfuric acid)  |           |               |              |              |            |      |               |         |         |          |
| LC FRUS WS LAEMP DRY 2022-09 N   | E318      | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 28 days | 4 days  | ✓        |
|  |           | · ·           | ,            |              |            |      | , ,           | ,       | , ,     |          |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |              |              |            |      |               |         |         |          |
| Amber glass total (sulfuric acid)  |           |               |              |              |            |      |               |         |         |          |
| LC_FRB_WS_LAEMP_DRY_2022-09_N  | E372-U    | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 15-Sep-2022   | 28 days | 5 days  | ✓        |
|  |           |               |              |              |            |      |               |         |         |          |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |              |              |            |      |               |         | 1       |          |
| Amber glass total (sulfuric acid)  |           |               |              |              |            |      |               |         |         |          |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N   | E372-U    | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 15-Sep-2022   | 28 days | 5 days  | ✓        |
|  |           |               |              |              |            |      |               |         |         |          |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |              |              |            |      |               |         |         |          |
| HDPE - dissolved (lab preserved)   |           |               |              |              |            |      |               |         |         |          |
| LC_FRB_WS_LAEMP_DRY_2022-09_N  | E421.Cr-L | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 180     | 4 days  | ✓        |
|  |           |               |              |              |            |      |               | days    |         |          |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |              |              |            |      |               |         |         |          |
| HDPE - dissolved (lab preserved)   |           |               |              |              |            |      |               |         |         |          |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N   | E421.Cr-L | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 180     | 4 days  | ✓        |
|  |           |               |              |              |            |      |               | days    |         |          |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                     |           |               |              |              |            |      |               |         |         |          |
| Glass vial dissolved (hydrochloric acid)                                   | F500      | 40 0 0000     | 44.0 0000    |              |            |      | 44.0 0000     | 00.1    | 4 4     |          |
| LC_FRB_WS_LAEMP_DRY_2022-09_N  | E509      | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 28 days | 4 days  | ✓        |
|  |           |               |              |              |            |      |               |         |         |          |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                     |           |               |              |              | I          |      |               | T       |         |          |
| Glass vial dissolved (hydrochloric acid)                                   | F500      | 40.0 0000     | 44.0 2000    |              |            |      | 44.0 0000     | 00.4    | F 4     | ,        |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N   | E509      | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 28 days | o days  | ✓        |
|  |           |               |              |              |            |      |               |         |         |          |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                  |           |               |              |              |            |      |               |         |         |          |
| HDPE - dissolved (lab preserved)  LC FRB WS LAEMP DRY 2022-09 N            | E421      | 10-Sep-2022   | 14-Sep-2022  |              |            |      | 14-Sep-2022   | 180     | 4 days  | <b>√</b> |
| FO_LVD_440_FVFIAIL_DI/L_5055-09_IA   | L721      | 10-06p-2022   | 1-4-06p-2022 |              |            |      | 1-4-06p-2022  |         | - uays  | •        |
|  |           |               |              |              |            |      |               | days    |         |          |

Page : 6 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited



| atrix: Water   |                      |               |                     |                |                   |      | Holding time exce |                |                 |          |
|--|----------------------|---------------|---------------------|----------------|-------------------|------|-------------------|----------------|-----------------|----------|
| Analyte Group  | Method               | Sampling Date |                     | traction / Pr  | •                 |      |                   | Analys         |                 |          |
| Container / Client Sample ID(s)  |                      |               | Preparation<br>Date | Holding<br>Rec | 7 Times<br>Actual | Eval | Analysis Date     | Holding<br>Rec | Times<br>Actual | Eval     |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                |                      |               |                     |                |                   |      |                   |                |                 |          |
| HDPE - dissolved (lab preserved)  LC_FRUS_WS_LAEMP_DRY_2022-09_N         | E421                 | 10-Sep-2022   | 14-Sep-2022         |                |                   |      | 14-Sep-2022       | 180<br>days    | 4 days          | ✓        |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Lo  | w Level)             |               |                     |                |                   |      |                   |                |                 |          |
| Amber glass dissolved (sulfuric acid) LC_FRB_WS_LAEMP_DRY_2022-09_N      | E358-L               | 10-Sep-2022   | 13-Sep-2022         |                |                   |      | 14-Sep-2022       | 28 days        | 3 days          | <b>√</b> |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Lo  | w Level)             |               |                     |                |                   |      |                   |                |                 |          |
| Amber glass dissolved (sulfuric acid)  LC_FRUS_WS_LAEMP_DRY_2022-09_N    | E358-L               | 10-Sep-2022   | 13-Sep-2022         |                |                   |      | 14-Sep-2022       | 28 days        | 3 days          | ✓        |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Com | ibustion (Low Level) |               |                     |                |                   |      |                   |                |                 |          |
| Amber glass total (sulfuric acid) LC_FRB_WS_LAEMP_DRY_2022-09_N          | E355-L               | 10-Sep-2022   | 13-Sep-2022         |                |                   |      | 14-Sep-2022       | 28 days        | 3 days          | ✓        |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Com | bustion (Low Level)  |               |                     |                |                   |      |                   |                |                 |          |
| Amber glass total (sulfuric acid)  LC_FRUS_WS_LAEMP_DRY_2022-09_N        | E355-L               | 10-Sep-2022   | 13-Sep-2022         |                |                   |      | 14-Sep-2022       | 28 days        | 3 days          | ✓        |
| Physical Tests : Acidity by Titration                                    |                      |               |                     |                |                   |      |                   |                |                 |          |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N                                       | E283                 | 10-Sep-2022   | 14-Sep-2022         |                |                   |      | 14-Sep-2022       | 14 days        | 4 days          | ✓        |
| Physical Tests : Acidity by Titration                                    |                      |               |                     |                |                   |      |                   |                |                 |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N                                      | E283                 | 10-Sep-2022   | 14-Sep-2022         |                |                   |      | 14-Sep-2022       | 14 days        | 4 days          | ✓        |
| Physical Tests : Alkalinity Species by Titration                         |                      |               |                     |                |                   |      | 1                 |                |                 |          |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N                                       | E290                 | 10-Sep-2022   | 14-Sep-2022         |                |                   |      | 14-Sep-2022       | 14 days        | 4 days          | ✓        |
| Physical Tests : Alkalinity Species by Titration                         |                      |               |                     |                |                   |      |                   |                |                 |          |
| HDPE  LC FRUS WS LAEMP DRY 2022-09 N                                     | E290                 | 10-Sep-2022   | 14-Sep-2022         |                |                   |      | 14-Sep-2022       | 14 days        | 4 days          | 1        |

Page : 7 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited



| Matrix: Water                                  |        |               |             |                |                 | aluation: × = | Holding time exce |                |                   | Holding Tin  |
|--|--------|---------------|-------------|----------------|-----------------|---------------|-------------------|----------------|-------------------|--------------|
| Analyte Group                                  | Method | Sampling Date | Ext         | traction / Pre |                 |               |                   | Analys         |                   |              |
| Container / Client Sample ID(s)                |        | P             |             | Holding<br>Rec | Times<br>Actual | Eval          | Analysis Date     | Holding<br>Rec | g Times<br>Actual | Eval         |
| Physical Tests : Conductivity in Water         |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N             | E100   | 10-Sep-2022   | 14-Sep-2022 |                |                 |               | 14-Sep-2022       | 28 days        | 4 days            | ✓            |
| Physical Tests : Conductivity in Water         |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N            | E100   | 10-Sep-2022   | 14-Sep-2022 |                |                 |               | 14-Sep-2022       | 28 days        | 4 days            | ✓            |
| Physical Tests : ORP by Electrode              |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N             | E125   | 10-Sep-2022   |             |                |                 |               | 14-Sep-2022       | 0.25<br>hrs    | 93 hrs            | ×<br>EHTR-FM |
| Physical Tests : ORP by Electrode              |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N            | E125   | 10-Sep-2022   |             |                |                 |               | 14-Sep-2022       | 0.25<br>hrs    | 98 hrs            | *<br>EHTR-FM |
| Physical Tests : pH by Meter                   |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N             | E108   | 10-Sep-2022   | 14-Sep-2022 |                |                 |               | 14-Sep-2022       | 0.25<br>hrs    | 0.26<br>hrs       | *<br>EHTR-FN |
| Physical Tests : pH by Meter                   |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N            | E108   | 10-Sep-2022   | 14-Sep-2022 |                |                 |               | 14-Sep-2022       | 0.25<br>hrs    | 0.26<br>hrs       | *<br>EHTR-FM |
| Physical Tests : TDS by Gravimetry             |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N             | E162   | 10-Sep-2022   |             |                |                 |               | 14-Sep-2022       | 7 days         | 4 days            | ✓            |
| Physical Tests : TDS by Gravimetry             |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N            | E162   | 10-Sep-2022   |             |                |                 |               | 14-Sep-2022       | 7 days         | 4 days            | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |                |                 |               |                   |                |                   |              |
| HDPE<br>LC_FRB_WS_LAEMP_DRY_2022-09_N          | E160-L | 10-Sep-2022   |             |                |                 |               | 14-Sep-2022       | 7 days         | 4 days            | ✓            |

Page : 8 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

: LINE CREEK OPERATIONS Project



| Matrix: Water                                  |  |             |             |                      | Ev                       | valuation: <b>≭</b> = l | Holding time excee | edance ; 🛚 | / = Within | Holding Time |
|--|--|-------------|-------------|----------------------|--------------------------|-------------------------|--------------------|------------|------------|--------------|
| Analyte Group                                  | Method Sampling Date Extraction / Preparation Analysis |             |             |                      | Extraction / Preparation |                         | is                 |            |            |              |
| Container / Client Sample ID(s)                |  |             | Preparation | ration Holding Times |                          | Eval                    | Analysis Date      | Holding    | g Times    | Eval         |
|  |  |             | Date        | Rec                  | Actual                   |                         |                    | Rec        | Actual     |              |
| Physical Tests : TSS by Gravimetry (Low Level) |  |             |             |                      |                          |                         |                    |            |            |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N            | E160-L   | 10-Sep-2022 |             |                      |                          |                         | 14-Sep-2022        | 7 days     | 4 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |  |             |             |                      |                          |                         |                    |            |            |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-09_N             | E121   | 10-Sep-2022 |             |                      |                          |                         | 13-Sep-2022        | 3 days     | 3 days     | <b>✓</b>     |

|  |           |             | Date        | Rec | Actual   |             | Rec         | Actual |          |
|--|-----------|-------------|-------------|-----|--|-------------|-------------|--------|----------|
| Physical Tests : TSS by Gravimetry (Low Level)                 |           |             |             |     |  |             |             |        |          |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-09_N                            | E160-L    | 10-Sep-2022 |             |     |  | 14-Sep-2022 | 7 days      | 4 days | 1        |
|  |           | ·           |             |     |  | ·           | -           | -      |          |
| hysical Tests : Turbidity by Nephelometry                      |           |             |             |     |  |             |             |        |          |
| HDPE   | E121      | 10-Sep-2022 |             |     |  | 13-Sep-2022 | 0 4         | 3 days | <b>✓</b> |
| LC_FRB_WS_LAEMP_DRY_2022-09_N                                  | EIZI      | 10-Sep-2022 | <del></del> |     |  | 13-Sep-2022 | 3 days      | 3 days | _        |
| hysical Tests : Turbidity by Nephelometry                      |           |             |             |     |  |             |             |        |          |
| HDPE   | E121      | 10-Sep-2022 |             |     |  | 13-Sep-2022 | 3 days      | 3 days | <b>/</b> |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N                                 | E121      | 10-Зер-2022 |             |     |  | 13-3ep-2022 | 3 uays      | 3 uays | ,        |
| otal Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |             |             |     |  |             |             |        |          |
| HDPE - total (lab preserved)  LC_FRB_WS_LAEMP_DRY_2022-09_N    | E420.Cr-L | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 400         | 4 days | _        |
| LC_FRD_WS_LAEMP_DR1_2022-09_N                                  | E420.GI-L | 10-Зер-2022 | 14-Зер-2022 |     |  | 14-3ep-2022 | 180<br>days | 4 uays | ,        |
| otal Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |             |             |     |  |             |             |        |          |
| HDPE - total (lab preserved)<br>LC_FRUS_WS_LAEMP_DRY_2022-09_N | E420.Cr-L | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 180         | 4 days | 1        |
| E0_1 1005_440_21.EMI _51(1_2022 00_1(                          | 2.20.0. 2 | 10 000 2022 | 11 000 2022 |     |  | 11 Cop 2022 | days        | , dayo |          |
| otal Metals : Total Mercury in Water by CVAAS                  |           |             |             |     |  |             |             |        |          |
| Glass vial total (hydrochloric acid)                           | E508      | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 28 days     | 4 days | 1        |
| LC_FRB_WS_LAEMP_DRY_2022-09_N                                  | E306      | 10-Зер-2022 | 14-3ep-2022 |     |  | 14-3ep-2022 | 20 days     | 4 uays | ,        |
| otal Metals : Total Mercury in Water by CVAAS                  |           |             |             |     |  |             |             |        |          |
| Glass vial total (hydrochloric acid)                           | E508      | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 29 days     | 5 dovo | 1        |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N                                 | E306      | 10-Зер-2022 | 14-5ep-2022 |     |  | 14-3ep-2022 | 28 days     | 5 days | <b>,</b> |
| otal Metals : Total Metals in Water by CRC ICPMS               |           |             |             |     |  |             |             |        |          |
| HDPE - total (lab preserved)                                   | E400      | 40.0 2000   | 44.0 2000   |     |  | 44.0 0000   |             | 4 -1   | /        |
| LC_FRB_WS_LAEMP_DRY_2022-09_N                                  | E420      | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 180<br>days | 4 days | _        |
| otal Metals : Total Metals in Water by CRC ICPMS               |           |             |             |     |  |             |             | I      |          |
|  |           |             |             | I   | T. Control of the Con |             |             |        |          |
| HDPE - total (lab preserved)<br>LC FRUS WS LAEMP DRY 2022-09 N | E420      | 10-Sep-2022 | 14-Sep-2022 |     |  | 14-Sep-2022 | 180         | 4 days | 1        |

## **Legend & Qualifier Definitions**

Page : 9 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Rec. HT: ALS recommended hold time (see units).

Page : 10 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **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.

| Quality Control Sample Type   | Co         | ount     |    | Frequency (%) | )      |          |            |
|---|------------|----------|----|---------------|--------|----------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular       | Actual | Expected | Evaluation |
| Laboratory Duplicates (DUP)   |            |          |    |               |        |          |            |
| Acidity by Titration  | E283       | 646040   | 1  | 9             | 11.1   | 5.0      | 1          |
| Alkalinity Species by Titration   | E290       | 646035   | 1  | 20            | 5.0    | 5.0      | <u>√</u>   |
| Ammonia by Fluorescence   | E298       | 645526   | 1  | 9             | 11.1   | 5.0      | <b>✓</b>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 645371   | 1  | 4             | 25.0   | 5.0      | <u>√</u>   |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 645372   | 1  | 4             | 25.0   | 5.0      | <b>✓</b>   |
| Conductivity in Water   | E100       | 646037   | 1  | 5             | 20.0   | 5.0      | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 646741   | 1  | 18            | 5.5    | 5.0      | 1          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 647532   | 1  | 13            | 7.6    | 5.0      | <b>✓</b>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 646742   | 1  | 18            | 5.5    | 5.0      | <u>√</u>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 645441   | 1  | 9             | 11.1   | 5.0      |            |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 645355   | 1  | 20            | 5.0    | 5.0      | <u> </u>   |
| Fluoride in Water by IC   | E235.F     | 645370   | 1  | 4             | 25.0   | 5.0      |            |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 645373   | 1  | 4             | 25.0   | 5.0      | <u> </u>   |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 645374   | 1  | 4             | 25.0   | 5.0      | <u> </u>   |
| ORP by Electrode  | E125       | 646219   | 1  | 9             | 11.1   | 5.0      |            |
| pH by Meter   | E108       | 646036   | 1  | 5             | 20.0   | 5.0      | <u> </u>   |
| Sulfate in Water by IC  | E235.SO4   | 645375   | 1  | 4             | 25.0   | 5.0      |            |
| TDS by Gravimetry   | E162       | 647154   | 1  | 11            | 9.0    | 5.0      | <u> </u>   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 646084   | 1  | 5             | 20.0   | 5.0      | <u>√</u>   |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 645448   | 1  | 9             | 11.1   | 5.0      |            |
| Total Mercury in Water by CVAAS   | E508       | 647531   | 1  | 13            | 7.6    | 5.0      | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 646083   | 1  | 6             | 16.6   | 5.0      |            |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 645442   | 1  | 9             | 11.1   | 5.0      |            |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 646476   | 1  | 9             | 11.1   | 5.0      | <u>√</u>   |
| Turbidity by Nephelometry   | E121       | 645376   | 1  | 6             | 16.6   | 5.0      | <b>✓</b>   |
| Laboratory Control Samples (LCS)  |            |          | _  |               |        |          |            |
| Acidity by Titration  | E283       | 646040   | 1  | 9             | 11.1   | 5.0      | 1          |
| Alkalinity Species by Titration   | E290       | 646035   | 1  | 20            | 5.0    | 5.0      | <u> </u>   |
| Ammonia by Fluorescence   | E298       | 645526   | 1  | 9             | 11.1   | 5.0      | <u> </u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 645371   | 1  | 4             | 25.0   | 5.0      |            |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 645372   | 1  | 4             | 25.0   | 5.0      | <u> </u>   |
| Conductivity in Water   | E100       | 646037   | 1  | 5             | 20.0   | 5.0      | <u> </u>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 646741   | 1  | 18            | 5.5    | 5.0      | <u> </u>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 647532   | 1  | 13            | 7.6    | 5.0      | <u> </u>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 646742   | 1  | 18            | 5.5    | 5.0      | <u> </u>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 645441   | 1  | 9             | 11.1   | 5.0      | <u> </u>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 645355   | 1  | 20            | 5.0    | 5.0      |            |

Page : 11 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

: LINE CREEK OPERATIONS Project



| Matrix: Water   | <u> </u>               | Evaluati | ion: × = QC frequ |         | ecification; ✓ = |               | <u> </u>   |
|---|------------------------|----------|-------------------|---------|------------------|---------------|------------|
| Quality Control Sample Type   |                        |          |                   | ount    |                  | Frequency (%) |            |
| Analytical Methods  | Method                 | QC Lot # | QC                | Regular | Actual           | Expected      | Evaluation |
| Laboratory Control Samples (LCS) - Continued                            |                        |          |                   |         |                  |               |            |
| Fluoride in Water by IC   | E235.F                 | 645370   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L             | 645373   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L             | 645374   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| ORP by Electrode  | E125                   | 646219   | 1                 | 9       | 11.1             | 5.0           | ✓          |
| pH by Meter   | E108                   | 646036   | 1                 | 5       | 20.0             | 5.0           | ✓          |
| Sulfate in Water by IC  | E235.SO4               | 645375   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| TDS by Gravimetry   | E162                   | 647154   | 1                 | 11      | 9.0              | 5.0           | <b>√</b>   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L              | 646084   | 1                 | 5       | 20.0             | 5.0           | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318                   | 645448   | 1                 | 9       | 11.1             | 5.0           | ✓          |
| Total Mercury in Water by CVAAS   | E508                   | 647531   | 1                 | 13      | 7.6              | 5.0           | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420                   | 646083   | 1                 | 6       | 16.6             | 5.0           | <b>√</b>   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L                 | 645442   | 1                 | 9       | 11.1             | 5.0           | <u>√</u>   |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U                 | 646476   | 1                 | 9       | 11.1             | 5.0           |            |
| TSS by Gravimetry (Low Level)   | E160-L                 | 647137   | 1                 | 17      | 5.8              | 5.0           | <u>√</u>   |
| Turbidity by Nephelometry   | E121                   | 645376   | 1                 | 6       | 16.6             | 5.0           |            |
| Method Blanks (MB)  |                        |          |                   |         |                  |               | -          |
| Acidity by Titration  | E283                   | 646040   | 1                 | 9       | 11.1             | 5.0           | 1          |
| Alkalinity Species by Titration   | E290                   | 646035   | 1                 | 20      | 5.0              | 5.0           |            |
| Ammonia by Fluorescence   | E298                   | 645526   | 1                 | 9       | 11.1             | 5.0           | <u>√</u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L              | 645371   | 1                 | 4       | 25.0             | 5.0           |            |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L              | 645372   | 1                 | 4       | 25.0             | 5.0           |            |
| Conductivity in Water   | E100                   | 646037   | 1                 | 5       | 20.0             | 5.0           |            |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L              | 646741   | 1                 | 18      | 5.5              | 5.0           |            |
| Dissolved Mercury in Water by CVAAS                                     | E509                   | 647532   | 1                 | 13      | 7.6              | 5.0           |            |
| Dissolved Metals in Water by CRC ICPMS                                  | E421                   | 646742   | 1                 | 18      | 5.5              | 5.0           | <u> </u>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L                 | 645441   | 1                 | 9       | 11.1             | 5.0           | <u> </u>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U                 | 645355   | 1                 | 20      | 5.0              | 5.0           |            |
| Fluoride in Water by IC   | E235.F                 | 645370   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.F<br>E235.NO3-L   | 645373   | 1                 | 4       | 25.0             | 5.0           | ✓          |
| Nitrite in Water by IC (Low Level)                                      |                        | 645374   | 1                 | 4       | 25.0             | 5.0           |            |
| Sulfate in Water by IC  | E235.NO2-L<br>E235.SO4 | 645375   | 1                 | 4       | 25.0             | 5.0           | <u>√</u>   |
| TDS by Gravimetry   |                        | 647154   | 1                 | 11      | 9.0              | 5.0           |            |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E162                   | 646084   | 1                 | 5       | 20.0             | 5.0           | <b>√</b>   |
| , ,   | E420.Cr-L              |          | 1                 | 9       | 11.1             | 5.0           | <b>√</b>   |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318                   | 645448   | 1                 |         |                  | 1 1           | <b>√</b>   |
| Total Mercury in Water by CVAAS   | E508                   | 647531   |                   | 13      | 7.6              | 5.0           | <u>√</u>   |
| Total Metals in Water by CRC ICPMS                                      | E420                   | 646083   | 1                 | 6       | 16.6             | 5.0           | <u>√</u>   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L                 | 645442   | 1                 | 9       | 11.1             | 5.0           | <u>√</u>   |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U                 | 646476   | 1                 | 9       | 11.1             | 5.0           | <u>√</u>   |
| TSS by Gravimetry (Low Level)   | E160-L                 | 647137   | 1                 | 17      | 5.8              | 5.0           | <b>√</b>   |
| Turbidity by Nephelometry   | E121                   | 645376   | 1                 | 6       | 16.6             | 5.0           | ✓          |
|   |                        |          |                   |         |                  |               |            |

Page : 12 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Matrix: Water Evaluation: × = QC frequency outside specification, ✓ = QC frequency within specification.

| Wattix. Water   |            | Lvaldati | on Qo nega | ericy outside spe | cincultori,   | QU ITEQUETICY WIL | inin specification |
|---|------------|----------|------------|-------------------|---------------|-------------------|--------------------|
| Quality Control Sample Type   |            | Co       | ount       |                   | Frequency (%) | )                 |                    |
| Analytical Methods  | Method     | QC Lot # | QC         | Regular           | Actual        | Expected          | Evaluation         |
| Matrix Spikes (MS)  |            |          |            |                   |               |                   |                    |
| Ammonia by Fluorescence   | E298       | 645526   | 1          | 9                 | 11.1          | 5.0               | ✓                  |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 645371   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 645372   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 646741   | 1          | 18                | 5.5           | 5.0               | ✓                  |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 647532   | 1          | 13                | 7.6           | 5.0               | ✓                  |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 646742   | 1          | 18                | 5.5           | 5.0               | ✓                  |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 645441   | 1          | 9                 | 11.1          | 5.0               | ✓                  |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 645355   | 1          | 20                | 5.0           | 5.0               | ✓                  |
| Fluoride in Water by IC   | E235.F     | 645370   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 645373   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 645374   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Sulfate in Water by IC  | E235.SO4   | 645375   | 1          | 4                 | 25.0          | 5.0               | ✓                  |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 646084   | 1          | 5                 | 20.0          | 5.0               | ✓                  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 645448   | 1          | 9                 | 11.1          | 5.0               | ✓                  |
| Total Mercury in Water by CVAAS   | E508       | 647531   | 1          | 13                | 7.6           | 5.0               | ✓                  |
| Total Metals in Water by CRC ICPMS                                      | E420       | 646083   | 1          | 6                 | 16.6          | 5.0               | ✓                  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 645442   | 1          | 9                 | 11.1          | 5.0               | ✓                  |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 646476   | 1          | 9                 | 11.1          | 5.0               | <b>√</b>           |

Page : 13 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **Methodology References and Summaries**

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

| Analytical Methods                  | Method / Lab   | Matrix | Method Reference  | Method Descriptions  |
|-------------------------------------|--|--------|-------------------|--|
| Conductivity in Water               | E100   | Water  | APHA 2510 (mod)   | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water  |
| all by Makes                        | Calgary - Environmental                                    | 14/    | ADIIA 4500 II (   | sample. Conductivity measurements are temperature-compensated to 25°C.   |
| pH by Meter                         | E108   | Water  | APHA 4500-H (mod) | pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results,  |
|                                     | Calgary - Environmental                                    |        |                   | pH should be measured in the field within the recommended 15 minute hold time.   |
| Turbidity by Nephelometry           | E121   | Water  | APHA 2130 B (mod) | Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.   |
|                                     | Calgary - Environmental                                    |        |                   |  |
| ORP by Electrode                    | E125 Calgary - Environmental                               | Water  | ASTM D1498 (mod)  | Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test   |
| TSS by Gravimetry (Low Level)       | E160-L   | Water  | APHA 2540 D (mod) | results, it is recommended that this analysis be conducted in the field.  Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre  |
| (                                   | Calgary - Environmental                                    |        |                   | filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples. |
| TDS by Gravimetry                   | E162  Calgary - Environmental                              | Water  | APHA 2540 C (mod) | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.   |
| Bromide in Water by IC (Low Level)  | E235.Br-L Calgary - Environmental                          | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Chloride in Water by IC (Low Level) | E235.CI-L Calgary - Environmental                          | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Fluoride in Water by IC             | E235.F  Calgary - Environmental                            | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Nitrite in Water by IC (Low Level)  | E235.NO2-L Calgary - Environmental                         | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Nitrate in Water by IC (Low Level)  | E235.NO3-L   | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Sulfate in Water by IC              | Calgary - Environmental  E235.SO4  Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.   |
| Acidity by Titration                | E283   | Water  | APHA 2310 B (mod) | Acidity is determined by potentiometric titration to pH endpoint of 8.3  |
|                                     | Calgary - Environmental                                    |        | , ,               |  |

Page : 14 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited



| Analytical Methods  | Method / Lab                      | Matrix | Method Reference              | Method Descriptions   |
|---|-----------------------------------|--------|-------------------------------|---|
| Alkalinity Species by Titration   | E290 Calgary - Environmental      | Water  | APHA 2320 B (mod)             | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.  |
| Ammonia by Fluorescence   | E298 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).   |
| Total Organic Carbon (Non-Purgeable) by<br>Combustion (Low Level)       | E355-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).                                       |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC). |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U  Calgary - Environmental   | Water  | APHA 4500-P E (mod).          | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U  Calgary - Environmental   | Water  | APHA 4500-P F (mod)           | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.   |
| Total Metals in Water by CRC ICPMS                                      | E420 Calgary - Environmental      | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L Calgary - Environmental | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.  |

Page : 15 of 15

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited



| Analytical Methods                                      | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
|---|-----------------------------------|--------|--------------------------------|--|
| Dissolved Chromium in Water by CRC ICPMS (Low Level)    | E421.Cr-L Calgary - Environmental | Water  | APHA 3030 B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS  |
| Total Mercury in Water by CVAAS                         | E508  Calgary - Environmental     | Water  | EPA 1631E (mod)                | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS   |
| Dissolved Mercury in Water by CVAAS                     | E509 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>1631E (mod)  | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.   |
| Dissolved Hardness (Calculated)                         | EC100 Calgary - Environmental     | Water  | APHA 2340B                     | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. |
| Ion Balance using Dissolved Metals                      | EC101 Calgary - Environmental     | Water  | APHA 1030E                     | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.  Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).  |
| Preparation Methods                                     | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
| Preparation for Ammonia                                 | EP298  Calgary - Environmental    | Water  |                                | Sample preparation for Preserved Nutrients Water Quality Analysis.   |
| Digestion for TKN in water                              | EP318  Calgary - Environmental    | Water  | APHA 4500-Norg D<br>(mod)      | Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.                                  |
| Preparation for Total Organic Carbon by Combustion      | EP355  Calgary - Environmental    | Water  |                                | Preparation for Total Organic Carbon by Combustion   |
| Preparation for Dissolved Organic Carbon for Combustion | EP358  Calgary - Environmental    | Water  | APHA 5310 B (mod)              | Preparation for Dissolved Organic Carbon   |
| Digestion for Total Phosphorus in water                 | EP372  Calgary - Environmental    | Water  | APHA 4500-P E (mod).           | Samples are heated with a persulfate digestion reagent.  |
| Dissolved Metals Water Filtration                       | EP421  Calgary - Environmental    | Water  | APHA 3030B                     | Water samples are filtered (0.45 um), and preserved with HNO3.   |
| Dissolved Mercury Water Filtration                      | EP509  Calgary - Environmental    | Water  | APHA 3030B                     | Water samples are filtered (0.45 um), and preserved with HCl.  |



# **QUALITY CONTROL REPORT**

Work Order : CG2212407

Amendment : 1

Client : Teck Coal Limited
Contact : Nicole Zathey
Address : 421 Pine Avenue

Sparwood BC Canada V0B2G0

Telephone : ----

Project : LINE CREEK OPERATIONS

PO : VPO00817033

C-O-C number : REP\_LAEMP\_DRY\_2022-09\_ALS

Sampler : Jennifer Ings

Site :---

Quote number : Teck Coal Master Quote

No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 18

Laboratory : Calgary - Environmental
Account Manager : Lyudmyla Shvets
Address : 2559 29th Street NE

Calgary, Alberta Canada T1Y 7B5

Telephone :+1 403 407 1800

Date Samples Received :13-Sep-2022 09:11

Date Analysis Commenced : 13-Sep-2022

Issue Date : 26-Sep-2022 08:57

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:

This Quality Control Report Contains the following information.

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### Signatories

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

| Signatories      | Position           | Laboratory Department                |
|------------------|--------------------|--------------------------------------|
| Elke Tabora      |                    | Calgary Inorganics, Calgary, Alberta |
| Kevin Baxter     |                    | Calgary Metals, Calgary, Alberta     |
| Parker Sgarbossa | Laboratory Analyst | Calgary Inorganics, Calgary, Alberta |
| Ruifang Zheng    | Analyst            | Calgary Inorganics, Calgary, Alberta |
| Sara Niroomand   |                    | Calgary Inorganics, Calgary, Alberta |
| Sara Niroomand   |                    | Calgary Metals, Calgary, Alberta     |
| Sonthuong Bui    | Laboratory Analyst | Calgary Metals, Calgary, Alberta     |
| Vladka Stamenova | Analyst            | Calgary Inorganics, Calgary, Alberta |
|                  |                    |                                      |

Page : 2 of 18

Work Order : CG2212407 Amendment 1

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



### **General Comments**

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

#### Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

### **Workorder Comments**

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

Page : 3 of 18

Work Order : CG2212407 Amendment 1 : Teck Coal Limited Client

: LINE CREEK OPERATIONS Project



## Laboratory Duplicate (DUP) Report

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

| Sub-Matrix: Water    |                                   |                                     |            |            |        |          | Labora             | atory Duplicate (D  | UP) Report              |                     |           |
|----------------------|-----------------------------------|-------------------------------------|------------|------------|--------|----------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID                  | Analyte                             | CAS Number | Method     | LOR    | Unit     | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Physical Tests (QC   | Lot: 645376)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | turbidity                           |            | E121       | 0.10   | NTU      | 0.48               | 0.47                | 0.02                    | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 646035)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212400-003        | Anonymous                         | alkalinity, bicarbonate (as CaCO3)  |            | E290       | 1.0    | mg/L     | 575                | 594                 | 3.33%                   | 20%                 |           |
|                      |                                   | alkalinity, carbonate (as CaCO3)    |            | E290       | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |           |
|                      |                                   | alkalinity, hydroxide (as CaCO3)    |            | E290       | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |           |
|                      |                                   | alkalinity, total (as CaCO3)        |            | E290       | 2.0    | mg/L     | 575                | 594                 | 3.33%                   | 20%                 |           |
| Physical Tests (QC   | Lot: 646036)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212407-001        | LC_FRB_WS_LAEMP_DR<br>Y_2022-09_N | рН                                  |            | E108       | 0.10   | pH units | 8.38               | 8.38                | 0.00%                   | 4%                  |           |
| Physical Tests (QC   | Lot: 646037)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212407-001        | LC_FRB_WS_LAEMP_DR<br>Y_2022-09_N | conductivity                        |            | E100       | 2.0    | μS/cm    | 769                | 762                 | 0.914%                  | 10%                 |           |
| Physical Tests (QC   | Lot: 646040)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | acidity (as CaCO3)                  |            | E283       | 2.0    | mg/L     | <2.0               | <2.0                | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 646219)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | oxidation-reduction potential [ORP] |            | E125       | 0.10   | mV       | 313                | 315                 | 0.541%                  | 15%                 |           |
| Physical Tests (QC   | Lot: 647154)                      |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | solids, total dissolved [TDS]       |            | E162       | 40     | mg/L     | 529                | 542                 | 2.43%                   | 20%                 |           |
| Anions and Nutrien   | ts (QC Lot: 645355)               |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010 | mg/L     | 0.0042             | 0.0042              | 0.00003                 | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 645370)               |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | fluoride                            | 16984-48-8 | E235.F     | 0.100  | mg/L     | 0.101              | 0.102               | 0.0005                  | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 645371)               |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | bromide                             | 24959-67-9 | E235.Br-L  | 0.250  | mg/L     | <0.250             | <0.250              | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 645372)               |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | chloride                            | 16887-00-6 | E235.CI-L  | 0.50   | mg/L     | 11.8               | 11.8                | 0.634%                  | 20%                 |           |
| Anions and Nutrien   | ts (QC Lot: 645373)               |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0250 | mg/L     | 13.8               | 13.7                | 0.681%                  | 20%                 |           |
| Anions and Nutrien   | its (QC Lot: 645374)              |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0050 | mg/L     | <0.0050            | <0.0050             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | its (QC Lot: 645375)              |                                     |            |            |        |          |                    |                     |                         |                     |           |
| CG2212405-001        | Anonymous                         | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 1.50   | mg/L     | 1070               | 1060                | 0.940%                  | 20%                 |           |
|                      |                                   |                                     |            | 1          |        |          | l                  |                     |                         |                     |           |

Page : 4 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Sub-Matrix: Water    |                                   |                                 |            |        |           |      | Labora             | tory Duplicate (D   | UP) Report              |                     |           |
|----------------------|-----------------------------------|---------------------------------|------------|--------|-----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID                  | Analyte                         | CAS Number | Method | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Anions and Nutrient  | ts (QC Lot: 645448)               |                                 |            |        |           |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | Kjeldahl nitrogen, total [TKN]  |            | E318   | 0.500     | mg/L | <0.500             | <0.500              | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient  | ts (QC Lot: 645526)               |                                 |            |        |           |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | ammonia, total (as N)           | 7664-41-7  | E298   | 0.0050    | mg/L | <0.0050            | <0.0050             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient  | ts (QC Lot: 646476)               |                                 |            |        |           |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | phosphorus, total               | 7723-14-0  | E372-U | 0.0020    | mg/L | 0.0071             | 0.0072              | 0.00009                 | Diff <2x LOR        |           |
| Organic / Inorganic  | Carbon (QC Lot: 64544             | 1)                              |            |        |           |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | carbon, dissolved organic [DOC] |            | E358-L | 0.50      | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
| Organic / Inorganic  | Carbon (QC Lot: 64544             | 2)                              |            |        |           |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                         | carbon, total organic [TOC]     |            | E355-L | 0.50      | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
| Total Metals (QC Lo  | ot: 646083)                       |                                 |            |        |           |      |                    |                     |                         |                     |           |
| CG2212407-001        | LC_FRB_WS_LAEMP_DR<br>Y 2022-09 N | aluminum, total                 | 7429-90-5  | E420   | 0.0030    | mg/L | 0.0046             | 0.0048              | 0.0002                  | Diff <2x LOR        |           |
|                      |                                   | antimony, total                 | 7440-36-0  | E420   | 0.00010   | mg/L | 0.00011            | 0.00010             | 0.000007                | Diff <2x LOR        |           |
|                      |                                   | arsenic, total                  | 7440-38-2  | E420   | 0.00010   | mg/L | <0.00010           | 0.00012             | 0.00002                 | Diff <2x LOR        |           |
|                      |                                   | barium, total                   | 7440-39-3  | E420   | 0.00010   | mg/L | 0.109              | 0.108               | 1.48%                   | 20%                 |           |
|                      |                                   | beryllium, total                | 7440-41-7  | E420   | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |           |
|                      |                                   | bismuth, total                  | 7440-69-9  | E420   | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                      |                                   | boron, total                    | 7440-42-8  | E420   | 0.010     | mg/L | 0.011              | 0.010               | 0.0001                  | Diff <2x LOR        |           |
|                      |                                   | cadmium, total                  | 7440-43-9  | E420   | 0.0000050 | mg/L | 0.0284 µg/L        | 0.0000292           | 0.0000008               | Diff <2x LOR        |           |
|                      |                                   | calcium, total                  | 7440-70-2  | E420   | 0.050     | mg/L | 97.2               | 98.5                | 1.30%                   | 20%                 |           |
|                      |                                   | cobalt, total                   | 7440-48-4  | E420   | 0.00010   | mg/L | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                                   | copper, total                   | 7440-50-8  | E420   | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                                   | iron, total                     | 7439-89-6  | E420   | 0.010     | mg/L | <0.010             | <0.010              | 0                       | Diff <2x LOR        |           |
|                      |                                   | lead, total                     | 7439-92-1  | E420   | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                      |                                   | lithium, total                  | 7439-93-2  | E420   | 0.0010    | mg/L | 0.0322             | 0.0312              | 3.20%                   | 20%                 |           |
|                      |                                   | magnesium, total                | 7439-95-4  | E420   | 0.0050    | mg/L | 45.2               | 44.6                | 1.36%                   | 20%                 |           |
|                      |                                   | manganese, total                | 7439-96-5  | E420   | 0.00010   | mg/L | 0.00160            | 0.00147             | 8.14%                   | 20%                 |           |
|                      |                                   | molybdenum, total               | 7439-98-7  | E420   | 0.000050  | mg/L | 0.00128            | 0.00128             | 0.270%                  | 20%                 |           |
|                      |                                   | nickel, total                   | 7440-02-0  | E420   | 0.00050   | mg/L | 0.00096            | 0.00088             | 0.00008                 | Diff <2x LOR        |           |
|                      |                                   | potassium, total                | 7440-09-7  | E420   | 0.050     | mg/L | 1.30               | 1.28                | 1.35%                   | 20%                 |           |
|                      |                                   | selenium, total                 | 7782-49-2  | E420   | 0.000050  | mg/L | 50.0 μg/L          | 0.0474              | 5.39%                   | 20%                 |           |
|                      |                                   | silicon, total                  | 7440-21-3  | E420   | 0.10      | mg/L | 2.17               | 2.15                | 0.874%                  | 20%                 |           |
|                      |                                   | silver, total                   | 7440-22-4  | E420   | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                                   | sodium, total                   | 7440-23-5  | E420   | 0.050     | mg/L | 2.80               | 2.79                | 0.0809%                 | 20%                 |           |
|                      |                                   | strontium, total                | 7440-24-6  | E420   | 0.00020   | mg/L | 0.145              | 0.145               | 0.295%                  | 20%                 |           |
|                      |                                   | sulfur, total                   | 7704-34-9  | E420   | 0.50      | mg/L | 68.2               | 68.4                | 0.334%                  | 20%                 |           |

Page : 5 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Sub-Matrix: Water    |                                   |                       |            |           |           |      | Labora             | tory Duplicate (D   | ur) keport   |                     |          |
|----------------------|-----------------------------------|-----------------------|------------|-----------|-----------|------|--------------------|---------------------|--|---------------------|----------|
| Laboratory sample ID | Client sample ID                  | Analyte               | CAS Number | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference  | Duplicate<br>Limits | Qualifie |
| Total Metals (QC L   | ot: 646083) - continued           |                       |            |           |           |      |                    |                     |  |                     |          |
| CG2212407-001        | LC_FRB_WS_LAEMP_DR<br>Y_2022-09_N | thallium, total       | 7440-28-0  | E420      | 0.000010  | mg/L | <0.000010          | <0.000010           | 0  | Diff <2x LOR        |          |
|                      |                                   | tin, total            | 7440-31-5  | E420      | 0.00010   | mg/L | <0.00010           | <0.00010            | 0  | Diff <2x LOR        |          |
|                      |                                   | titanium, total       | 7440-32-6  | E420      | 0.00030   | mg/L | <0.00030           | <0.00030            | 0  | Diff <2x LOR        |          |
|                      |                                   | uranium, total        | 7440-61-1  | E420      | 0.000010  | mg/L | 0.00220            | 0.00216             | 2.03%  | 20%                 |          |
|                      |                                   | vanadium, total       | 7440-62-2  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0  | Diff <2x LOR        |          |
|                      |                                   | zinc, total           | 7440-66-6  | E420      | 0.0030    | mg/L | <0.0030            | <0.0030             | 0  | Diff <2x LOR        |          |
| otal Metals (QC L    | ot: 646084)                       |                       |            |           |           |      |                    |                     |  |                     |          |
| CG2212407-001        | LC_FRB_WS_LAEMP_DR<br>Y_2022-09_N | chromium, total       | 7440-47-3  | E420.Cr-L | 0.00010   | mg/L | 0.00012            | 0.00016             | 0.00003  | Diff <2x LOR        |          |
| Total Metals (QC Lo  | ot: 647531)                       |                       |            |           |           |      |                    |                     |  |                     |          |
| CG2212395-001        | Anonymous                         | mercury, total        | 7439-97-6  | E508      | 0.0000050 | mg/L | <0.0000050         | <0.0000050          | 0  | Diff <2x LOR        |          |
| Dissolved Metals (   | QC Lot: 646741)                   |                       |            |           |           |      |                    |                     |  |                     |          |
| CG2212207-001        | Anonymous                         | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.00010   | mg/L | <0.00010           | <0.00010            | 0  | Diff <2x LOR        |          |
| Dissolved Metals (   | QC Lot: 646742)                   |                       |            |           |           |      |                    |                     |  |                     |          |
| CG2212207-001        | Anonymous                         | aluminum, dissolved   | 7429-90-5  | E421      | 0.0010    | mg/L | <0.0010            | <0.0010             | 0  | Diff <2x LOR        |          |
|                      |                                   | antimony, dissolved   | 7440-36-0  | E421      | 0.00010   | mg/L | 0.00065            | 0.00067             | 0.00002  | Diff <2x LOR        |          |
|                      |                                   | arsenic, dissolved    | 7440-38-2  | E421      | 0.00010   | mg/L | 0.00010            | <0.00010            | 0.000003   | Diff <2x LOR        |          |
|                      |                                   | barium, dissolved     | 7440-39-3  | E421      | 0.00010   | mg/L | 0.0502             | 0.0508              | 1.31%  | 20%                 |          |
|                      |                                   | beryllium, dissolved  | 7440-41-7  | E421      | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0  | Diff <2x LOR        |          |
|                      |                                   | bismuth, dissolved    | 7440-69-9  | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0  | Diff <2x LOR        |          |
|                      |                                   | boron, dissolved      | 7440-42-8  | E421      | 0.010     | mg/L | 0.031              | 0.032               | 0.0007   | Diff <2x LOR        |          |
|                      |                                   | cadmium, dissolved    | 7440-43-9  | E421      | 0.0000050 | mg/L | 0.0869 µg/L        | 0.0000969           | 10.9%  | 20%                 |          |
|                      |                                   | calcium, dissolved    | 7440-70-2  | E421      | 0.050     | mg/L | 223                | 228                 | 2.24%  | 20%                 |          |
|                      |                                   | cobalt, dissolved     | 7440-48-4  | E421      | 0.00010   | mg/L | <0.10 µg/L         | <0.00010            | 0  | Diff <2x LOR        |          |
|                      |                                   | copper, dissolved     | 7440-50-8  | E421      | 0.00020   | mg/L | <0.00020           | <0.00020            | 0  | Diff <2x LOR        |          |
|                      |                                   | iron, dissolved       | 7439-89-6  | E421      | 0.010     | mg/L | <0.010             | <0.010              | 0  | Diff <2x LOR        |          |
|                      |                                   | lead, dissolved       | 7439-92-1  | E421      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0  | Diff <2x LOR        |          |
|                      |                                   | lithium, dissolved    | 7439-93-2  | E421      | 0.0010    | mg/L | 0.306              | 0.305               | 0.501%   | 20%                 |          |
|                      |                                   | magnesium, dissolved  | 7439-95-4  | E421      | 0.0050    | mg/L | 125                | 128                 | 2.52%  | 20%                 |          |
|                      |                                   | manganese, dissolved  | 7439-96-5  | E421      | 0.00010   | mg/L | 0.00044            | 0.00048             | 0.00005  | Diff <2x LOR        |          |
|                      |                                   | molybdenum, dissolved | 7439-98-7  | E421      | 0.000050  | mg/L | 0.00269            | 0.00280             | 3.97%  | 20%                 |          |
|                      |                                   | nickel, dissolved     | 7440-02-0  | E421      | 0.00050   | mg/L | 0.00659            | 0.00652             | 1.04%  | 20%                 |          |
|                      |                                   | potassium, dissolved  | 7440-09-7  | E421      | 0.050     | mg/L | 6.59               | 6.77                | 2.82%  | 20%                 |          |
|                      |                                   | selenium, dissolved   | 7782-49-2  | E421      | 0.000050  | mg/L | 128 µg/L           | 0.135               | 5.63%  | 20%                 |          |
|                      |                                   |                       |            |           |           |      |                    |                     | The second secon |                     |          |

Page : 6 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Sub-Matrix: Water    | Matrix: Water            |                      |            |        | Laboratory Duplicate (DUP) Report |      |                    |                     |                         |                     |           |
|----------------------|--------------------------|----------------------|------------|--------|-----------------------------------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID         | Analyte              | CAS Number | Method | LOR                               | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Dissolved Metals (C  | QC Lot: 646742) - contin | ued                  |            |        |                                   |      |                    |                     |                         |                     |           |
| CG2212207-001        | Anonymous                | silver, dissolved    | 7440-22-4  | E421   | 0.000010                          | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                          | sodium, dissolved    | 7440-23-5  | E421   | 0.050                             | mg/L | 10.8               | 11.1                | 2.46%                   | 20%                 |           |
|                      |                          | strontium, dissolved | 7440-24-6  | E421   | 0.00020                           | mg/L | 0.381              | 0.392               | 2.84%                   | 20%                 |           |
|                      |                          | sulfur, dissolved    | 7704-34-9  | E421   | 0.50                              | mg/L | 179                | 188                 | 4.75%                   | 20%                 |           |
|                      |                          | thallium, dissolved  | 7440-28-0  | E421   | 0.000010                          | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                          | tin, dissolved       | 7440-31-5  | E421   | 0.00010                           | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                          | titanium, dissolved  | 7440-32-6  | E421   | 0.00030                           | mg/L | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |           |
|                      |                          | uranium, dissolved   | 7440-61-1  | E421   | 0.000010                          | mg/L | 0.0113             | 0.0116              | 2.59%                   | 20%                 |           |
|                      |                          | vanadium, dissolved  | 7440-62-2  | E421   | 0.00050                           | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                          | zinc, dissolved      | 7440-66-6  | E421   | 0.0010                            | mg/L | 0.0031             | 0.0032              | 0.00007                 | Diff <2x LOR        |           |
| Dissolved Metals (C  | QC Lot: 647532)          |                      |            |        |                                   |      |                    |                     |                         |                     |           |
| CG2212395-001        | Anonymous                | mercury, dissolved   | 7439-97-6  | E509   | 0.0000050                         | mg/L | <0.0000050         | <0.0000050          | 0                       | Diff <2x LOR        |           |

Page : 7 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Method Blank (MB) Report

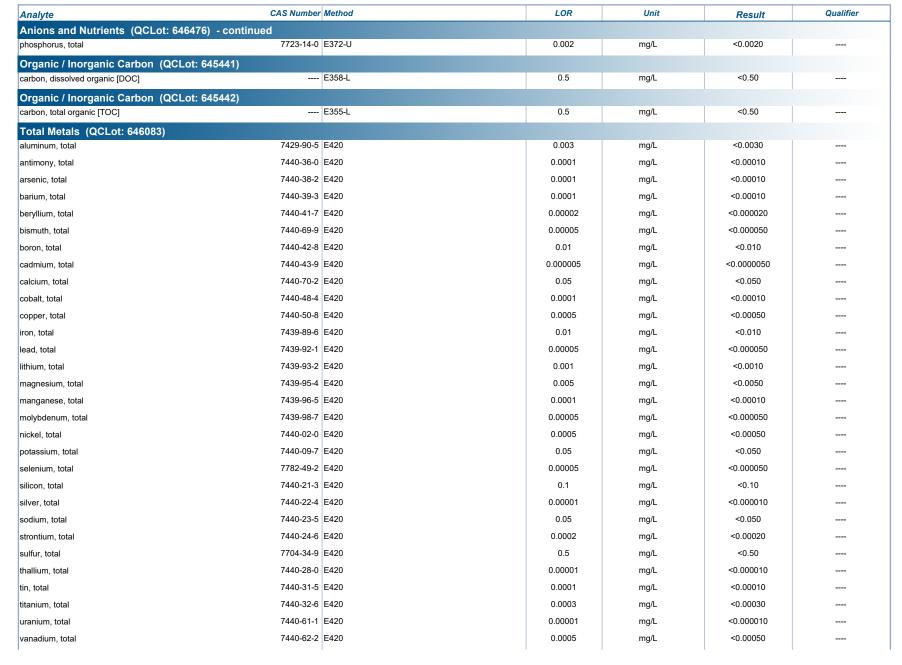
A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the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

| Analyte                              | CAS Number Method     | LOR   | Unit  | Result  | Qualifier |
|--------------------------------------|-----------------------|-------|-------|---------|-----------|
| Physical Tests (QCLot: 645376)       |                       |       |       |         |           |
| turbidity                            | E121                  | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 646035)       |                       |       |       |         |           |
| alkalinity, bicarbonate (as CaCO3)   | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, carbonate (as CaCO3)     | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, hydroxide (as CaCO3)     | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, total (as CaCO3)         | E290                  | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 646037)       |                       |       |       |         |           |
| conductivity                         | E100                  | 1     | μS/cm | 1.2     |           |
| Physical Tests (QCLot: 646040)       |                       |       |       |         |           |
| acidity (as CaCO3)                   | E283                  | 2     | mg/L  | <2.0    |           |
| Physical Tests (QCLot: 647137)       |                       |       |       |         |           |
| solids, total suspended [TSS]        | E160-L                | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 647154)       |                       |       |       |         |           |
| solids, total dissolved [TDS]        | E162                  | 10    | mg/L  | <10     |           |
| Anions and Nutrients (QCLot: 645355) |                       |       |       |         |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U     | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 645370) |                       |       |       |         |           |
| fluoride                             | 16984-48-8 E235.F     | 0.02  | mg/L  | <0.020  |           |
| Anions and Nutrients (QCLot: 645371) |                       |       |       |         |           |
| bromide                              | 24959-67-9 E235.Br-L  | 0.05  | mg/L  | <0.050  |           |
| Anions and Nutrients (QCLot: 645372) |                       |       |       |         |           |
| chloride                             | 16887-00-6 E235.CI-L  | 0.1   | mg/L  | <0.10   |           |
| Anions and Nutrients (QCLot: 645373) |                       |       |       |         |           |
| nitrate (as N)                       | 14797-55-8 E235.NO3-L | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 645374) |                       |       |       |         |           |
| nitrite (as N)                       | 14797-65-0 E235.NO2-L | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 645375) |                       |       |       |         |           |
| sulfate (as SO4)                     | 14808-79-8 E235.SO4   | 0.3   | mg/L  | <0.30   |           |
| Anions and Nutrients (QCLot: 645448) |                       |       |       |         |           |
| Kjeldahl nitrogen, total [TKN]       | E318                  | 0.05  | mg/L  | <0.050  |           |
| Anions and Nutrients (QCLot: 645526) |                       |       |       |         |           |
| ammonia, total (as N)                | 7664-41-7 E298        | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 646476) |                       |       |       |         |           |

Page : 8 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS

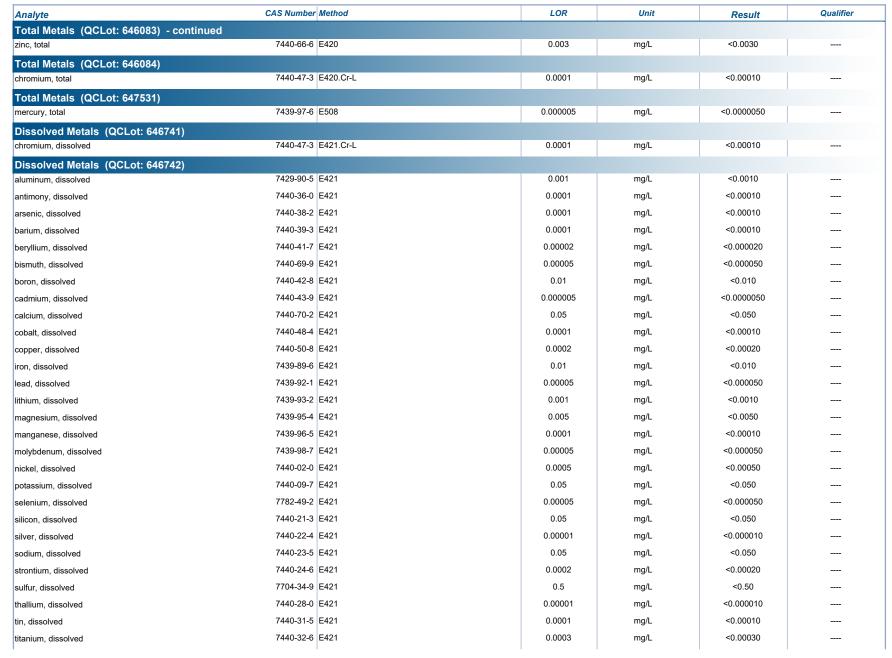




Page : 9 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS





Page : 10 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS





Page : 11 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Laboratory Control Sample (LCS) Report

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

| Sub-Matrix: Water                    |               |           |       |          |               | Laboratory Cor | trol Sample (LCS) | Report     |           |
|--------------------------------------|---------------|-----------|-------|----------|---------------|----------------|-------------------|------------|-----------|
|                                      |               |           |       |          | Spike         | Recovery (%)   | Recovery          | Limits (%) |           |
| Analyte                              | CAS Number Me | ethod     | LOR   | Unit     | Concentration | LCS            | Low               | High       | Qualifier |
| Physical Tests (QCLot: 645376)       |               |           |       |          |               |                |                   |            |           |
| turbidity                            | E1            | 121       | 0.1   | NTU      | 200 NTU       | 104            | 85.0              | 115        |           |
| Physical Tests (QCLot: 646035)       |               |           |       |          |               |                |                   |            |           |
| alkalinity, total (as CaCO3)         | E2            | 290       | 1     | mg/L     | 500 mg/L      | 104            | 85.0              | 115        |           |
| Physical Tests (QCLot: 646036)       |               |           |       |          |               |                |                   |            |           |
| pH                                   | E1            | 108       |       | pH units | 7 pH units    | 101            | 98.6              | 101        |           |
| Physical Tests (QCLot: 646037)       |               |           |       |          |               |                |                   |            |           |
| conductivity                         | E1            | 100       | 1     | μS/cm    | 146.9 µS/cm   | 96.9           | 90.0              | 110        |           |
| Physical Tests (QCLot: 646040)       |               |           |       |          |               |                |                   |            |           |
| acidity (as CaCO3)                   | E2            | 283       | 2     | mg/L     | 50 mg/L       | 104            | 85.0              | 115        |           |
| Physical Tests (QCLot: 646219)       |               |           |       |          |               |                |                   |            |           |
| oxidation-reduction potential [ORP]  | E1            | 125       |       | mV       | 220 mV        | 102            | 95.4              | 104        |           |
| Physical Tests (QCLot: 647137)       |               |           |       |          |               |                |                   |            |           |
| solids, total suspended [TSS]        | E1            | 160-L     | 1     | mg/L     | 150 mg/L      | 99.8           | 85.0              | 115        |           |
| Physical Tests (QCLot: 647154)       |               |           |       |          |               |                |                   |            |           |
| solids, total dissolved [TDS]        | E1            | 162       | 10    | mg/L     | 1000 mg/L     | 99.0           | 85.0              | 115        |           |
|                                      |               |           |       |          |               |                |                   |            |           |
| Anions and Nutrients (QCLot: 645355) |               |           |       |          |               |                |                   |            |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E3 | 378-U     | 0.001 | mg/L     | 0.03 mg/L     | 96.4           | 80.0              | 120        |           |
| Anions and Nutrients (QCLot: 645370) |               |           |       |          |               |                |                   |            |           |
| fluoride                             | 16984-48-8 E2 | 235.F     | 0.02  | mg/L     | 1 mg/L        | 101            | 90.0              | 110        |           |
| Anions and Nutrients (QCLot: 645371) |               |           |       |          |               |                |                   |            |           |
| bromide                              | 24959-67-9 E2 | 235.Br-L  | 0.05  | mg/L     | 0.5 mg/L      | 102            | 85.0              | 115        |           |
| Anions and Nutrients (QCLot: 645372) |               |           |       |          |               |                |                   |            |           |
| chloride                             | 16887-00-6 E2 | 235.CI-L  | 0.1   | mg/L     | 100 mg/L      | 100            | 90.0              | 110        |           |
| Anions and Nutrients (QCLot: 645373) |               |           |       |          |               |                |                   |            |           |
| nitrate (as N)                       | 14797-55-8 E2 | 235.NO3-L | 0.005 | mg/L     | 2.5 mg/L      | 100            | 90.0              | 110        |           |
| Anions and Nutrients (QCLot: 645374) |               |           |       |          |               |                |                   |            |           |
| nitrite (as N)                       | 14797-65-0 E2 | 235.NO2-L | 0.001 | mg/L     | 0.5 mg/L      | 102            | 90.0              | 110        |           |
| Anions and Nutrients (QCLot: 645375) |               |           |       |          |               |                |                   |            |           |
| sulfate (as SO4)                     | 14808-79-8 E2 | 235.SO4   | 0.3   | mg/L     | 100 mg/L      | 102            | 90.0              | 110        |           |
| Anions and Nutrients (QCLot: 645448) |               |           |       |          |               |                |                   |            |           |
| Kjeldahl nitrogen, total [TKN]       | E3            | 318       | 0.05  | mg/L     | 4 mg/L        | 99.6           | 75.0              | 125        |           |
| Anions and Nutrients (QCLot: 645526) |               |           |       |          |               |                |                   |            |           |
| Amono ana Natricitto (QOEOt. 043020) |               |           |       |          |               |                |                   |            |           |

Page : 12 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Sub-Matrix: Water                     |                   |          |      |               | Laboratory Co | ntrol Sample (LCS) | Report     |           |
|---------------------------------------|-------------------|----------|------|---------------|---------------|--------------------|------------|-----------|
|                                       |                   |          |      | Spike         | Recovery (%)  | Recovery           | Limits (%) |           |
| Analyte                               | CAS Number Method | LOR      | Unit | Concentration | LCS           | Low                | High       | Qualifier |
| Anions and Nutrients (QCLot: 645526)  | - continued       |          |      |               |               |                    |            |           |
| ammonia, total (as N)                 | 7664-41-7 E298    | 0.005    | mg/L | 0.2 mg/L      | 98.4          | 85.0               | 115        |           |
| Anions and Nutrients (QCLot: 646476)  |                   |          |      |               |               |                    |            |           |
| phosphorus, total                     | 7723-14-0 E372-U  | 0.002    | mg/L | 0.03 mg/L     | 94.4          | 80.0               | 120        |           |
|                                       |                   |          |      |               |               |                    |            |           |
| Organic / Inorganic Carbon (QCLot: 64 | 45441)            |          |      |               |               |                    |            |           |
| carbon, dissolved organic [DOC]       | E358-L            | 0.5      | mg/L | 8.57 mg/L     | 103           | 80.0               | 120        |           |
| Organic / Inorganic Carbon (QCLot: 64 | 15442)            |          |      |               |               |                    |            |           |
| carbon, total organic [TOC]           | E355-L            | 0.5      | mg/L | 8.57 mg/L     | 105           | 80.0               | 120        |           |
|                                       |                   |          |      |               |               |                    |            |           |
| Total Metals (QCLot: 646083)          |                   |          |      |               |               |                    | 1          |           |
| aluminum, total                       | 7429-90-5 E420    | 0.003    | mg/L | 2 mg/L        | 98.5          | 80.0               | 120        |           |
| antimony, total                       | 7440-36-0 E420    | 0.0001   | mg/L | 1 mg/L        | 95.8          | 80.0               | 120        |           |
| arsenic, total                        | 7440-38-2 E420    | 0.0001   | mg/L | 1 mg/L        | 93.0          | 80.0               | 120        |           |
| barium, total                         | 7440-39-3 E420    | 0.0001   | mg/L | 0.25 mg/L     | 96.0          | 80.0               | 120        |           |
| beryllium, total                      | 7440-41-7 E420    | 0.00002  | mg/L | 0.1 mg/L      | 95.5          | 80.0               | 120        |           |
| bismuth, total                        | 7440-69-9 E420    | 0.00005  | mg/L | 1 mg/L        | 102           | 80.0               | 120        |           |
| boron, total                          | 7440-42-8 E420    | 0.01     | mg/L | 1 mg/L        | 92.3          | 80.0               | 120        |           |
| cadmium, total                        | 7440-43-9 E420    | 0.000005 | mg/L | 0.1 mg/L      | 94.6          | 80.0               | 120        |           |
| calcium, total                        | 7440-70-2 E420    | 0.05     | mg/L | 50 mg/L       | 93.0          | 80.0               | 120        |           |
| cobalt, total                         | 7440-48-4 E420    | 0.0001   | mg/L | 0.25 mg/L     | 93.9          | 80.0               | 120        |           |
| copper, total                         | 7440-50-8 E420    | 0.0005   | mg/L | 0.25 mg/L     | 93.0          | 80.0               | 120        |           |
| iron, total                           | 7439-89-6 E420    | 0.01     | mg/L | 1 mg/L        | 104           | 80.0               | 120        |           |
| lead, total                           | 7439-92-1 E420    | 0.00005  | mg/L | 0.5 mg/L      | 102           | 80.0               | 120        |           |
| lithium, total                        | 7439-93-2 E420    | 0.001    | mg/L | 0.25 mg/L     | 102           | 80.0               | 120        |           |
| magnesium, total                      | 7439-95-4 E420    | 0.005    | mg/L | 50 mg/L       | 102           | 80.0               | 120        |           |
| manganese, total                      | 7439-96-5 E420    | 0.0001   | mg/L | 0.25 mg/L     | 96.2          | 80.0               | 120        |           |
| molybdenum, total                     | 7439-98-7 E420    | 0.00005  | mg/L | 0.25 mg/L     | 96.5          | 80.0               | 120        |           |
| nickel, total                         | 7440-02-0 E420    | 0.0005   | mg/L | 0.5 mg/L      | 93.9          | 80.0               | 120        |           |
| potassium, total                      | 7440-09-7 E420    | 0.05     | mg/L | 50 mg/L       | 97.2          | 80.0               | 120        |           |
| selenium, total                       | 7782-49-2 E420    | 0.00005  | mg/L | 1 mg/L        | 90.8          | 80.0               | 120        |           |
| silicon, total                        | 7440-21-3 E420    | 0.1      | mg/L | 10 mg/L       | 103           | 60.0               | 140        |           |
| silver, total                         | 7440-22-4 E420    | 0.00001  | mg/L | 0.1 mg/L      | 83.2          | 80.0               | 120        |           |
| sodium, total                         | 7440-23-5 E420    | 0.05     | mg/L | 50 mg/L       | 98.3          | 80.0               | 120        |           |
| strontium, total                      | 7440-24-6 E420    | 0.0002   | mg/L | 0.25 mg/L     | 95.7          | 80.0               | 120        |           |
| sulfur, total                         | 7704-34-9 E420    | 0.5      | mg/L | 50 mg/L       | 93.9          | 80.0               | 120        |           |
| thallium, total                       | 7440-28-0 E420    | 0.00001  | mg/L | 1 mg/L        | 97.8          | 80.0               | 120        |           |
| tin, total                            | 7440-31-5 E420    | 0.0001   | mg/L | 0.5 mg/L      | 96.1          | 80.0               | 120        |           |
| ,                                     |                   | 0.000.   |      | J.J IIIg/L    | 00.1          |                    |            |           |

Page : 13 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Sub-Matrix: Water                        |            |           |          |      |               | Laboratory Co | ntrol Sample (LCS) | Report     |           |
|--|------------|-----------|----------|------|---------------|---------------|--------------------|------------|-----------|
|  |            |           |          |      | Spike         | Recovery (%)  | Recovery           | Limits (%) |           |
| Analyte                                  | CAS Number | Method    | LOR      | Unit | Concentration | LCS           | Low                | High       | Qualifier |
| Total Metals (QCLot: 646083) - continued |            |           |          |      |               |               |                    |            |           |
| titanium, total                          | 7440-32-6  | E420      | 0.0003   | mg/L | 0.25 mg/L     | 91.7          | 80.0               | 120        |           |
| uranium, total                           | 7440-61-1  | E420      | 0.00001  | mg/L | 0.005 mg/L    | 91.5          | 80.0               | 120        |           |
| vanadium, total                          | 7440-62-2  | E420      | 0.0005   | mg/L | 0.5 mg/L      | 94.1          | 80.0               | 120        |           |
| zinc, total                              | 7440-66-6  | E420      | 0.003    | mg/L | 0.5 mg/L      | 91.0          | 80.0               | 120        |           |
| Total Metals (QCLot: 646084)             |            |           |          |      |               |               |                    |            |           |
| chromium, total                          | 7440-47-3  | E420.Cr-L | 0.0001   | mg/L | 0.25 mg/L     | 95.9          | 80.0               | 120        |           |
| Total Metals (QCLot: 647531)             |            |           |          |      |               |               |                    |            |           |
| mercury, total                           | 7439-97-6  | E508      | 0.000005 | mg/L | 0.0001 mg/L   | 100           | 80.0               | 120        |           |
|  |            |           |          |      |               |               |                    |            |           |
| Dissolved Metals (QCLot: 646741)         |            |           |          |      |               |               |                    |            | 1         |
| chromium, dissolved                      | 7440-47-3  | E421.Cr-L | 0.0001   | mg/L | 0.25 mg/L     | 99.0          | 80.0               | 120        |           |
| Dissolved Metals (QCLot: 646742)         |            |           |          |      |               |               |                    | 1          | 1         |
| aluminum, dissolved                      | 7429-90-5  | E421      | 0.001    | mg/L | 2 mg/L        | 103           | 80.0               | 120        |           |
| antimony, dissolved                      | 7440-36-0  | E421      | 0.0001   | mg/L | 1 mg/L        | 101           | 80.0               | 120        |           |
| arsenic, dissolved                       | 7440-38-2  | E421      | 0.0001   | mg/L | 1 mg/L        | 99.1          | 80.0               | 120        |           |
| barium, dissolved                        | 7440-39-3  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 99.7          | 80.0               | 120        |           |
| beryllium, dissolved                     | 7440-41-7  | E421      | 0.00002  | mg/L | 0.1 mg/L      | 106           | 80.0               | 120        |           |
| bismuth, dissolved                       | 7440-69-9  | E421      | 0.00005  | mg/L | 1 mg/L        | 98.2          | 80.0               | 120        |           |
| boron, dissolved                         | 7440-42-8  | E421      | 0.01     | mg/L | 1 mg/L        | 98.6          | 80.0               | 120        |           |
| cadmium, dissolved                       | 7440-43-9  | E421      | 0.000005 | mg/L | 0.1 mg/L      | 98.8          | 80.0               | 120        |           |
| calcium, dissolved                       | 7440-70-2  | E421      | 0.05     | mg/L | 50 mg/L       | 95.4          | 80.0               | 120        |           |
| cobalt, dissolved                        | 7440-48-4  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 96.0          | 80.0               | 120        |           |
| copper, dissolved                        | 7440-50-8  | E421      | 0.0002   | mg/L | 0.25 mg/L     | 96.5          | 80.0               | 120        |           |
| iron, dissolved                          | 7439-89-6  | E421      | 0.01     | mg/L | 1 mg/L        | 108           | 80.0               | 120        |           |
| lead, dissolved                          | 7439-92-1  | E421      | 0.00005  | mg/L | 0.5 mg/L      | 98.7          | 80.0               | 120        |           |
| lithium, dissolved                       | 7439-93-2  | E421      | 0.001    | mg/L | 0.25 mg/L     | 91.7          | 80.0               | 120        |           |
| magnesium, dissolved                     | 7439-95-4  | E421      | 0.005    | mg/L | 50 mg/L       | 94.9          | 80.0               | 120        |           |
| manganese, dissolved                     | 7439-96-5  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 96.4          | 80.0               | 120        |           |
| molybdenum, dissolved                    | 7439-98-7  | E421      | 0.00005  | mg/L | 0.25 mg/L     | 99.5          | 80.0               | 120        |           |
| nickel, dissolved                        | 7440-02-0  | E421      | 0.0005   | mg/L | 0.5 mg/L      | 94.7          | 80.0               | 120        |           |
| potassium, dissolved                     | 7440-09-7  | E421      | 0.05     | mg/L | 50 mg/L       | 99.2          | 80.0               | 120        |           |
| selenium, dissolved                      | 7782-49-2  | E421      | 0.00005  | mg/L | 1 mg/L        | 90.2          | 80.0               | 120        |           |
| silicon, dissolved                       | 7440-21-3  | E421      | 0.05     | mg/L | 10 mg/L       | 100           | 60.0               | 140        |           |
| silver, dissolved                        | 7440-22-4  | E421      | 0.00001  | mg/L | 0.1 mg/L      | 89.0          | 80.0               | 120        |           |
| sodium, dissolved                        | 7440-23-5  | E421      | 0.05     | mg/L | 50 mg/L       | 99.7          | 80.0               | 120        |           |
| strontium, dissolved                     | 7440-24-6  | E421      | 0.0002   | mg/L | 0.25 mg/L     | 101           | 80.0               | 120        |           |
| sulfur, dissolved                        | 7704-34-9  |           | 0.5      | mg/L | 50 mg/L       | 99.0          | 80.0               | 120        |           |

Page : 14 of 18

Work Order : CG2212407 Amendment 1





| Sub-Matrix: Water                       |            |        |          |      |               | Laboratory Cor | ntrol Sample (LCS) | Report     |           |
|---|------------|--------|----------|------|---------------|----------------|--------------------|------------|-----------|
|   |            |        |          |      | Spike         | Recovery (%)   | Recovery           | Limits (%) |           |
| Analyte                                 | CAS Number | Method | LOR      | Unit | Concentration | LCS            | Low                | High       | Qualifier |
| Dissolved Metals (QCLot: 646742) - conf | inued      |        |          |      |               |                |                    |            |           |
| thallium, dissolved                     | 7440-28-0  | E421   | 0.00001  | mg/L | 1 mg/L        | 99.4           | 80.0               | 120        |           |
| tin, dissolved                          | 7440-31-5  | E421   | 0.0001   | mg/L | 0.5 mg/L      | 97.2           | 80.0               | 120        |           |
| titanium, dissolved                     | 7440-32-6  | E421   | 0.0003   | mg/L | 0.25 mg/L     | 98.8           | 80.0               | 120        |           |
| uranium, dissolved                      | 7440-61-1  | E421   | 0.00001  | mg/L | 0.005 mg/L    | 96.2           | 80.0               | 120        |           |
| vanadium, dissolved                     | 7440-62-2  | E421   | 0.0005   | mg/L | 0.5 mg/L      | 99.8           | 80.0               | 120        |           |
| zinc, dissolved                         | 7440-66-6  | E421   | 0.001    | mg/L | 0.5 mg/L      | 103            | 80.0               | 120        |           |
| mercury, dissolved                      | 7439-97-6  | E509   | 0.000005 | mg/L | 0.0001 mg/L   | 104            | 80.0               | 120        |           |
|   |            |        |          |      |               |                |                    |            |           |

Page : 15 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Matrix Spike (MS) Report

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

| Sub-Matrix: Water      |                        |                                     |            |            | Matrix Spike (MS) Report |           |              |          |            |          |  |
|------------------------|------------------------|-------------------------------------|------------|------------|--------------------------|-----------|--------------|----------|------------|----------|--|
|                        |                        |                                     |            |            | Spi                      |           | Recovery (%) | Recovery | Limits (%) |          |  |
| Laboratory sample<br>D | Client sample ID       | Analyte                             | CAS Number | Method     | Concentration            | Target    | MS           | Low      | High       | Qualifie |  |
| Anions and Nutr        | ients (QCLot: 645355)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212395-002          | Anonymous              | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0473 mg/L              | 0.05 mg/L | 94.5         | 70.0     | 130        |          |  |
| Anions and Nutr        | ients (QCLot: 645370)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212405-002          | Anonymous              | fluoride                            | 16984-48-8 | E235.F     | 0.816 mg/L               | 1 mg/L    | 81.6         | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645371)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212405-002          | Anonymous              | bromide                             | 24959-67-9 | E235.Br-L  | 0.497 mg/L               | 0.5 mg/L  | 99.4         | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645372)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212405-002          | Anonymous              | chloride                            | 16887-00-6 | E235.CI-L  | 97.7 mg/L                | 100 mg/L  | 97.7         | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645373)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212405-002          | Anonymous              | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | ND mg/L                  | 2.5 mg/L  | ND           | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645374)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212405-002          | Anonymous              | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.492 mg/L               | 0.5 mg/L  | 98.4         | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645375)  |                                     |            |            |                          |           |              |          | 1          |          |  |
| CG2212405-002          | Anonymous              | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | ND mg/L                  | 100 mg/L  | ND           | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 645448)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212395-002          | Anonymous              | Kjeldahl nitrogen, total [TKN]      |            | E318       | 2.54 mg/L                | 2.5 mg/L  | 101          | 70.0     | 130        |          |  |
| Anions and Nutr        | ients (QCLot: 645526)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212395-002          | Anonymous              | ammonia, total (as N)               | 7664-41-7  | E298       | 0.109 mg/L               | 0.1 mg/L  | 109          | 75.0     | 125        |          |  |
| Anions and Nutr        | ients (QCLot: 646476)  |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212395-002          | Anonymous              | phosphorus, total                   | 7723-14-0  | E372-U     | 0.0472 mg/L              | 0.05 mg/L | 94.4         | 70.0     | 130        |          |  |
| Organic / Inorga       | nic Carbon (QCLot: 645 | 441)                                |            |            |                          |           |              |          |            |          |  |
| CG2212395-001          | Anonymous              | carbon, dissolved organic [DOC]     |            | E358-L     | 5.72 mg/L                | 5 mg/L    | 114          | 70.0     | 130        |          |  |
| Organic / Inorga       | nic Carbon (QCLot: 645 | 442)                                |            |            |                          |           |              |          |            |          |  |
| CG2212395-001          | Anonymous              | carbon, total organic [TOC]         |            | E355-L     | 5.80 mg/L                | 5 mg/L    | 116          | 70.0     | 130        |          |  |
| otal Metals (Q0        | CLot: 646083)          |                                     |            |            |                          |           |              |          |            |          |  |
| CG2212407-001          | LC_FRB_WS_LAEMP_DRY    | aluminum, total                     | 7429-90-5  | E420       | 1.92 mg/L                | 2 mg/L    | 96.3         | 70.0     | 130        |          |  |
|                        | _2022-09_N             | antimony, total                     | 7440-36-0  | E420       | 0.186 mg/L               | 0.2 mg/L  | 93.2         | 70.0     | 130        |          |  |
|                        |                        | arsenic, total                      | 7440-38-2  | E420       | 0.190 mg/L               | 0.2 mg/L  | 94.8         | 70.0     | 130        |          |  |
|                        |                        | barium, total                       | 7440-39-3  | E420       | 0.178 mg/L               | 0.2 mg/L  | 88.8         | 70.0     | 130        |          |  |
|                        | 1                      | beryllium, total                    | 7440-41-7  | E420       | 0.373 mg/L               | 0.4 mg/L  | 93.2         | 70.0     | 130        |          |  |

Page : 16 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| ub-Matrix: Water       |                                   |                     |            |           |               |             | Matrix Spik  | e (MS) Report |            |           |
|------------------------|-----------------------------------|---------------------|------------|-----------|---------------|-------------|--------------|---------------|------------|-----------|
|                        |                                   |                     |            |           | Spi           | ke          | Recovery (%) | Recovery      | Limits (%) |           |
| Laboratory sample<br>D | Client sample ID                  | Analyte             | CAS Number | Method    | Concentration | Target      | MS           | Low           | High       | Qualifier |
| otal Metals (QC        | Lot: 646083) - continue           | d                   |            |           |               |             |              |               |            |           |
| CG2212407-001          | LC_FRB_WS_LAEMP_DRY               | bismuth, total      | 7440-69-9  | E420      | 0.0998 mg/L   | 0.1 mg/L    | 99.8         | 70.0          | 130        |           |
|                        | _2022-09_N                        | boron, total        | 7440-42-8  | E420      | 0.899 mg/L    | 1 mg/L      | 89.9         | 70.0          | 130        |           |
|                        |                                   | cadmium, total      | 7440-43-9  | E420      | 0.0393 mg/L   | 0.04 mg/L   | 98.2         | 70.0          | 130        |           |
|                        |                                   | calcium, total      | 7440-70-2  | E420      | ND mg/L       | 40 mg/L     | ND           | 70.0          | 130        |           |
|                        |                                   | cobalt, total       | 7440-48-4  | E420      | 0.192 mg/L    | 0.2 mg/L    | 95.8         | 70.0          | 130        |           |
|                        |                                   | copper, total       | 7440-50-8  | E420      | 0.194 mg/L    | 0.2 mg/L    | 97.0         | 70.0          | 130        |           |
|                        |                                   | iron, total         | 7439-89-6  | E420      | 19.1 mg/L     | 20 mg/L     | 95.4         | 70.0          | 130        |           |
|                        |                                   | lead, total         | 7439-92-1  | E420      | 0.203 mg/L    | 0.2 mg/L    | 102          | 70.0          | 130        |           |
|                        |                                   | lithium, total      | 7439-93-2  | E420      | 0.934 mg/L    | 1 mg/L      | 93.4         | 70.0          | 130        |           |
|                        |                                   | magnesium, total    | 7439-95-4  | E420      | ND mg/L       | 10 mg/L     | ND           | 70.0          | 130        |           |
|                        |                                   | manganese, total    | 7439-96-5  | E420      | 0.194 mg/L    | 0.2 mg/L    | 96.9         | 70.0          | 130        |           |
|                        |                                   | molybdenum, total   | 7439-98-7  | E420      | 0.199 mg/L    | 0.2 mg/L    | 99.5         | 70.0          | 130        |           |
|                        |                                   | nickel, total       | 7440-02-0  | E420      | 0.384 mg/L    | 0.4 mg/L    | 96.0         | 70.0          | 130        |           |
|                        |                                   | potassium, total    | 7440-09-7  | E420      | 38.3 mg/L     | 40 mg/L     | 95.8         | 70.0          | 130        |           |
|                        |                                   | selenium, total     | 7782-49-2  | E420      | 0.388 mg/L    | 0.4 mg/L    | 97.0         | 70.0          | 130        |           |
|                        |                                   | silicon, total      | 7440-21-3  | E420      | 102 mg/L      | 100 mg/L    | 102          | 70.0          | 130        |           |
|                        |                                   | silver, total       | 7440-22-4  | E420      | 0.0384 mg/L   | 0.04 mg/L   | 96.1         | 70.0          | 130        |           |
|                        |                                   | sodium, total       | 7440-23-5  | E420      | 19.6 mg/L     | 20 mg/L     | 97.9         | 70.0          | 130        |           |
|                        |                                   | strontium, total    | 7440-24-6  | E420      | 0.197 mg/L    | 0.2 mg/L    | 98.5         | 70.0          | 130        |           |
|                        |                                   | sulfur, total       | 7704-34-9  | E420      | 174 mg/L      | 200 mg/L    | 87.0         | 70.0          | 130        |           |
|                        |                                   | thallium, total     | 7440-28-0  | E420      | 0.0361 mg/L   | 0.04 mg/L   | 90.2         | 70.0          | 130        |           |
|                        |                                   | tin, total          | 7440-31-5  | E420      | 0.184 mg/L    | 0.2 mg/L    | 91.9         | 70.0          | 130        |           |
|                        |                                   | titanium, total     | 7440-32-6  | E420      | 0.378 mg/L    | 0.4 mg/L    | 94.4         | 70.0          | 130        |           |
|                        |                                   | uranium, total      | 7440-61-1  | E420      | 0.0373 mg/L   | 0.04 mg/L   | 93.3         | 70.0          | 130        |           |
|                        |                                   | vanadium, total     | 7440-62-2  | E420      | 0.954 mg/L    | 1 mg/L      | 95.4         | 70.0          | 130        |           |
|                        |                                   | zinc, total         | 7440-66-6  | E420      | 3.84 mg/L     | 4 mg/L      | 95.9         | 70.0          | 130        |           |
| otal Metals (QC        | Lot: 646084)                      |                     |            |           |               |             |              |               |            |           |
| CG2212407-001          | LC_FRB_WS_LAEMP_DRY<br>_2022-09_N | chromium, total     | 7440-47-3  | E420.Cr-L | 0.392 mg/L    | 0.4 mg/L    | 98.1         | 70.0          | 130        |           |
| otal Metals (QC        | Lot: 647531)                      |                     |            |           |               |             | ·            |               |            |           |
| CG2212395-002          | Anonymous                         | mercury, total      | 7439-97-6  | E508      | 0.000103 mg/L | 0.0001 mg/L | 103          | 70.0          | 130        |           |
| issolved Metals        | (QCLot: 646741)                   |                     |            |           |               |             |              |               |            |           |
| CG2212207-002          | Anonymous                         | chromium, dissolved | 7440-47-3  | E421.Cr-L | 0.451 mg/L    | 0.4 mg/L    | 113          | 70.0          | 130        |           |
| issolved Metals        | (QCLot: 646742)                   |                     |            |           |               |             |              |               |            |           |
| CG2212207-002          | Anonymous                         | aluminum, dissolved | 7429-90-5  | E421      | 2.29 mg/L     | 2 mg/L      | 114          | 70.0          | 130        |           |
|                        | T.                                | antimony, dissolved | 7440-36-0  | E421      | 0.219 mg/L    | 0.2 mg/L    | 109          | 70.0          | 130        |           |

Page : 17 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| ub-Matrix: Water |                   |                       |            |        |               |             | Matrix Spik  | e (MS) Report |            |           |
|------------------|-------------------|-----------------------|------------|--------|---------------|-------------|--------------|---------------|------------|-----------|
|                  |                   |                       |            |        | Spi           | ke          | Recovery (%) | Recovery      | Limits (%) |           |
| aboratory sample | Client sample ID  | Analyte               | CAS Number | Method | Concentration | Target      | MS           | Low           | High       | Qualifier |
| issolved Metals  | (QCLot: 646742) - | continued             |            |        |               |             |              |               |            |           |
| CG2212207-002    | Anonymous         | arsenic, dissolved    | 7440-38-2  | E421   | 0.213 mg/L    | 0.2 mg/L    | 106          | 70.0          | 130        |           |
|                  |                   | barium, dissolved     | 7440-39-3  | E421   | 0.148 mg/L    | 0.2 mg/L    | 74.3         | 70.0          | 130        |           |
|                  |                   | beryllium, dissolved  | 7440-41-7  | E421   | 0.439 mg/L    | 0.4 mg/L    | 110          | 70.0          | 130        |           |
|                  |                   | bismuth, dissolved    | 7440-69-9  | E421   | 0.111 mg/L    | 0.1 mg/L    | 111          | 70.0          | 130        |           |
|                  |                   | boron, dissolved      | 7440-42-8  | E421   | 1.05 mg/L     | 1 mg/L      | 105          | 70.0          | 130        |           |
|                  |                   | cadmium, dissolved    | 7440-43-9  | E421   | 0.0445 mg/L   | 0.04 mg/L   | 111          | 70.0          | 130        |           |
|                  |                   | calcium, dissolved    | 7440-70-2  | E421   | ND mg/L       | 40 mg/L     | ND           | 70.0          | 130        |           |
|                  |                   | cobalt, dissolved     | 7440-48-4  | E421   | 0.216 mg/L    | 0.2 mg/L    | 108          | 70.0          | 130        |           |
|                  |                   | copper, dissolved     | 7440-50-8  | E421   | 0.220 mg/L    | 0.2 mg/L    | 110          | 70.0          | 130        |           |
|                  |                   | iron, dissolved       | 7439-89-6  | E421   | 21.2 mg/L     | 20 mg/L     | 106          | 70.0          | 130        |           |
|                  |                   | lead, dissolved       | 7439-92-1  | E421   | 0.225 mg/L    | 0.2 mg/L    | 112          | 70.0          | 130        |           |
|                  |                   | lithium, dissolved    | 7439-93-2  | E421   | 0.956 mg/L    | 1 mg/L      | 95.6         | 70.0          | 130        |           |
|                  |                   | magnesium, dissolved  | 7439-95-4  | E421   | ND mg/L       | 10 mg/L     | ND           | 70.0          | 130        |           |
|                  |                   | manganese, dissolved  | 7439-96-5  | E421   | 0.222 mg/L    | 0.2 mg/L    | 111          | 70.0          | 130        |           |
|                  |                   | molybdenum, dissolved | 7439-98-7  | E421   | 0.217 mg/L    | 0.2 mg/L    | 108          | 70.0          | 130        |           |
|                  |                   | nickel, dissolved     | 7440-02-0  | E421   | 0.433 mg/L    | 0.4 mg/L    | 108          | 70.0          | 130        |           |
|                  |                   | potassium, dissolved  | 7440-09-7  | E421   | 40.9 mg/L     | 40 mg/L     | 102          | 70.0          | 130        |           |
|                  |                   | selenium, dissolved   | 7782-49-2  | E421   | 0.362 mg/L    | 0.4 mg/L    | 90.6         | 70.0          | 130        |           |
|                  |                   | silicon, dissolved    | 7440-21-3  | E421   | 82.1 mg/L     | 100 mg/L    | 82.1         | 70.0          | 130        |           |
|                  |                   | silver, dissolved     | 7440-22-4  | E421   | 0.0463 mg/L   | 0.04 mg/L   | 116          | 70.0          | 130        |           |
|                  |                   | sodium, dissolved     | 7440-23-5  | E421   | 20.3 mg/L     | 20 mg/L     | 101          | 70.0          | 130        |           |
|                  |                   | strontium, dissolved  | 7440-24-6  | E421   | 0.238 mg/L    | 0.2 mg/L    | 119          | 70.0          | 130        |           |
|                  |                   | sulfur, dissolved     | 7704-34-9  | E421   | 141 mg/L      | 200 mg/L    | 70.4         | 70.0          | 130        |           |
|                  |                   | thallium, dissolved   | 7440-28-0  | E421   | 0.0425 mg/L   | 0.04 mg/L   | 106          | 70.0          | 130        |           |
|                  |                   | tin, dissolved        | 7440-31-5  | E421   | 0.222 mg/L    | 0.2 mg/L    | 111          | 70.0          | 130        |           |
|                  |                   | titanium, dissolved   | 7440-32-6  | E421   | 0.451 mg/L    | 0.4 mg/L    | 113          | 70.0          | 130        |           |
|                  |                   | uranium, dissolved    | 7440-61-1  | E421   | 0.0404 mg/L   | 0.04 mg/L   | 101          | 70.0          | 130        |           |
|                  |                   | vanadium, dissolved   | 7440-62-2  | E421   | 1.08 mg/L     | 1 mg/L      | 108          | 70.0          | 130        |           |
|                  |                   | zinc, dissolved       | 7440-66-6  | E421   | 4.76 mg/L     | 4 mg/L      | 119          | 70.0          | 130        |           |
| ssolved Metals   | (QCLot: 647532)   |                       |            |        |               |             |              |               |            |           |
| G2212395-002     | Anonymous         | mercury, dissolved    | 7439-97-6  | E509   | 0.000100 mg/L | 0.0001 mg/L | 100          | 70.0          | 130        |           |

Page : 18 of 18

Work Order : CG2212407 Amendment 1
Client : Teck Coal Limited



| Teck   |  |             |                             |               |          | Page         | 1          | of           | 1          |                   |               |                |                       |  |              |                     |                |                |              |                                       |
|--|--|-------------|-----------------------------|---------------|----------|--------------|------------|--------------|------------|-------------------|---------------|----------------|-----------------------|--|--------------|---------------------|----------------|----------------|--------------|---------------------------------------|
| ICCK   | COCUP. KI  | EP_LA       | EMP                         | _DKY_ZU.      | ZZ-      | TURNA        | DOUN       | ר חו         | 'IME       |                   |               |                |                       | RUSH: Priority                                   |              |                     |                |                |              |                                       |
| puo  | COC ID:  |             | UO_4                        | 7.5           |          | 201010       |            |              | ABORA      | TORY              | 2-            | 3 Busine       | ess Day:              | <u>s</u>   |              |                     | ER INFO        | -              |              |                                       |
|  | ECT/CLIENT INFO Regional Effects Program         |             |                             |               |          | Name         |            | S Calgar     |            |                   |               | Re             | nort For              | mat / D  | istributi    |                     | Excel          | PDF            | EDD          |                                       |
| Project Manage   |  |             |                             |               |          |              |            | L            | idmyla S   |                   |               |                |                       | ail 1:   | III.         | Stillouti           | UII.           | v              | X            | Y                                     |
|  | Nicole Zathey@Teck.com                           |             |                             |               |          | - Lao        |            | ĻŤ           | tmyla.Shve |                   | Slobal.com    |                |                       | ail 2:   | tocked       | ചരവ                 | isonline.      | com            | <u></u>      | X                                     |
| <u> </u>   | 421 Pine Avenune                                 |             |                             |               |          |              | <u> </u>   | 9 29 Str     |            |                   |               |                | ail 3:                |  |              | ults@tec            |                | v              | Y            |                                       |
| Addless  | 421 Fine Avenune                                 |             |                             |               |          | <del> </del> | - Luci C33 |              |            |                   |               |                |                       | ail 4:   |              | ron@minr            |                | v              | v            | v                                     |
| Oi.  | - Smarrand                                       |             |                             | Province BC   |          |              | City       | Ca           | gary/      |                   | Province      | AB             |                       | ail 5:   |              | alleau@mìr          |                | l v            | v            | v                                     |
| City Postal Code   |  |             |                             | Country Can   |          | Post         | al Code    |              |            |                   | Country       | Canada         |                       | ail 5:   |              |                     | Teck.com       | X              | X            | X                                     |
| <u> </u>   | r 1-250-865-3048                                 | <del></del> |                             | country Can   |          |              |            |              | 407 179    | 94                | Country       | Cunada         |                       | umber  | Jessica      | 2.1XII.2(Q)         |                | 817033         |              |                                       |
|  | SAMPLE DETAILS                                   |             |                             |               |          | 1 Hone 1     | tuinoci    | 70.          | 107 177    |                   | LYSIS RE      | OUESTI         |                       | iumooi_  |              | Fib                 | tered - F: Fie |                |              | Lab, N: None                          |
| Environmental Division   | SAM DE DETAILS                                   |             |                             |               |          | · · ·        |            | 1            | -          |                   | 1             | 1              | 1                     |  | T            | T                   |                |                |              |                                       |
| Calgary Work Order Reference   |  |             |                             |               |          |              |            | ŧ            | F          | F                 |               | 1              |                       | ĺ  | N            | 1.                  |                |                |              |                                       |
| Work Order Reference<br>CG2212407  |  |             | 6                           |               |          |              |            | ESERV.       | H2SO4      | HCL               |               |                |                       |  | H2SO4        |                     |                |                |              |                                       |
|  |  |             | ξ                           |               |          |              |            | P.           |            | 100               |               |                | <u> </u>              |  | 1-100000     |                     |                | <u> </u>       |              |                                       |
|  |  | :           | Hazardous Material (Yes/No) |               |          |              |            | ANALYSIS     |            | Mercury_Dissolved | Mercury_Total | TECKCOAL_METNH | TECKCOAL_METNH<br>G_T | FECKCOAL_ROUTIN                                  | I_PT         |                     |                |                |              |                                       |
| main at symmetry, is matin   |  |             | Suc                         |               |          |              |            | Ž.           |            | 7                 | L_            | Õ              | Ö                     | Įõ   | ₹            |                     |                |                |              |                                       |
| Telephone: +1 403 407 1600   |  |             | rdo                         |               |          | G=Grab       |            | 1            |            | Ë                 | Ë             | 15             | 3                     | 15   | TOC_TKN      |                     |                |                |              |                                       |
|  | Sample Location                                  | Field       | 223                         |               | Time     | C=Com        | #Of        |              | DOC        | <u>e</u> rc       | er e          | TEC            | 걸다                    | 2  | 8            |                     | 1              |                |              |                                       |
| Sample ID  | (sys loc code)                                   | Matrix      | 王                           | Date          | (24hr)   | р            | Cont.      | ⊢            | <u> </u>   |                   |               | 1 5            | 1                     | <del></del>                                      | <b>—</b> •   | +                   | +              | -              |              |                                       |
| LC_FRB_WS_LAEMP_DRY_2022-09_N  | LC_FRB   | ws          |                             | 2022/09/10    | 14:00    | G            | 7          |              | 1          | 1                 | 1             | 1              | 1                     | 1  | 1            |                     | <u> </u>       | <u> </u>       |              | ļ                                     |
| LC_FRUS_WS_LAEMP_DRY_2022-09_N   | LC_FRUS  | ws          |                             | 2022/09/10    | 9:00     | G            | 7          |              | 1          | 1                 | 1             | 1              | 1                     | 1  | 1            |                     |                |                |              |                                       |
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|  |  |             |                             |               |          | _            |            | 1            |            |                   |               | <del>.</del>   |                       | <del>                                     </del> | <del> </del> |                     | +-             | <del> </del>   | -            |                                       |
|  |  |             |                             |               |          |              |            |              |            |                   |               |                |                       |  |              |                     |                |                | 1            |                                       |
|  |  |             |                             |               |          |              |            | ١,           |            |                   |               |                |                       |  |              |                     |                |                |              |                                       |
|  |  |             |                             |               | -        | <del> </del> |            |              |            |                   | <u> </u>      | <u> </u>       |                       |  | <b> </b>     | +                   | +              |                |              |                                       |
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|  |  |             |                             |               |          | l            |            | L            |            |                   |               | 1              |                       | 1  |              |                     |                |                |              |                                       |
| ADDITIONAL COMMENTS/SPECIA   |  | a           | R                           | ELINQUISHE    |          |              | N          |              | DATE/I     |                   | * ACC         | EPTED          |                       | FILIATI  | ON           |                     |                | ATE/TI         |              |                                       |
| Dissolved metals were field filtered an  |  |             |                             | Jennifer      | Ings/Mir | now          |            |              | 12-Se      | ep                |               |                | NC                    |  |              |                     | 13/09/         | 22             | _ 09         | lt                                    |
| Total metals to be lab pr  | reserved   |             |                             |               |          |              |            |              |            |                   |               |                |                       |  |              |                     |                |                |              | •                                     |
|  | · ·  |             |                             |               |          |              |            |              |            |                   |               |                |                       |  |              |                     |                |                |              |                                       |
|  |  | F           | <del></del>                 |               |          |              |            |              |            |                   |               |                |                       |  |              |                     |                |                |              |                                       |
| SERVICE REQUEST (rush - subje  | SERVICE REQUEST (rush - subject to availability) |             |                             | reser         |          | <del> </del> |            | <del> </del> | z' g       |                   | No. 7         |                | ·à.                   | *  |              | - S. S. S. S. S. S. | *******        | 14             | ٠.           |                                       |
| The state of the s | Regular (de                                      | *****       |                             |               |          | Ι            |            |              |            |                   |               | 34-1           | bile#                 | T  |              |                     | 5195003        | 144            |              |                                       |
| Priority (2  | -3 business days) - 50% surc                     |             |                             | Sampler's Nai | пе<br>   | <u> </u>     |            | Jen          | nifer In   | Rz                |               | IVIO           | vii¢ #                |  |              |                     | 11730034       | 144            |              |                                       |
| Emergency (  | 1 Business Day) - 100% surc                      | harge       | Ça                          | mpler's Signa | ture     |              | _          |              |            |                   |               | Date           | /Time                 |  |              | Sept                | ember 1        | 2, 2022        |              |                                       |
| For Emergency <1 Day,  | ASAP or Weekend - Contact                        | ALS         |                             | b.c. 2 0.8111 |          | L            | ·          |              |            |                   |               |                |                       | <u> </u>   |              |                     |                |                |              |                                       |

# **WATER CHEMISTRY**

ALS Laboratory Report CG2212551 (Finalized 16-Sept-22)



## **CERTIFICATE OF ANALYSIS**

Work Order : CG2212551

: Teck Coal Limited

Contact : Nicole Zathey

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : --

Client

Project : LINE CREEK OPERATIONS

PO : VPO00817033

C-O-C number : LCO\_LAEMP\_DRY\_2022-09\_ALS

Sampler : Jennifer Ings/Minnow

Site : --

Quote number : Teck Coal Master Quote

No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 6

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary AB Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 14-Sep-2022 09:00

Date Analysis Commenced : 15-Sep-2022

Issue Date : 16-Sep-2022 18:23

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

### **Signatories**

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

| Signatories         | Position                 | Laboratory Department        |
|---------------------|--------------------------|------------------------------|
| Anthony Calero      | Supervisor - Inorganic   | Inorganics, Calgary, Alberta |
| Dwayne Bennett      | Supervisor - Inorganic   | Metals, Calgary, Alberta     |
| Elke Tabora         |                          | Inorganics, Calgary, Alberta |
| Harpreet Chawla     | Team Leader - Inorganics | Inorganics, Calgary, Alberta |
| Harpreet Chawla     | Team Leader - Inorganics | Metals, Calgary, Alberta     |
| Mackenzie Lamoureux | Laboratory Analyst       | Metals, Calgary, Alberta     |
| Parker Sgarbossa    | Laboratory Analyst       | Inorganics, Calgary, Alberta |
| Sara Niroomand      |                          | Inorganics, Calgary, Alberta |
| Shirley Li          |                          | Metals, Calgary, Alberta     |

Page : 2 of 6 Work Order : CG2212551 Client

: Teck Coal Limited

Project : LINE CREEK OPERATIONS



### **General Comments**

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

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

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

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

Key: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

| Unit     | Description                   |
|----------|-------------------------------|
| -        | No Unit                       |
| %        | percent                       |
| μg/L     | micrograms per litre          |
| μS/cm    | Microsiemens per centimetre   |
| meq/L    | milliequivalents per litre    |
| mg/L     | milligrams per litre          |
| mV       | millivolts                    |
| NTU      | nephelometric turbidity units |
| pH units | pH units                      |

<sup>&</sup>lt;: less than.

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

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

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

### **Qualifiers**

| Qualifier | Description  |
|-----------|--|
| DLM       | Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity). |
|           |  |

<sup>&</sup>gt;: greater than.

Page : 3 of 6
Work Order : CG2212551
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water)   |            |            | C           | lient sample ID   | LC_DCEF_WS_<br>LAEMP_DRY_2 | <br> | <br> |
|-------------------------------------|------------|------------|-------------|-------------------|----------------------------|------|------|
| (Matrix. Water)                     |            |            |             |                   | 022-09_N                   |      |      |
|                                     |            |            | Client same | oling date / time | 12-Sep-2022                | <br> | <br> |
|                                     |            |            | ,           | 3                 | 14:30                      |      |      |
| Analyte                             | CAS Number | Method     | LOR         | Unit              | CG2212551-001              | <br> | <br> |
|                                     |            |            |             |                   | Result                     | <br> | <br> |
| Physical Tests                      |            |            |             |                   |                            |      |      |
| acidity (as CaCO3)                  |            | E283       | 2.0         | mg/L              | <2.0                       | <br> | <br> |
| alkalinity, bicarbonate (as CaCO3)  |            | E290       | 1.0         | mg/L              | 149                        | <br> | <br> |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3    | E290       | 1.0         | mg/L              | 181                        | <br> | <br> |
| alkalinity, carbonate (as CaCO3)    |            | E290       | 1.0         | mg/L              | <1.0                       | <br> | <br> |
| alkalinity, carbonate (as CO3)      | 3812-32-6  | E290       | 1.0         | mg/L              | <1.0                       | <br> | <br> |
| alkalinity, hydroxide (as CaCO3)    |            | E290       | 1.0         | mg/L              | <1.0                       | <br> | <br> |
| alkalinity, hydroxide (as OH)       | 14280-30-9 | E290       | 1.0         | mg/L              | <1.0                       | <br> | <br> |
| alkalinity, total (as CaCO3)        |            | E290       | 1.0         | mg/L              | 149                        | <br> | <br> |
| conductivity                        |            | E100       | 2.0         | μS/cm             | 265                        | <br> | <br> |
| hardness (as CaCO3), dissolved      |            | EC100      | 0.50        | mg/L              | 140                        | <br> | <br> |
| oxidation-reduction potential [ORP] |            | E125       | 0.10        | mV                | 307                        | <br> | <br> |
| pH                                  |            | E108       | 0.10        | pH units          | 8.07                       | <br> | <br> |
| solids, total dissolved [TDS]       |            | E162       | 10          | mg/L              | 158                        | <br> | <br> |
| solids, total suspended [TSS]       |            | E160-L     | 1.0         | mg/L              | 22.7                       | <br> | <br> |
| turbidity                           |            | E121       | 0.10        | NTU               | 5.63                       | <br> | <br> |
| Anions and Nutrients                |            |            |             |                   |                            |      |      |
| ammonia, total (as N)               | 7664-41-7  | E298       | 0.0050      | mg/L              | <0.0050                    | <br> | <br> |
| bromide                             | 24959-67-9 | E235.Br-L  | 0.050       | mg/L              | <0.050                     | <br> | <br> |
| chloride                            | 16887-00-6 | E235.CI-L  | 0.10        | mg/L              | 0.24                       | <br> | <br> |
| fluoride                            | 16984-48-8 | E235.F     | 0.020       | mg/L              | 0.108                      | <br> | <br> |
| Kjeldahl nitrogen, total [TKN]      |            | E318       | 0.050       | mg/L              | <0.500 DLM                 | <br> | <br> |
| nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0050      | mg/L              | 0.0866                     | <br> | <br> |
| nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0010      | mg/L              | <0.0010                    | <br> | <br> |
| phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010      | mg/L              | 0.0038                     | <br> | <br> |
| phosphorus, total                   | 7723-14-0  | E372-U     | 0.0010      | mg/L              | 0.0117                     | <br> | <br> |
| sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 0.30        | mg/L              | 6.85                       | <br> | <br> |
| Organic / Inorganic Carbon          |            |            |             | J                 |                            |      |      |
| carbon, dissolved organic [DOC]     |            | E358-L     | 0.50        | mg/L              | 1.00                       | <br> | <br> |
| carbon, total organic [TOC]         |            | E355-L     | 0.50        | mg/L              | 1.11                       | <br> | <br> |

Page : 4 of 6
Work Order : CG2212551
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) | ient sample ID | LC_DCEF_WS_<br>LAEMP_DRY_2<br>022-09_N |           | <br>             |                         |  |      |  |
|-----------------------------------|----------------|--|-----------|------------------|-------------------------|--|------|--|
|                                   |                | Mathad                                 |           | ling date / time | 12-Sep-2022<br>14:30    |  | <br> |  |
| Analyte                           | CAS Number     | Method                                 | LOR       | Unit             | CG2212551-001<br>Result |  | <br> |  |
| Ion Balance                       |                |  |           |                  | rtosait                 |  |      |  |
| anion sum                         |                | EC101                                  | 0.10      | meq/L            | 3.14                    |  | <br> |  |
| cation sum                        |                | EC101                                  | 0.10      | meq/L            | 2.91                    |  | <br> |  |
| ion balance (cations/anions)      |                | EC101                                  | 0.010     | %                | 92.7                    |  | <br> |  |
| ion balance (APHA)                |                | EC101                                  | 0.010     | %                | 3.80                    |  | <br> |  |
| Total Metals                      |                |  |           |                  |                         |  |      |  |
| aluminum, total                   | 7429-90-5      | E420                                   | 0.0030    | mg/L             | 0.0312                  |  | <br> |  |
| antimony, total                   | 7440-36-0      | E420                                   | 0.00010   | mg/L             | 0.00014                 |  | <br> |  |
| arsenic, total                    | 7440-38-2      | E420                                   | 0.00010   | mg/L             | 0.00022                 |  | <br> |  |
| barium, total                     | 7440-39-3      | E420                                   | 0.00010   | mg/L             | 0.249                   |  | <br> |  |
| beryllium, total                  | 7440-41-7      | E420                                   | 0.020     | μg/L             | <0.020                  |  | <br> |  |
| bismuth, total                    | 7440-69-9      | E420                                   | 0.000050  | mg/L             | <0.000050               |  | <br> |  |
| boron, total                      | 7440-42-8      | E420                                   | 0.010     | mg/L             | 0.010                   |  | <br> |  |
| cadmium, total                    | 7440-43-9      | E420                                   | 0.0050    | μg/L             | 0.0676                  |  | <br> |  |
| calcium, total                    | 7440-70-2      | E420                                   | 0.050     | mg/L             | 33.3                    |  | <br> |  |
| chromium, total                   | 7440-47-3      | E420.Cr-L                              | 0.00010   | mg/L             | 0.00012                 |  | <br> |  |
| cobalt, total                     | 7440-48-4      | E420                                   | 0.10      | μg/L             | <0.10                   |  | <br> |  |
| copper, total                     | 7440-50-8      | E420                                   | 0.00050   | mg/L             | <0.00050                |  | <br> |  |
| iron, total                       | 7439-89-6      | E420                                   | 0.010     | mg/L             | 0.046                   |  | <br> |  |
| lead, total                       | 7439-92-1      | E420                                   | 0.000050  | mg/L             | 0.000060                |  | <br> |  |
| lithium, total                    | 7439-93-2      | E420                                   | 0.0010    | mg/L             | 0.0163                  |  | <br> |  |
| magnesium, total                  | 7439-95-4      | E420                                   | 0.0050    | mg/L             | 14.1                    |  | <br> |  |
| manganese, total                  | 7439-96-5      | E420                                   | 0.00010   | mg/L             | 0.00307                 |  | <br> |  |
| mercury, total                    | 7439-97-6      | E508                                   | 0.0000050 | mg/L             | <0.0000050              |  | <br> |  |
| molybdenum, total                 | 7439-98-7      | E420                                   | 0.000050  | mg/L             | 0.00111                 |  | <br> |  |
| nickel, total                     | 7440-02-0      | E420                                   | 0.00050   | mg/L             | <0.00050                |  | <br> |  |
| potassium, total                  | 7440-09-7      | E420                                   | 0.050     | mg/L             | 1.00                    |  | <br> |  |
| selenium, total                   | 7782-49-2      | E420                                   | 0.050     | μg/L             | 1.66                    |  | <br> |  |
| silicon, total                    | 7440-21-3      | E420                                   | 0.10      | mg/L             | 3.00                    |  | <br> |  |
| silver, total                     | 7440-22-4      | E420                                   | 0.000010  | mg/L             | <0.000010               |  | <br> |  |
| sodium, total                     | 7440-23-5      | E420                                   | 0.050     | mg/L             | 2.30                    |  | <br> |  |

Page : 5 of 6
Work Order : CG2212551
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) | ent sample ID | LC_DCEF_WS_<br>LAEMP_DRY_2<br>022-09_N | <br>      | <br>             |                         |      |      |
|-----------------------------------|---------------|--|-----------|------------------|-------------------------|------|------|
|                                   |               |  | ·         | ling date / time | 12-Sep-2022<br>14:30    | <br> | <br> |
| Analyte                           | CAS Number    | Method                                 | LOR       | Unit             | CG2212551-001<br>Result | <br> | <br> |
| Total Metals                      |               |  |           |                  | Nesuit                  | <br> | <br> |
| strontium, total                  | 7440-24-6     | E420                                   | 0.00020   | mg/L             | 0.0525                  | <br> | <br> |
| sulfur, total                     | 7704-34-9     | E420                                   | 0.50      | mg/L             | 2.90                    | <br> | <br> |
| thallium, total                   | 7440-28-0     | E420                                   | 0.000010  | mg/L             | <0.000010               | <br> | <br> |
| tin, total                        | 7440-31-5     | E420                                   | 0.00010   | mg/L             | <0.00010                | <br> | <br> |
| titanium, total                   | 7440-32-6     | E420                                   | 0.00030   | mg/L             | 0.00066                 | <br> | <br> |
| uranium, total                    | 7440-61-1     | E420                                   | 0.000010  | mg/L             | 0.000357                | <br> | <br> |
| vanadium, total                   | 7440-62-2     | E420                                   | 0.00050   | mg/L             | 0.00090                 | <br> | <br> |
| zinc, total                       | 7440-66-6     | E420                                   | 0.0030    | mg/L             | <0.0030                 | <br> | <br> |
| Dissolved Metals                  |               |  |           |                  |                         |      |      |
| aluminum, dissolved               | 7429-90-5     | E421                                   | 0.0010    | mg/L             | 0.0011                  | <br> | <br> |
| antimony, dissolved               | 7440-36-0     | E421                                   | 0.00010   | mg/L             | 0.00013                 | <br> | <br> |
| arsenic, dissolved                | 7440-38-2     | E421                                   | 0.00010   | mg/L             | 0.00016                 | <br> | <br> |
| barium, dissolved                 | 7440-39-3     | E421                                   | 0.00010   | mg/L             | 0.254                   | <br> | <br> |
| beryllium, dissolved              | 7440-41-7     | E421                                   | 0.020     | μg/L             | <0.020                  | <br> | <br> |
| bismuth, dissolved                | 7440-69-9     | E421                                   | 0.000050  | mg/L             | <0.000050               | <br> | <br> |
| boron, dissolved                  | 7440-42-8     | E421                                   | 0.010     | mg/L             | 0.011                   | <br> | <br> |
| cadmium, dissolved                | 7440-43-9     | E421                                   | 0.0050    | μg/L             | 0.0397                  | <br> | <br> |
| calcium, dissolved                | 7440-70-2     | E421                                   | 0.050     | mg/L             | 33.3                    | <br> | <br> |
| chromium, dissolved               | 7440-47-3     | E421.Cr-L                              | 0.00010   | mg/L             | <0.00010                | <br> | <br> |
| cobalt, dissolved                 | 7440-48-4     | E421                                   | 0.10      | μg/L             | <0.10                   | <br> | <br> |
| copper, dissolved                 | 7440-50-8     | E421                                   | 0.00020   | mg/L             | 0.00024                 | <br> | <br> |
| iron, dissolved                   | 7439-89-6     | E421                                   | 0.010     | mg/L             | <0.010                  | <br> | <br> |
| lead, dissolved                   | 7439-92-1     | E421                                   | 0.000050  | mg/L             | <0.000050               | <br> | <br> |
| lithium, dissolved                | 7439-93-2     | E421                                   | 0.0010    | mg/L             | 0.0181                  | <br> | <br> |
| magnesium, dissolved              | 7439-95-4     | E421                                   | 0.0050    | mg/L             | 13.7                    | <br> | <br> |
| manganese, dissolved              | 7439-96-5     | E421                                   | 0.00010   | mg/L             | 0.00017                 | <br> | <br> |
| mercury, dissolved                | 7439-97-6     | E509                                   | 0.0000050 | mg/L             | <0.0000050              | <br> | <br> |
| molybdenum, dissolved             | 7439-98-7     | E421                                   | 0.000050  | mg/L             | 0.00111                 | <br> | <br> |
| nickel, dissolved                 | 7440-02-0     | E421                                   | 0.00050   | mg/L             | <0.00050                | <br> | <br> |
| potassium, dissolved              | 7440-09-7     | E421                                   | 0.050     | mg/L             | 0.993                   | <br> | <br> |

Page : 6 of 6
Work Order : CG2212551
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water                     |            |        | Cli           | ient sample ID   | LC_DCEF_WS_   | <br> | <br> |
|---------------------------------------|------------|--------|---------------|------------------|---------------|------|------|
| (Matrix: Water)                       |            |        |               |                  | LAEMP_DRY_2   |      |      |
|                                       |            |        |               |                  | 022-09_N      |      |      |
|                                       |            |        | Client samp   | ling date / time | 12-Sep-2022   | <br> | <br> |
|                                       |            |        | , , , , , , , | 3                | 14:30         |      |      |
| Analyte                               | CAS Number | Method | LOR           | Unit             | CG2212551-001 | <br> | <br> |
|                                       |            |        |               |                  | Result        | <br> | <br> |
| Dissolved Metals                      |            |        |               |                  |               |      |      |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050         | μg/L             | 1.94          | <br> | <br> |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050         | mg/L             | 3.03          | <br> | <br> |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010      | mg/L             | <0.000010     | <br> | <br> |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050         | mg/L             | 2.28          | <br> | <br> |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020       | mg/L             | 0.0497        | <br> | <br> |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50          | mg/L             | 3.12          | <br> | <br> |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010      | mg/L             | <0.000010     | <br> | <br> |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010       | mg/L             | <0.00010      | <br> | <br> |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030       | mg/L             | <0.00030      | <br> | <br> |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010      | mg/L             | 0.000299      | <br> | <br> |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050       | mg/L             | 0.00055       | <br> | <br> |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010        | mg/L             | <0.0010       | <br> | <br> |
| dissolved mercury filtration location |            | EP509  | -             | -                | Field         | <br> | <br> |
| dissolved metals filtration location  |            | EP421  | -             | -                | Field         | <br> | <br> |

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



# **QUALITY CONTROL INTERPRETIVE REPORT**

**Work Order** : **CG2212551** Page : 1 of 12

Client : Teck Coal Limited Laboratory : Calgary - Environmental
Contact : Nicole Zathey Account Manager : Lyudmyla Shvets

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43 Address : 2559 29th Street NE

Sparwood BC Canada V0B 2G0 Calgary, Alberta Canada T1Y 7B5

 Telephone
 : -- Telephone
 : +1 403 407 1800

 Project
 : LINE CREEK OPERATIONS
 Date Samples Received
 : 14-Sep-2022 09:00

PO : VPO00817033 | Issue Date : 16-Sep-2022 18:23

C-O-C number : LCO\_LAEMP\_DRY\_2022-09\_ALS

Sampler : Jennifer Ings/Minnow

Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 1
No. of samples analysed : 1

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

#### Key

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

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

**DQO: Data Quality Objective.** 

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

#### **Workorder Comments**

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

# **Summary of Outliers**

#### **Outliers: Quality Control Samples**

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

#### Outliers: Reference Material (RM) Samples

• No Reference Material (RM) Sample outliers occur.

#### **Outliers : Analysis Holding Time Compliance (Breaches)**

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

#### **Outliers: Frequency of Quality Control Samples**

• No Quality Control Sample Frequency Outliers occur.



Page : 3 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **Analysis Holding Time Compliance**

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

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

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

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

| Matrix: Water   |            |               |             |               | Ev        | aluation: 🗴 = | Holding time exce | edance ; 🔻 | = Within | Holding Time    |
|---|------------|---------------|-------------|---------------|-----------|---------------|-------------------|------------|----------|-----------------|
| Analyte Group   | Method     | Sampling Date | Ext         | traction / Pr | eparation |               |                   | Analys     | is       |                 |
| Container / Client Sample ID(s)   |            |               | Preparation | Holding       | g Times   | Eval          | Analysis Date     | Holding    | Times    | Eval            |
|   |            |               | Date        | Rec           | Actual    |               |                   | Rec        | Actual   |                 |
| Anions and Nutrients : Ammonia by Fluorescence                                  |            |               |             |               |           |               |                   |            |          |                 |
| Amber glass total (sulfuric acid)  LC_DCEF_WS_LAEMP_DRY_2022-09_N               | E298       | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 28 days    | 3 days   | ✓               |
| Anions and Nutrients : Bromide in Water by IC (Low Level)                       |            |               |             |               |           |               |                   |            |          |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.Br-L  | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 28 days    | 3 days   | ✓               |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |            |               |             |               |           |               |                   |            |          |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.CI-L  | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 28 days    | 3 days   | ✓               |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001  |               |             |               |           |               |                   |            |          |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E378-U     | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 3 days     | 3 days   | <b>*</b><br>EHT |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |             |               |           |               |                   |            |          |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.F     | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 28 days    | 3 days   | ✓               |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)                       |            |               |             |               |           |               |                   |            | 1        |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.NO3-L | 12-Sep-2022   | 15-Sep-2022 | 3 days        | 3 days    | ✓             | 15-Sep-2022       | 3 days     | 0 days   | ✓               |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                       |            |               |             |               |           |               |                   |            | '        |                 |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.NO2-L | 12-Sep-2022   | 15-Sep-2022 |               |           |               | 15-Sep-2022       | 3 days     | 3 days   | #<br>EHT        |

Page : 4 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| viaurix: water   |                |               |             |              |           | alaation. | Holding time exce | oudinoo ,   | *************************************** |          |
|--|----------------|---------------|-------------|--------------|-----------|-----------|-------------------|-------------|---|----------|
| Analyte Group  | Method         | Sampling Date | Ext         | raction / Pr | eparation |           |                   | Analys      | is                                      |          |
| Container / Client Sample ID(s)  |                |               | Preparation | Holding      | g Times   | Eval      | Analysis Date     | Holding     | Times                                   | Eval     |
|  |                |               | Date        | Rec          | Actual    |           |                   | Rec         | Actual                                  |          |
| Anions and Nutrients : Sulfate in Water by IC  |                |               |             |              |           |           |                   |             |   |          |
| HDPE   |                |               |             |              |           |           |                   |             |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E235.SO4       | 12-Sep-2022   | 15-Sep-2022 |              |           |           | 15-Sep-2022       | 28 days     | 3 days                                  | ✓        |
|  |                |               |             |              |           |           |                   |             |   |          |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)                       |                |               |             |              |           |           |                   |             |   |          |
| Amber glass total (sulfuric acid)  |                |               |             |              |           |           |                   |             |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E318           | 12-Sep-2022   | 16-Sep-2022 |              |           |           | 16-Sep-2022       | 28 days     | 4 days                                  | ✓        |
|  |                |               |             |              |           |           |                   |             |   |          |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)                             |                |               |             |              |           |           |                   |             |   |          |
| Amber glass total (sulfuric acid)  | F070 !!        | 40.0          | 45.0        |              |           |           | 40.0              | 00.1        |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E372-U         | 12-Sep-2022   | 15-Sep-2022 |              |           |           | 16-Sep-2022       | 28 days     | 3 days                                  | ✓        |
|  |                |               |             |              |           |           |                   |             |   |          |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                          |                |               |             | I            | 1         |           | ı                 | I           |   |          |
| HDPE dissolved (nitric acid)   | E421.Cr-L      | 12-Sep-2022   | 16-Sep-2022 |              |           |           | 16-Sep-2022       | 400         | 4 days                                  | <b>1</b> |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E421.GI-L      | 12-3ep-2022   | 10-Sep-2022 |              |           |           | 10-3ep-2022       | 180<br>days | 4 uays                                  | <b>,</b> |
|  |                |               |             |              |           |           |                   | uays        |   |          |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS  Glass vial dissolved (hydrochloric acid) |                |               |             |              |           |           | I                 |             |   |          |
| LC DCEF WS LAEMP DRY 2022-09 N   | E509           | 12-Sep-2022   | 16-Sep-2022 |              |           |           | 16-Sep-2022       | 28 days     | 4 days                                  | <b>√</b> |
| E0_B0E1_W0_E1EMI _BIX1_2022-00_IV  |                | .2 336 2322   | 10 00p 2022 |              |           |           | 10 000 2022       | 20 days     | , dayo                                  |          |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS  |                |               |             |              |           |           | <u> </u>          |             |   |          |
| HDPE dissolved (nitric acid)   |                |               |             |              |           |           |                   |             |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E421           | 12-Sep-2022   | 16-Sep-2022 |              |           |           | 16-Sep-2022       | 180         | 4 days                                  | ✓        |
|  |                |               |             |              |           |           |                   | days        |   |          |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve                    | el)            |               |             |              |           |           |                   |             |   |          |
| Amber glass dissolved (sulfuric acid)  |                |               |             |              |           |           |                   |             |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E358-L         | 12-Sep-2022   | 15-Sep-2022 |              |           |           | 15-Sep-2022       | 28 days     | 3 days                                  | ✓        |
|  |                |               |             |              |           |           |                   |             |   |          |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustic                   | on (Low Level) |               |             |              |           |           |                   |             |   |          |
| Amber glass total (sulfuric acid)  |                |               |             |              |           |           |                   |             |   |          |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | E355-L         | 12-Sep-2022   | 15-Sep-2022 |              |           |           | 15-Sep-2022       | 28 days     | 3 days                                  | ✓        |
|  |                |               |             |              |           |           | L                 |             |   |          |
| Physical Tests : Acidity by Titration  |                |               |             |              |           |           | I                 | T           |   |          |
| HDPE   | E283           | 12-Sep-2022   | 15-Sep-2022 |              |           |           | 15-Sep-2022       | 14 days     | 3 days                                  | 1        |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | L203           | 12-0ch-2022   | 10-06h-2022 |              |           |           | 10-0ch-2022       | 14 uays     | Juays                                   | •        |

Page 5 of 12 CG2212551 Work Order

Client

: Teck Coal Limited : LINE CREEK OPERATIONS Project



| Matrix: Water   |           |               |                     |                                |  | aluation: 🗴 = | Holding time exce        |             |             | Holding Tir  |
|---|-----------|---------------|---------------------|--------------------------------|--|---------------|--------------------------|-------------|-------------|--------------|
| Analyte Group   | Method    | Sampling Date | Ext                 | traction / Pi                  |  |               |                          | Analys      |             |              |
| Container / Client Sample ID(s)                                     |           |               | Preparation<br>Date | Holding Times Eval  Rec Actual |  | Analysis Date | Holding Times Rec Actual |             | Eval        |              |
| Physical Tests : Alkalinity Species by Titration                    |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E290      | 12-Sep-2022   | 15-Sep-2022         |                                |  |               | 15-Sep-2022              | 14 days     | 3 days      | ✓            |
| Physical Tests : Conductivity in Water                              |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E100      | 12-Sep-2022   | 15-Sep-2022         |                                |  |               | 15-Sep-2022              | 28 days     | 3 days      | 4            |
| Physical Tests : ORP by Electrode                                   |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E125      | 12-Sep-2022   |                     |                                |  |               | 16-Sep-2022              | 0.25<br>hrs | 93 hrs      | #<br>EHTR-FM |
| Physical Tests : pH by Meter  |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E108      | 12-Sep-2022   | 15-Sep-2022         |                                |  |               | 15-Sep-2022              | 0.25<br>hrs | 0.25<br>hrs | #<br>EHTR-FN |
| Physical Tests : TDS by Gravimetry                                  |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E162      | 12-Sep-2022   |                     |                                |  |               | 15-Sep-2022              | 7 days      | 3 days      | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level)                      |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E160-L    | 12-Sep-2022   |                     |                                |  |               | 15-Sep-2022              | 7 days      | 3 days      | ✓            |
| Physical Tests : Turbidity by Nephelometry                          |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-09_N                                 | E121      | 12-Sep-2022   |                     |                                |  |               | 15-Sep-2022              | 3 days      | 3 days      | ✓            |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level)     |           |               |                     |                                |  |               |                          |             |             |              |
| HDPE total (nitric acid) LC_DCEF_WS_LAEMP_DRY_2022-09_N             | E420.Cr-L | 12-Sep-2022   | 16-Sep-2022         |                                |  |               | 16-Sep-2022              | 180<br>days | 4 days      | ✓            |
| Total Metals : Total Mercury in Water by CVAAS                      |           |               |                     |                                |  |               |                          |             |             |              |
| Glass vial total (hydrochloric acid) LC_DCEF_WS_LAEMP_DRY_2022-09_N | E508      | 12-Sep-2022   | 16-Sep-2022         |                                |  |               | 16-Sep-2022              | 28 days     | 4 days      | ✓            |

Page : 6 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| Wild Mild Fracti  |        |               |             |               |           | diddion. | riolaning airio oxooc | danoo ,     | *************************************** | riolanig riili |
|---|--------|---------------|-------------|---------------|-----------|----------|-----------------------|-------------|---|----------------|
| Analyte Group   | Method | Sampling Date | Ext         | raction / Pre | eparation |          |                       | Analys      | sis                                     |                |
| Container / Client Sample ID(s)                         |        |               | Preparation | Holding       | Times     | Eval     | Analysis Date         | Holding     | g Times                                 | Eval           |
|   |        |               | Date        | Rec           | Actual    |          |                       | Rec         | Actual                                  |                |
| Total Metals : Total Metals in Water by CRC ICPMS       |        |               |             |               |           |          |                       |             |   |                |
| HDPE total (nitric acid) LC_DCEF_WS_LAEMP_DRY_2022-09_N | E420   | 12-Sep-2022   | 16-Sep-2022 |               |           |          | 16-Sep-2022           | 180<br>days | 4 days                                  | <b>√</b>       |

#### **Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Page : 7 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **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.

| Quality Control Sample Type   |            |          | C  | ount    |          | )                      |            |
|---|------------|----------|----|---------|----------|------------------------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual   | Frequency (%) Expected | Evaluation |
| Laboratory Duplicates (DUP)   |            |          |    |         | <u>'</u> |                        |            |
| Acidity by Titration  | E283       | 649325   | 1  | 4       | 25.0     | 5.0                    | 1          |
| Alkalinity Species by Titration   | E290       | 649329   | 1  | 6       | 16.6     | 5.0                    |            |
| Ammonia by Fluorescence   | E298       | 649577   | 1  | 17      | 5.8      | 5.0                    | <u> </u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 649483   | 1  | 16      | 6.2      | 5.0                    | <b>√</b>   |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 649484   | 1  | 16      | 6.2      | 5.0                    | <b>√</b>   |
| Conductivity in Water   | E100       | 649328   | 1  | 6       | 16.6     | 5.0                    | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 650008   | 1  | 15      | 6.6      | 5.0                    | <b>√</b>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 650160   | 1  | 20      | 5.0      | 5.0                    | <b>√</b>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 650009   | 1  | 20      | 5.0      | 5.0                    | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 649550   | 1  | 17      | 5.8      | 5.0                    | <b>√</b>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 649627   | 1  | 20      | 5.0      | 5.0                    | <u>√</u>   |
| Fluoride in Water by IC   | E235.F     | 649482   | 1  | 16      | 6.2      | 5.0                    | <b>√</b>   |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 649485   | 1  | 19      | 5.2      | 5.0                    | <b>√</b>   |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 649486   | 1  | 19      | 5.2      | 5.0                    | <b>√</b>   |
| ORP by Electrode  | E125       | 650422   | 1  | 10      | 10.0     | 5.0                    | ✓          |
| pH by Meter   | E108       | 649327   | 1  | 8       | 12.5     | 5.0                    | <b>√</b>   |
| Sulfate in Water by IC  | E235.SO4   | 649487   | 1  | 16      | 6.2      | 5.0                    | ✓          |
| TDS by Gravimetry   | E162       | 649536   | 1  | 16      | 6.2      | 5.0                    | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 649992   | 1  | 8       | 12.5     | 5.0                    | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 649378   | 1  | 4       | 25.0     | 5.0                    | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 650164   | 1  | 20      | 5.0      | 5.0                    | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 649993   | 1  | 8       | 12.5     | 5.0                    | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 649551   | 1  | 18      | 5.5      | 5.0                    | ✓          |
| Turbidity by Nephelometry   | E121       | 649414   | 1  | 4       | 25.0     | 5.0                    | ✓          |
| Laboratory Control Samples (LCS)  |            |          |    |         |          |                        |            |
| Acidity by Titration  | E283       | 649325   | 1  | 4       | 25.0     | 5.0                    | ✓          |
| Alkalinity Species by Titration   | E290       | 649329   | 1  | 6       | 16.6     | 5.0                    | ✓          |
| Ammonia by Fluorescence   | E298       | 649577   | 1  | 17      | 5.8      | 5.0                    | ✓          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 649483   | 1  | 16      | 6.2      | 5.0                    | ✓          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 649484   | 1  | 16      | 6.2      | 5.0                    | ✓          |
| Conductivity in Water   | E100       | 649328   | 1  | 6       | 16.6     | 5.0                    | ✓          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 650008   | 1  | 15      | 6.6      | 5.0                    | ✓          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 650160   | 1  | 20      | 5.0      | 5.0                    | ✓          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 650009   | 1  | 20      | 5.0      | 5.0                    | ✓          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 649550   | 1  | 17      | 5.8      | 5.0                    | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 649627   | 1  | 20      | 5.0      | 5.0                    | ✓          |
| Fluoride in Water by IC   | E235.F     | 649482   | 1  | 16      | 6.2      | 5.0                    | ✓          |

Page : 8 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

| Quality Control Sample Type   |                        | Lvaluati         | ion: × = QC rreque | ount    |   | Frequency (%) |            |
|---|------------------------|------------------|--------------------|---------|---|---------------|------------|
| Analytical Methods  | Method                 | QC Lot #         | QC                 | Regular | Actual                                  | Expected      | Evaluation |
| Laboratory Control Samples (LCS) - Continued                            |                        | 40 201           |                    |         | 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 |               |            |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L             | 649485           | 1                  | 19      | 5.2                                     | 5.0           | 1          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L             | 649486           | 1                  | 19      | 5.2                                     | 5.0           |            |
| ORP by Electrode  | E125                   | 650422           | 1                  | 10      | 10.0                                    | 5.0           |            |
| pH by Meter   | E108                   | 649327           | 1                  | 8       | 12.5                                    | 5.0           |            |
| Sulfate in Water by IC  | E235.SO4               | 649487           | 1                  | 16      | 6.2                                     | 5.0           |            |
| TDS by Gravimetry   | E162                   | 649536           | 1                  | 16      | 6.2                                     | 5.0           |            |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L              | 649992           | 1                  | 8       | 12.5                                    | 5.0           |            |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318                   | 649378           | 1                  | 4       | 25.0                                    | 5.0           |            |
| Total Mercury in Water by CVAAS   | E508                   | 650164           | 1                  | 20      | 5.0                                     | 5.0           |            |
| Total Metals in Water by CRC ICPMS                                      | E420                   | 649993           | 1                  | 8       | 12.5                                    | 5.0           |            |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L                 | 649551           | 1                  | 18      | 5.5                                     | 5.0           |            |
| TSS by Gravimetry (Low Level)   | E160-L                 | 649523           | 1                  | 12      | 8.3                                     | 5.0           |            |
| Turbidity by Nephelometry   | E121                   | 649414           | 1                  | 4       | 25.0                                    | 5.0           |            |
| Method Blanks (MB)  | E121                   | 0.0              |                    |         | 20.0                                    | 0.0           | <u> </u>   |
| Acidity by Titration  | F292                   | 649325           | 1                  | 4       | 25.0                                    | 5.0           |            |
| Alkalinity Species by Titration   | E283<br>E290           | 649329           | 1                  | 6       | 16.6                                    | 5.0           | <b>√</b>   |
| Ammonia by Fluorescence   | E298                   | 649577           | 1                  | 17      | 5.8                                     | 5.0           |            |
| Bromide in Water by IC (Low Level)                                      |                        | 649483           | 1                  | 16      | 6.2                                     | 5.0           | <b>✓</b>   |
| Chloride in Water by IC (Low Level)                                     | E235.Br-L<br>E235.Cl-L | 649484           | 1                  | 16      | 6.2                                     | 5.0           | ✓          |
| Conductivity in Water   |                        | 649328           | 1                  | 6       | 16.6                                    | 5.0           |            |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E100<br>E421.Cr-L      | 650008           | 1                  | 15      | 6.6                                     | 5.0           | <b>√</b>   |
| Dissolved Mercury in Water by CVAAS                                     |                        | 650160           | 1                  | 20      | 5.0                                     | 5.0           |            |
| Dissolved Metals in Water by CRC ICPMS                                  | E509                   | 650009           | 1                  | 20      | 5.0                                     | 5.0           | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E421                   | 649550           | 1                  | 17      | 5.8                                     | 5.0           | <b>√</b>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E358-L                 | 649627           | 1                  | 20      | 5.0                                     | 5.0           | <b>√</b>   |
| Fluoride in Water by IC   | E378-U                 | 649482           | 1                  | 16      | 6.2                                     | 5.0           | <b>√</b>   |
| Nitrate in Water by IC (Low Level)                                      | E235.F                 | 649485           | 1                  | 19      | 5.2                                     | 5.0           | <u> </u>   |
| Nitrite in Water by IC (Low Level)                                      | E235.NO3-L             | 649486           | 1                  | 19      | 5.2                                     | 5.0           | ✓          |
| Sulfate in Water by IC  | E235.NO2-L             | 649487           | 1                  | 16      | 6.2                                     | 5.0           |            |
| TDS by Gravimetry   | E235.SO4               | 649536           | 1                  | 16      | 6.2                                     | 5.0           | <b>√</b>   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E162                   | 649992           | 1                  | 8       | 12.5                                    | 5.0           | <b>√</b>   |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E420.Cr-L              | 649378           | 1                  | 4       | 25.0                                    | 5.0           | <b>√</b>   |
| Total Mercury in Water by CVAAS   | E318                   | 650164           | 1                  | 20      | 5.0                                     | 5.0           | <b>√</b>   |
| Total Metals in Water by CRC ICPMS                                      | E508                   |                  | 1                  | 8       | 12.5                                    | 5.0           | <b>√</b>   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E420                   | 649993<br>649551 | 1                  | 18      | 5.5                                     | 5.0           | <b>√</b>   |
|   | E355-L                 | 649523           | 1                  | 12      |   |               | <b>√</b>   |
| TSS by Gravimetry (Low Level)   | E160-L                 | 649523           | 1                  | 4       | 8.3<br>25.0                             | 5.0<br>5.0    | <b>√</b>   |
| Turbidity by Nephelometry   | E121                   | 049414           | 1                  | 4       | 25.0                                    | 5.0           | ✓          |
| Matrix Spikes (MS)  |                        | 040              |                    | 4-      |   | F.0           |            |
| Ammonia by Fluorescence   | E298                   | 649577           | 1                  | 17      | 5.8                                     | 5.0           | <u>√</u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L              | 649483           | 1                  | 16      | 6.2                                     | 5.0           | ✓          |

Page : 9 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

|   |            |          |    |         |        | ~ · · · · · · · · · · · · · · · · · · · |            |
|---|------------|----------|----|---------|--------|---|------------|
| Quality Control Sample Type   |            |          | Co | ount    |        | Frequency (%)                           | )          |
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected                                | Evaluation |
| Matrix Spikes (MS) - Continued  |            |          |    |         |        |   |            |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 649484   | 1  | 16      | 6.2    | 5.0                                     | ✓          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 650008   | 1  | 15      | 6.6    | 5.0                                     | ✓          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 650160   | 1  | 20      | 5.0    | 5.0                                     | ✓          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 650009   | 1  | 20      | 5.0    | 5.0                                     | ✓          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 649550   | 1  | 17      | 5.8    | 5.0                                     | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 649627   | 1  | 20      | 5.0    | 5.0                                     | ✓          |
| Fluoride in Water by IC   | E235.F     | 649482   | 1  | 16      | 6.2    | 5.0                                     | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 649485   | 1  | 19      | 5.2    | 5.0                                     | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 649486   | 1  | 19      | 5.2    | 5.0                                     | ✓          |
| Sulfate in Water by IC  | E235.SO4   | 649487   | 1  | 16      | 6.2    | 5.0                                     | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 649992   | 1  | 8       | 12.5   | 5.0                                     | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 649378   | 1  | 4       | 25.0   | 5.0                                     | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 650164   | 1  | 20      | 5.0    | 5.0                                     | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 649993   | 1  | 8       | 12.5   | 5.0                                     | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 649551   | 1  | 18      | 5.5    | 5.0                                     | ✓          |
|   |            |          |    |         |        |   |            |

Page : 10 of 12 Work Order : CG2212551

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **Methodology References and Summaries**

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

| Analytical Methods                  | Method / Lab                       | Matrix | Method Reference  | Method Descriptions  |
|-------------------------------------|------------------------------------|--------|-------------------|--|
| Conductivity in Water               | E100  Calgary - Environmental      | Water  | APHA 2510 (mod)   | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.   |
| pH by Meter                         | E108  Calgary - Environmental      | Water  | APHA 4500-H (mod) | pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.   |
| Turbidity by Nephelometry           | E121 Calgary - Environmental       | Water  | APHA 2130 B (mod) | Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.   |
| ORP by Electrode                    | E125 Calgary - Environmental       | Water  | ASTM D1498 (mod)  | Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test results, it is recommended that this analysis be conducted in the field.  |
| TSS by Gravimetry (Low Level)       | E160-L Calgary - Environmental     | Water  | APHA 2540 D (mod) | Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples. |
| TDS by Gravimetry                   | E162 Calgary - Environmental       | Water  | APHA 2540 C (mod) | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.   |
| Bromide in Water by IC (Low Level)  | E235.Br-L Calgary - Environmental  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.   |
| Chloride in Water by IC (Low Level) | E235.CI-L  Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Fluoride in Water by IC             | E235.F  Calgary - Environmental    | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Nitrite in Water by IC (Low Level)  | E235.NO2-L Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.   |
| Nitrate in Water by IC (Low Level)  | E235.NO3-L Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Sulfate in Water by IC              | E235.SO4  Calgary - Environmental  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Acidity by Titration                | E283  Calgary - Environmental      | Water  | APHA 2310 B (mod) | Acidity is determined by potentiometric titration to pH endpoint of 8.3  |

Page : 11 of 12 Work Order : CG2212551

Client : Teck Coal Limited



| Analytical Methods  | Method / Lab                      | Matrix | Method Reference              | Method Descriptions   |
|---|-----------------------------------|--------|-------------------------------|---|
| Alkalinity Species by Titration   | E290 Calgary - Environmental      | Water  | APHA 2320 B (mod)             | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.  |
| Ammonia by Fluorescence   | E298 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).   |
| Total Organic Carbon (Non-Purgeable) by<br>Combustion (Low Level)       | E355-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).                                       |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC). |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U  Calgary - Environmental   | Water  | APHA 4500-P E (mod).          | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U  Calgary - Environmental   | Water  | APHA 4500-P F (mod)           | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.   |
| Total Metals in Water by CRC ICPMS                                      | E420 Calgary - Environmental      | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L Calgary - Environmental | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.  |

Page : 12 of 12 Work Order : CG2212551

Client : Teck Coal Limited



| Analytical Methods                                      | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
|---|-----------------------------------|--------|--------------------------------|--|
| Dissolved Chromium in Water by CRC ICPMS (Low Level)    | E421.Cr-L Calgary - Environmental | Water  | APHA 3030 B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS  |
| Total Mercury in Water by CVAAS                         | E508  Calgary - Environmental     | Water  | EPA 1631E (mod)                | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS   |
| Dissolved Mercury in Water by CVAAS                     | E509 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>1631E (mod)  | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.   |
| Dissolved Hardness (Calculated)                         | EC100 Calgary - Environmental     | Water  | APHA 2340B                     | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. |
| Ion Balance using Dissolved Metals                      | EC101 Calgary - Environmental     | Water  | APHA 1030E                     | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.  Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).  |
| Preparation Methods                                     | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
| Preparation for Ammonia                                 | EP298  Calgary - Environmental    | Water  |                                | Sample preparation for Preserved Nutrients Water Quality Analysis.   |
| Digestion for TKN in water                              | EP318  Calgary - Environmental    | Water  | APHA 4500-Norg D<br>(mod)      | Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.                                  |
| Preparation for Total Organic Carbon by Combustion      | EP355  Calgary - Environmental    | Water  |                                | Preparation for Total Organic Carbon by Combustion   |
| Preparation for Dissolved Organic Carbon for Combustion | EP358  Calgary - Environmental    | Water  | APHA 5310 B (mod)              | Preparation for Dissolved Organic Carbon   |
| Digestion for Total Phosphorus in water                 | EP372  Calgary - Environmental    | Water  | APHA 4500-P E (mod).           | Samples are heated with a persulfate digestion reagent.  |
| Dissolved Metals Water Filtration                       | EP421  Calgary - Environmental    | Water  | APHA 3030B                     | Water samples are filtered (0.45 um), and preserved with HNO3.   |
| Dissolved Mercury Water Filtration                      | EP509  Calgary - Environmental    | Water  | APHA 3030B                     | Water samples are filtered (0.45 um), and preserved with HCl.  |



# **QUALITY CONTROL REPORT**

Work Order : CG2212551

Client : Teck Coal Limited
Contact : Nicole Zathey

Address Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Project : LINE CREEK OPERATIONS

PO : VPO00817033

C-O-C number : LCO LAEMP DRY 2022-09 ALS

Sampler : Jennifer Ings/Minnow

Site : --

Quote number : Teck Coal Master Quote

No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 18

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary, Alberta Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 14-Sep-2022 09:00

Date Analysis Commenced : 15-Sep-2022

Issue Date : 16-Sep-2022 18:23

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

This Quality Control Report contains the following information:

Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives

- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

#### Signatories

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

| Signatories         | Position                 | Laboratory Department                |
|---------------------|--------------------------|--------------------------------------|
| Anthony Calero      | Supervisor - Inorganic   | Calgary Inorganics, Calgary, Alberta |
| Dwayne Bennett      | Supervisor - Inorganic   | Calgary Metals, Calgary, Alberta     |
| Elke Tabora         |                          | Calgary Inorganics, Calgary, Alberta |
| Harpreet Chawla     | Team Leader - Inorganics | Calgary Inorganics, Calgary, Alberta |
| Harpreet Chawla     | Team Leader - Inorganics | Calgary Metals, Calgary, Alberta     |
| Mackenzie Lamoureux | Laboratory Analyst       | Calgary Metals, Calgary, Alberta     |
| Parker Sgarbossa    | Laboratory Analyst       | Calgary Inorganics, Calgary, Alberta |
| Sara Niroomand      |                          | Calgary Inorganics, Calgary, Alberta |
| Shirley Li          |                          | Calgary Metals, Calgary, Alberta     |
|                     |                          |                                      |

 Page
 : 2 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



#### **General Comments**

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

Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

#### **Workorder Comments**

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

 Page
 : 3 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Laboratory Duplicate (DUP) Report

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

| Sub-Matrix: Water                   |                      |   |            |            |        | Laboratory Duplicate (DUP) Report |                    |                     |                         |                     |          |  |  |
|-------------------------------------|----------------------|---|------------|------------|--------|-----------------------------------|--------------------|---------------------|-------------------------|---------------------|----------|--|--|
| aboratory sample ID                 | Client sample ID     | Analyte                                 | CAS Number | Method     | LOR    | Unit                              | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifie |  |  |
| Physical Tests (Q                   | ,                    |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001                       | Anonymous            | acidity (as CaCO3)                      |            | E283       | 2.0    | mg/L                              | <2.0               | <2.0                | 0                       | Diff <2x LOR        |          |  |  |
| Physical Tests (Q                   | C Lot: 649327)       |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212457-001                       | Anonymous            | рН                                      |            | E108       | 0.10   | pH units                          | 8.06               | 8.06                | 0.00%                   | 4%                  |          |  |  |
| Physical Tests (Q                   | C Lot: 649328)       |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212462-001                       | Anonymous            | conductivity                            |            | E100       | 2.0    | μS/cm                             | 68.5               | 67.3                | 1.77%                   | 10%                 |          |  |  |
| Physical Tests (Q                   | C Lot: 649329)       |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212462-001                       | Anonymous            | alkalinity, bicarbonate (as CaCO3)      |            | E290       | 1.0    | mg/L                              | 47.0               | 44.0                | 6.59%                   | 20%                 |          |  |  |
|                                     |                      | alkalinity, carbonate (as CaCO3)        |            | E290       | 1.0    | mg/L                              | <1.0               | <1.0                | 0                       | Diff <2x LOR        |          |  |  |
|                                     |                      | alkalinity, hydroxide (as CaCO3)        |            | E290       | 1.0    | mg/L                              | <1.0               | <1.0                | 0                       | Diff <2x LOR        |          |  |  |
|                                     |                      | alkalinity, total (as CaCO3)            |            | E290       | 2.0    | mg/L                              | 47.0               | 44.0                | 6.59%                   | 20%                 |          |  |  |
| Physical Tests (Q                   | C Lot: 649414)       |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001                       | Anonymous            | turbidity                               |            | E121       | 0.10   | NTU                               | 0.37               | 0.40                | 0.03                    | Diff <2x LOR        |          |  |  |
| Physical Tests (Q                   | C Lot: 649536)       |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212460-001                       | Anonymous            | solids, total dissolved [TDS]           |            | E162       | 20     | mg/L                              | 1540               | 1550                | 0.453%                  | 20%                 |          |  |  |
| Physical Tests (Q                   | 2 Lot: 650422)       | , |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001                       | Anonymous            | oxidation-reduction potential [ORP]     |            | E125       | 0.10   | mV                                | 302                | 299                 | 0.765%                  | 15%                 |          |  |  |
|                                     | ,                    | oxidation roddetion potential [Orti ]   |            | 2.20       | 0.10   |                                   | 002                | 200                 | 0.10070                 | .070                |          |  |  |
| Anions and Nutriei<br>CG2212550-001 | Anonymous            | Kjeldahl nitrogen, total [TKN]          |            | E318       | 0.500  | mg/L                              | <0.500             | <0.500              | 0                       | Diff <2x LOR        |          |  |  |
|                                     | ,                    | Kjeldani filitogen, total [TKN]         |            | L310       | 0.500  | mg/L                              | <b>~0.300</b>      | <b>~0.500</b>       | 0                       | DIII VZX LOIX       |          |  |  |
|                                     | nts (QC Lot: 649482) |   | 10001 10 0 | 5005 F     | 0.400  |                                   | .0.400             | 20,400              |                         | D:# .0 1.0D         |          |  |  |
| CG2212545-001                       | Anonymous            | fluoride                                | 16984-48-8 | E235.F     | 0.400  | mg/L                              | <0.400             | <0.400              | 0                       | Diff <2x LOR        |          |  |  |
|                                     | nts (QC Lot: 649483) |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212545-001                       | Anonymous            | bromide                                 | 24959-67-9 | E235.Br-L  | 1.00   | mg/L                              | <1.00              | <1.00               | 0                       | Diff <2x LOR        |          |  |  |
|                                     | nts (QC Lot: 649484) |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212545-001                       | Anonymous            | chloride                                | 16887-00-6 | E235.CI-L  | 2.00   | mg/L                              | 10.7               | 10.7                | 0.01                    | Diff <2x LOR        |          |  |  |
| Anions and Nutrie                   | nts (QC Lot: 649485) |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212545-001                       | Anonymous            | nitrate (as N)                          | 14797-55-8 | E235.NO3-L | 0.100  | mg/L                              | 209                | 208                 | 0.299%                  | 20%                 |          |  |  |
| Anions and Nutrie                   | nts (QC Lot: 649486) |   |            |            |        |                                   |                    |                     |                         |                     |          |  |  |
| CG2212545-001                       | Anonymous            | nitrite (as N)                          | 14797-65-0 | E235.NO2-L | 0.0200 | mg/L                              | 0.611              | 0.616               | 0.880%                  | 20%                 |          |  |  |
| Anions and Nutrie                   | nts (QC Lot: 649487) |   |            |            |        |                                   |                    | <u> </u>            |                         |                     |          |  |  |
| CG2212545-001                       | Anonymous            | sulfate (as SO4)                        | 14808-79-8 | E235.SO4   | 6.00   | mg/L                              | 1430               | 1430                | 0.266%                  | 20%                 |          |  |  |

 Page
 : 4 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| ub-Matrix: Water     |                     |                                     |            |           |           | Laboratory Duplicate (DUP) Report |                    |                     |                         |                     |          |  |  |
|----------------------|---------------------|-------------------------------------|------------|-----------|-----------|-----------------------------------|--------------------|---------------------|-------------------------|---------------------|----------|--|--|
| Laboratory sample ID | Client sample ID    | Analyte                             | CAS Number | Method    | LOR       | Unit                              | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifie |  |  |
| nions and Nutrien    | ts (QC Lot: 649577) | - continued                         |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001        | Anonymous           | ammonia, total (as N)               | 7664-41-7  | E298      | 0.0050    | mg/L                              | <0.0050            | <0.0050             | 0                       | Diff <2x LOR        |          |  |  |
| Inions and Nutrien   | ts (QC Lot: 649627) |                                     |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212545-001        | Anonymous           | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U    | 0.0010    | mg/L                              | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |          |  |  |
| Organic / Inorganic  | Carbon (QC Lot: 649 | 9550)                               |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001        | Anonymous           | carbon, dissolved organic [DOC]     |            | E358-L    | 0.50      | mg/L                              | <0.50              | <0.50               | 0                       | Diff <2x LOR        |          |  |  |
| Organic / Inorganic  | Carbon (QC Lot: 649 | 9551)                               |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001        | Anonymous           | carbon, total organic [TOC]         |            | E355-L    | 0.50      | mg/L                              | <0.50              | <0.50               | 0                       | Diff <2x LOR        |          |  |  |
| otal Metals (QC Lo   | ot: 649992)         |                                     |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001        | Anonymous           | chromium, total                     | 7440-47-3  | E420.Cr-L | 0.00010   | mg/L                              | 0.00037            | 0.00024             | 0.00013                 | Diff <2x LOR        |          |  |  |
| Total Metals (QC Lo  | ot: 649993)         |                                     |            |           |           |                                   |                    |                     |                         |                     |          |  |  |
| CG2212550-001        | Anonymous           | aluminum, total                     | 7429-90-5  | E420      | 0.0030    | mg/L                              | 0.0069             | 0.0098              | 0.0029                  | Diff <2x LOR        |          |  |  |
|                      |                     | antimony, total                     | 7440-36-0  | E420      | 0.00010   | mg/L                              | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | arsenic, total                      | 7440-38-2  | E420      | 0.00010   | mg/L                              | 0.00018            | 0.00018             | 0.000006                | Diff <2x LOR        |          |  |  |
|                      |                     | barium, total                       | 7440-39-3  | E420      | 0.00010   | mg/L                              | 0.0536             | 0.0552              | 2.97%                   | 20%                 |          |  |  |
|                      |                     | beryllium, total                    | 7440-41-7  | E420      | 0.000020  | mg/L                              | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | bismuth, total                      | 7440-69-9  | E420      | 0.000050  | mg/L                              | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | boron, total                        | 7440-42-8  | E420      | 0.010     | mg/L                              | <0.010             | <0.010              | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | cadmium, total                      | 7440-43-9  | E420      | 0.0000050 | mg/L                              | 0.0138 μg/L        | 0.0000175           | 0.0000037               | Diff <2x LOR        |          |  |  |
|                      |                     | calcium, total                      | 7440-70-2  | E420      | 0.050     | mg/L                              | 71.0               | 71.6                | 0.777%                  | 20%                 |          |  |  |
|                      |                     | cobalt, total                       | 7440-48-4  | E420      | 0.00010   | mg/L                              | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | copper, total                       | 7440-50-8  | E420      | 0.00050   | mg/L                              | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | iron, total                         | 7439-89-6  | E420      | 0.010     | mg/L                              | <0.010             | 0.014               | 0.004                   | Diff <2x LOR        |          |  |  |
|                      |                     | lead, total                         | 7439-92-1  | E420      | 0.000050  | mg/L                              | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |  |  |
|                      |                     | lithium, total                      | 7439-93-2  | E420      | 0.0010    | mg/L                              | 0.0066             | 0.0066              | 0.00002                 | Diff <2x LOR        |          |  |  |
|                      |                     | magnesium, total                    | 7439-95-4  | E420      | 0.0050    | mg/L                              | 41.7               | 43.4                | 3.84%                   | 20%                 |          |  |  |
|                      |                     | manganese, total                    | 7439-96-5  | E420      | 0.00010   | mg/L                              | 0.00090            | 0.00086             | 0.00004                 | Diff <2x LOR        |          |  |  |
|                      |                     | molybdenum, total                   | 7439-98-7  | E420      | 0.000050  | mg/L                              | 0.000912           | 0.000917            | 0.596%                  | 20%                 |          |  |  |
|                      |                     | nickel, total                       | 7440-02-0  | E420      | 0.00050   | mg/L                              | 0.00069            | 0.00068             | 0.00001                 | Diff <2x LOR        |          |  |  |
|                      |                     | potassium, total                    | 7440-09-7  | E420      | 0.050     | mg/L                              | 0.807              | 0.828               | 2.61%                   | 20%                 |          |  |  |
|                      |                     | selenium, total                     | 7782-49-2  | E420      | 0.000050  | mg/L                              | 36.3 µg/L          | 0.0365              | 0.568%                  | 20%                 |          |  |  |
|                      |                     | silicon, total                      | 7440-21-3  | E420      | 0.10      | mg/L                              | 2.22               | 2.24                | 0.816%                  | 20%                 |          |  |  |
|                      |                     | silver, total                       | 7440-22-4  | E420      | 0.000010  | mg/L                              | 0.000013           | <0.000010           | 0.000003                | Diff <2x LOR        |          |  |  |
|                      |                     | sodium, total                       | 7440-23-5  | E420      | 0.050     | mg/L                              | 1.38               | 1.41                | 1.88%                   | 20%                 |          |  |  |
|                      |                     | strontium, total                    | 7440-24-6  | E420      | 0.00020   | mg/L                              | 0.116              | 0.117               | 0.562%                  | 20%                 |          |  |  |
|                      |                     | sulfur, total                       | 7704-34-9  | E420      | 0.50      | mg/L                              | 65.7               | 65.4                | 0.479%                  | 20%                 |          |  |  |

 Page
 : 5 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| Sub-Matrix: Water    | Matrix: Water          |                       |            |           |           |      | Laboratory Duplicate (DUP) Report |                     |                         |                     |           |  |  |  |
|----------------------|------------------------|-----------------------|------------|-----------|-----------|------|-----------------------------------|---------------------|-------------------------|---------------------|-----------|--|--|--|
| Laboratory sample ID | Client sample ID       | Analyte               | CAS Number | Method    | LOR       | Unit | Original<br>Result                | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |  |  |  |
| Total Metals (QC Lo  | ot: 649993) - continue | d                     |            |           |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212550-001        | Anonymous              | thallium, total       | 7440-28-0  | E420      | 0.000010  | mg/L | <0.000010                         | <0.000010           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | tin, total            | 7440-31-5  | E420      | 0.00010   | mg/L | <0.00010                          | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | titanium, total       | 7440-32-6  | E420      | 0.00030   | mg/L | <0.00030                          | <0.00030            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | uranium, total        | 7440-61-1  | E420      | 0.000010  | mg/L | 0.00232                           | 0.00234             | 1.02%                   | 20%                 |           |  |  |  |
|                      |                        | vanadium, total       | 7440-62-2  | E420      | 0.00050   | mg/L | <0.00050                          | <0.00050            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | zinc, total           | 7440-66-6  | E420      | 0.0030    | mg/L | <0.0030                           | <0.0030             | 0                       | Diff <2x LOR        |           |  |  |  |
| Total Metals (QC Lo  | ot: 650164)            |                       |            |           |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212515-001        | Anonymous              | mercury, total        | 7439-97-6  | E508      | 0.000050  | mg/L | <0.0000050                        | <0.0000050          | 0                       | Diff <2x LOR        |           |  |  |  |
| Dissolved Metals (   | QC Lot: 650008)        |                       |            |           |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212268-001        | Anonymous              | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.00010   | mg/L | <0.00010                          | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
| Dissolved Metals ((  | QC Lot: 650009)        |                       |            |           |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212268-001        | Anonymous              | aluminum, dissolved   | 7429-90-5  | E421      | 0.0010    | mg/L | 0.0041                            | 0.0040              | 0.0001                  | Diff <2x LOR        |           |  |  |  |
|                      |                        | antimony, dissolved   | 7440-36-0  | E421      | 0.00010   | mg/L | <0.00010                          | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | arsenic, dissolved    | 7440-38-2  | E421      | 0.00010   | mg/L | 0.00011                           | 0.00010             | 0.000010                | Diff <2x LOR        |           |  |  |  |
|                      |                        | barium, dissolved     | 7440-39-3  | E421      | 0.00010   | mg/L | 0.0412                            | 0.0419              | 1.78%                   | 20%                 |           |  |  |  |
|                      |                        | beryllium, dissolved  | 7440-41-7  | E421      | 0.000020  | mg/L | <0.000020                         | <0.000020           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | bismuth, dissolved    | 7440-69-9  | E421      | 0.000050  | mg/L | <0.000050                         | <0.000050           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | boron, dissolved      | 7440-42-8  | E421      | 0.010     | mg/L | <0.010                            | <0.010              | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | cadmium, dissolved    | 7440-43-9  | E421      | 0.0000050 | mg/L | 0.0000342                         | 0.0000278           | 0.0000064               | Diff <2x LOR        |           |  |  |  |
|                      |                        | calcium, dissolved    | 7440-70-2  | E421      | 0.050     | mg/L | 51.4                              | 52.3                | 1.68%                   | 20%                 |           |  |  |  |
|                      |                        | cobalt, dissolved     | 7440-48-4  | E421      | 0.00010   | mg/L | <0.00010                          | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | copper, dissolved     | 7440-50-8  | E421      | 0.00020   | mg/L | <0.00020                          | <0.00020            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | iron, dissolved       | 7439-89-6  | E421      | 0.010     | mg/L | <0.010                            | <0.010              | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | lead, dissolved       | 7439-92-1  | E421      | 0.000050  | mg/L | <0.000050                         | <0.000050           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | lithium, dissolved    | 7439-93-2  | E421      | 0.0010    | mg/L | 0.0033                            | 0.0034              | 0.00008                 | Diff <2x LOR        |           |  |  |  |
|                      |                        | magnesium, dissolved  | 7439-95-4  | E421      | 0.0050    | mg/L | 25.4                              | 25.4                | 0.0305%                 | 20%                 |           |  |  |  |
|                      |                        | manganese, dissolved  | 7439-96-5  | E421      | 0.00010   | mg/L | 0.00149                           | 0.00149             | 0.0188%                 | 20%                 |           |  |  |  |
|                      |                        | molybdenum, dissolved | 7439-98-7  | E421      | 0.000050  | mg/L | 0.00122                           | 0.00126             | 3.23%                   | 20%                 |           |  |  |  |
|                      |                        | nickel, dissolved     | 7440-02-0  | E421      | 0.00050   | mg/L | <0.00050                          | <0.00050            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | potassium, dissolved  | 7440-09-7  | E421      | 0.050     | mg/L | 0.790                             | 0.797               | 0.821%                  | 20%                 |           |  |  |  |
|                      |                        | selenium, dissolved   | 7782-49-2  | E421      | 0.000050  | mg/L | 0.00182                           | 0.00182             | 0.348%                  | 20%                 |           |  |  |  |
|                      |                        | silicon, dissolved    | 7440-21-3  | E421      | 0.050     | mg/L | 2.61                              | 2.66                | 1.84%                   | 20%                 |           |  |  |  |
|                      |                        | silver, dissolved     | 7440-22-4  | E421      | 0.000010  | mg/L | <0.000010                         | <0.000010           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                        | sodium, dissolved     | 7440-23-5  | E421      | 0.050     | mg/L | 0.910                             | 0.904               | 0.640%                  | 20%                 |           |  |  |  |
|                      |                        | strontium, dissolved  | 7440-24-6  | E421      | 0.00020   | mg/L | 0.116                             | 0.118               | 1.69%                   | 20%                 |           |  |  |  |

Page : 6 of 18
Work Order : CG2212551
Client : Teck Coal Limited



| Sub-Matrix: Water    | o-Matrix: Water           |                     |            |        |           |      | Laboratory Duplicate (DUP) Report |                     |                         |                     |           |  |  |  |
|----------------------|---------------------------|---------------------|------------|--------|-----------|------|-----------------------------------|---------------------|-------------------------|---------------------|-----------|--|--|--|
| Laboratory sample ID | Client sample ID          | Analyte             | CAS Number | Method | LOR       | Unit | Original<br>Result                | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |  |  |  |
| Dissolved Metals (0  | QC Lot: 650009) - continu | ued                 |            |        |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212268-001        | Anonymous                 | sulfur, dissolved   | 7704-34-9  | E421   | 0.50      | mg/L | 22.1                              | 22.6                | 2.39%                   | 20%                 |           |  |  |  |
|                      |                           | thallium, dissolved | 7440-28-0  | E421   | 0.000010  | mg/L | 0.000013                          | 0.000012            | 0.0000008               | Diff <2x LOR        |           |  |  |  |
|                      |                           | tin, dissolved      | 7440-31-5  | E421   | 0.00010   | mg/L | 0.00032                           | 0.00032             | 0.000004                | Diff <2x LOR        |           |  |  |  |
|                      |                           | titanium, dissolved | 7440-32-6  | E421   | 0.00030   | mg/L | <0.00030                          | <0.00030            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                           | uranium, dissolved  | 7440-61-1  | E421   | 0.000010  | mg/L | 0.00285                           | 0.00296             | 3.68%                   | 20%                 |           |  |  |  |
|                      |                           | vanadium, dissolved | 7440-62-2  | E421   | 0.00050   | mg/L | <0.00050                          | <0.00050            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                           | zinc, dissolved     | 7440-66-6  | E421   | 0.0010    | mg/L | 0.0030                            | 0.0028              | 0.0001                  | Diff <2x LOR        |           |  |  |  |
| Dissolved Metals (0  | QC Lot: 650160)           |                     |            |        |           |      |                                   |                     |                         |                     |           |  |  |  |
| CG2212336-001        | Anonymous                 | mercury, dissolved  | 7439-97-6  | E509   | 0.0000050 | mg/L | <0.0000050                        | <0.0000050          | 0                       | Diff <2x LOR        |           |  |  |  |

 Page
 : 7 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# 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.

| Analyte                                    | CAS Number Method     | LOR   | Unit  | Result  | Qualifier |
|--|-----------------------|-------|-------|---------|-----------|
| Physical Tests (QCLot: 649325)             |                       |       |       |         |           |
| acidity (as CaCO3)                         | E283                  | 2     | mg/L  | <2.0    |           |
| Physical Tests (QCLot: 649328)             |                       |       |       |         |           |
| conductivity                               | E100                  | 1     | μS/cm | <1.0    |           |
| Physical Tests (QCLot: 649329)             |                       |       |       |         |           |
| alkalinity, bicarbonate (as CaCO3)         | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, carbonate (as CaCO3)           | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, hydroxide (as CaCO3)           | E290                  | 1     | mg/L  | <1.0    |           |
| alkalinity, total (as CaCO3)               | E290                  | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 649414)             |                       |       |       |         |           |
| turbidity                                  | E121                  | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 649523)             |                       |       |       |         |           |
| solids, total suspended [TSS]              | E160-L                | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 649536)             |                       |       |       |         |           |
| solids, total dissolved [TDS]              | E162                  | 10    | mg/L  | <10     |           |
| Anions and Nutrients (QCLot: 649378)       |                       |       |       |         |           |
| Kjeldahl nitrogen, total [TKN]             | E318                  | 0.05  | mg/L  | <0.050  |           |
| Anions and Nutrients (QCLot: 649482)       |                       |       |       |         |           |
| fluoride                                   | 16984-48-8 E235.F     | 0.02  | mg/L  | <0.020  |           |
| Anions and Nutrients (QCLot: 649483)       |                       |       |       |         |           |
| bromide                                    | 24959-67-9 E235.Br-L  | 0.05  | mg/L  | <0.050  |           |
| Anions and Nutrients (QCLot: 649484)       |                       |       |       |         |           |
| chloride                                   | 16887-00-6 E235.CI-L  | 0.1   | mg/L  | <0.10   |           |
| Anions and Nutrients (QCLot: 649485)       |                       |       |       |         |           |
| nitrate (as N)                             | 14797-55-8 E235.NO3-L | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 649486)       |                       |       |       |         |           |
| nitrite (as N)                             | 14797-65-0 E235.NO2-L | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 649487)       | 44000 70 0 5005 004   | 0.0   |       | .0.00   |           |
| sulfate (as SO4)                           | 14808-79-8 E235.SO4   | 0.3   | mg/L  | <0.30   |           |
| Anions and Nutrients (QCLot: 649577)       | 7004 44 7 5000        | 0.007 |       | 10.0050 |           |
| ammonia, total (as N)                      | 7664-41-7   E298      | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 649627)       | 1007 110 7070 11      | 0.05  |       |         |           |
| phosphate, ortho-, dissolved (as P)        | 14265-44-2 E378-U     | 0.001 | mg/L  | <0.0010 |           |
| Organic / Inorganic Carbon (QCLot: 649550) |                       |       |       |         |           |

 Page
 : 8 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS

# ALS

|                                    |            | 1         |          |      |            |           |
|------------------------------------|------------|-----------|----------|------|------------|-----------|
| Analyte                            | CAS Number | Method    | LOR      | Unit | Result     | Qualifier |
| Organic / Inorganic Carbon  (QCLot |            |           |          |      |            |           |
| carbon, dissolved organic [DOC]    |            | E358-L    | 0.5      | mg/L | <0.50      |           |
| Organic / Inorganic Carbon(QCLot   |            |           |          |      |            |           |
| carbon, total organic [TOC]        |            | E355-L    | 0.5      | mg/L | <0.50      |           |
| Total Metals (QCLot: 649992)       |            |           |          |      |            |           |
| chromium, total                    | 7440-47-3  | E420.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Total Metals (QCLot: 649993)       |            |           |          |      |            |           |
| aluminum, total                    | 7429-90-5  | E420      | 0.003    | mg/L | <0.0030    |           |
| intimony, total                    | 7440-36-0  | E420      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, total                     | 7440-38-2  | E420      | 0.0001   | mg/L | <0.00010   |           |
| parium, total                      | 7440-39-3  | E420      | 0.0001   | mg/L | <0.00010   |           |
| peryllium, total                   | 7440-41-7  | E420      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, total                     | 7440-69-9  | E420      | 0.00005  | mg/L | <0.000050  |           |
| poron, total                       | 7440-42-8  | E420      | 0.01     | mg/L | <0.010     |           |
| cadmium, total                     | 7440-43-9  | E420      | 0.000005 | mg/L | <0.0000050 |           |
| calcium, total                     | 7440-70-2  | E420      | 0.05     | mg/L | <0.050     |           |
| cobalt, total                      | 7440-48-4  | E420      | 0.0001   | mg/L | <0.00010   |           |
| copper, total                      | 7440-50-8  | E420      | 0.0005   | mg/L | <0.00050   |           |
| ron, total                         | 7439-89-6  | E420      | 0.01     | mg/L | <0.010     |           |
| ead, total                         | 7439-92-1  | E420      | 0.00005  | mg/L | <0.000050  |           |
| ithium, total                      | 7439-93-2  | E420      | 0.001    | mg/L | <0.0010    |           |
| nagnesium, total                   | 7439-95-4  | E420      | 0.005    | mg/L | <0.0050    |           |
| nanganese, total                   | 7439-96-5  | E420      | 0.0001   | mg/L | <0.00010   |           |
| nolybdenum, total                  | 7439-98-7  | E420      | 0.00005  | mg/L | <0.00050   |           |
| nickel, total                      | 7440-02-0  | E420      | 0.0005   | mg/L | <0.00050   |           |
| potassium, total                   | 7440-09-7  |           | 0.05     | mg/L | <0.050     |           |
| selenium, total                    | 7782-49-2  |           | 0.00005  | mg/L | <0.000050  |           |
| silicon, total                     | 7440-21-3  |           | 0.1      | mg/L | <0.10      |           |
| ilver, total                       | 7440-22-4  |           | 0.00001  | mg/L | <0.00010   |           |
| odium, total                       | 7440-23-5  |           | 0.05     | mg/L | <0.050     |           |
| trontium, total                    | 7440-24-6  |           | 0.0002   | mg/L | <0.00020   |           |
| sulfur, total                      | 7704-34-9  |           | 0.5      | mg/L | <0.50      |           |
| hallium, total                     | 7440-28-0  |           | 0.00001  | mg/L | <0.000010  |           |
| n, total                           | 7440-31-5  |           | 0.0001   | mg/L | <0.00010   |           |
| itanium, total                     | 7440-31-6  |           | 0.0003   | mg/L | <0.00010   |           |
| ıranium, total                     | 7440-61-1  |           | 0.0003   | mg/L | <0.00030   |           |
|                                    |            |           |          |      |            |           |
| vanadium, total                    | 7440-62-2  | E42U      | 0.0005   | mg/L | <0.00050   |           |

 Page
 : 9 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS

# ALS

| Analyte                           | CAS Number Method   | LOR      | Unit | Result     | Qualifier |
|-----------------------------------|---------------------|----------|------|------------|-----------|
| Total Metals (QCLot: 649993) - co |                     |          |      |            |           |
| zinc, total                       | 7440-66-6 E420      | 0.003    | mg/L | <0.0030    |           |
| Total Metals (QCLot: 650164)      |                     |          |      |            |           |
| mercury, total                    | 7439-97-6 E508      | 0.000005 | mg/L | <0.0000050 |           |
| Dissolved Metals (QCLot: 650008)  |                     |          |      |            |           |
| chromium, dissolved               | 7440-47-3 E421.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Dissolved Metals (QCLot: 650009)  |                     |          |      |            |           |
| aluminum, dissolved               | 7429-90-5 E421      | 0.001    | mg/L | <0.0010    |           |
| antimony, dissolved               | 7440-36-0 E421      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, dissolved                | 7440-38-2 E421      | 0.0001   | mg/L | <0.00010   |           |
| parium, dissolved                 | 7440-39-3 E421      | 0.0001   | mg/L | <0.00010   |           |
| peryllium, dissolved              | 7440-41-7 E421      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, dissolved                | 7440-69-9 E421      | 0.00005  | mg/L | <0.000050  |           |
| poron, dissolved                  | 7440-42-8 E421      | 0.01     | mg/L | <0.010     |           |
| cadmium, dissolved                | 7440-43-9 E421      | 0.000005 | mg/L | <0.0000050 |           |
| calcium, dissolved                | 7440-70-2 E421      | 0.05     | mg/L | <0.050     |           |
| cobalt, dissolved                 | 7440-48-4 E421      | 0.0001   | mg/L | <0.00010   |           |
| copper, dissolved                 | 7440-50-8 E421      | 0.0002   | mg/L | <0.00020   |           |
| ron, dissolved                    | 7439-89-6 E421      | 0.01     | mg/L | <0.010     |           |
| ead, dissolved                    | 7439-92-1 E421      | 0.00005  | mg/L | <0.000050  |           |
| ithium, dissolved                 | 7439-93-2 E421      | 0.001    | mg/L | <0.0010    |           |
| magnesium, dissolved              | 7439-95-4 E421      | 0.005    | mg/L | <0.0050    |           |
| manganese, dissolved              | 7439-96-5 E421      | 0.0001   | mg/L | <0.00010   |           |
| molybdenum, dissolved             | 7439-98-7 E421      | 0.00005  | mg/L | <0.000050  |           |
| nickel, dissolved                 | 7440-02-0 E421      | 0.0005   | mg/L | <0.00050   |           |
| ootassium, dissolved              | 7440-09-7 E421      | 0.05     | mg/L | <0.050     |           |
| selenium, dissolved               | 7782-49-2 E421      | 0.00005  | mg/L | <0.000050  |           |
| silicon, dissolved                | 7440-21-3 E421      | 0.05     | mg/L | <0.050     |           |
| silver, dissolved                 | 7440-22-4 E421      | 0.00001  | mg/L | <0.000010  |           |
| sodium, dissolved                 | 7440-23-5 E421      | 0.05     | mg/L | <0.050     |           |
| strontium, dissolved              | 7440-24-6 E421      | 0.0002   | mg/L | <0.00020   |           |
| sulfur, dissolved                 | 7704-34-9 E421      | 0.5      | mg/L | <0.50      |           |
| hallium, dissolved                | 7440-28-0 E421      | 0.00001  | mg/L | <0.000010  |           |
| in, dissolved                     | 7440-31-5 E421      | 0.0001   | mg/L | <0.00010   |           |
| itanium, dissolved                | 7440-32-6 E421      | 0.0003   | mg/L | <0.00030   |           |
| uranium, dissolved                | 7440-61-1 E421      | 0.00001  | mg/L | <0.000010  |           |
| vanadium, dissolved               | 7440-62-2 E421      | 0.0005   | mg/L | <0.00050   |           |

 Page
 : 10 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



| Analyte                                      | CAS Number | Method | LOR      | Unit | Result     | Qualifier |  |  |  |
|--|------------|--------|----------|------|------------|-----------|--|--|--|
| Dissolved Metals (QCLot: 650009) - continued |            |        |          |      |            |           |  |  |  |
| zinc, dissolved                              | 7440-66-6  | E421   | 0.001    | mg/L | <0.0010    |           |  |  |  |
| Dissolved Metals (QCLot: 650160)             |            |        |          |      |            |           |  |  |  |
| mercury, dissolved                           | 7439-97-6  | E509   | 0.000005 | mg/L | <0.0000050 |           |  |  |  |

Page : 11 of 18 Work Order : CG2212551 Client

: Teck Coal Limited

: LINE CREEK OPERATIONS Project



# Laboratory Control Sample (LCS) Report

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

| Sub-Matrix: Water                    |               |           |       |          | Laboratory Control Sample (LCS) Report |              |          |            |           |  |  |
|--------------------------------------|---------------|-----------|-------|----------|--|--------------|----------|------------|-----------|--|--|
|                                      |               |           |       |          | Spike                                  | Recovery (%) | Recovery | Limits (%) |           |  |  |
| Analyte                              | CAS Number M  | ethod     | LOR   | Unit     | Concentration                          | LCS          | Low      | High       | Qualifier |  |  |
| Physical Tests (QCLot: 649325)       |               |           |       |          |  |              |          |            |           |  |  |
| acidity (as CaCO3)                   | E2            | 283       | 2     | mg/L     | 50 mg/L                                | 104          | 85.0     | 115        |           |  |  |
| Physical Tests (QCLot: 649327)       |               |           |       |          |  |              |          |            |           |  |  |
| рН                                   | E1            | 108       |       | pH units | 7 pH units                             | 101          | 98.6     | 101        |           |  |  |
| Physical Tests (QCLot: 649328)       |               |           |       |          |  |              |          |            |           |  |  |
| conductivity                         | E1            | 100       | 1     | μS/cm    | 146.9 μS/cm                            | 100          | 90.0     | 110        |           |  |  |
| Physical Tests (QCLot: 649329)       |               |           |       |          |  |              |          |            |           |  |  |
| alkalinity, total (as CaCO3)         | E2            | 290       | 1     | mg/L     | 500 mg/L                               | 101          | 85.0     | 115        |           |  |  |
| Physical Tests (QCLot: 649414)       |               |           |       |          |  |              |          |            |           |  |  |
| turbidity                            | E1            | 121       | 0.1   | NTU      | 200 NTU                                | 109          | 85.0     | 115        |           |  |  |
| Physical Tests (QCLot: 649523)       |               |           |       |          |  |              |          |            |           |  |  |
| solids, total suspended [TSS]        | E1            | 160-L     | 1     | mg/L     | 150 mg/L                               | 95.7         | 85.0     | 115        |           |  |  |
| Physical Tests (QCLot: 649536)       |               |           |       |          |  |              |          |            |           |  |  |
| solids, total dissolved [TDS]        | E1            | 162       | 10    | mg/L     | 1000 mg/L                              | 95.0         | 85.0     | 115        |           |  |  |
| Physical Tests (QCLot: 650422)       |               |           |       |          |  |              |          |            |           |  |  |
| oxidation-reduction potential [ORP]  | E1            | 125       |       | mV       | 220 mV                                 | 101          | 95.4     | 104        |           |  |  |
|                                      |               |           |       |          |  |              |          |            |           |  |  |
| Anions and Nutrients (QCLot: 649378) |               |           |       |          |  |              |          |            | ı         |  |  |
| Kjeldahl nitrogen, total [TKN]       | E3            | 318       | 0.05  | mg/L     | 4 mg/L                                 | 100          | 75.0     | 125        |           |  |  |
| Anions and Nutrients (QCLot: 649482) |               |           |       |          |  |              |          |            | ı         |  |  |
| fluoride                             | 16984-48-8 E2 | 235.F     | 0.02  | mg/L     | 1 mg/L                                 | 104          | 90.0     | 110        |           |  |  |
| Anions and Nutrients (QCLot: 649483) |               |           |       |          |  |              |          |            |           |  |  |
| bromide                              | 24959-67-9 E2 | 235.Br-L  | 0.05  | mg/L     | 0.5 mg/L                               | 95.0         | 85.0     | 115        |           |  |  |
| Anions and Nutrients (QCLot: 649484) |               |           |       |          |  |              |          |            | ı         |  |  |
| chloride                             | 16887-00-6 E2 | 235.CI-L  | 0.1   | mg/L     | 100 mg/L                               | 101          | 90.0     | 110        |           |  |  |
| Anions and Nutrients (QCLot: 649485) |               |           |       |          |  |              |          |            | ı         |  |  |
| nitrate (as N)                       | 14797-55-8 E2 | 235.NO3-L | 0.005 | mg/L     | 2.5 mg/L                               | 102          | 90.0     | 110        |           |  |  |
| Anions and Nutrients (QCLot: 649486) |               |           |       |          |  |              |          |            |           |  |  |
| nitrite (as N)                       | 14797-65-0 E2 | 235.NO2-L | 0.001 | mg/L     | 0.5 mg/L                               | 101          | 90.0     | 110        |           |  |  |
| Anions and Nutrients (QCLot: 649487) |               |           |       |          |  |              |          |            |           |  |  |
| sulfate (as SO4)                     | 14808-79-8 E2 | 235.SO4   | 0.3   | mg/L     | 100 mg/L                               | 104          | 90.0     | 110        |           |  |  |
| Anions and Nutrients (QCLot: 649577) |               |           |       |          |  |              |          |            |           |  |  |
| ammonia, total (as N)                | 7664-41-7 E2  | 298       | 0.005 | mg/L     | 0.2 mg/L                               | 99.2         | 85.0     | 115        |           |  |  |
| Anions and Nutrients (QCLot: 649627) |               |           |       |          |  |              |          |            |           |  |  |

 Page
 : 12 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| Sub-Matrix: Water                              | Laboratory Control Sample (LCS) Report |          |      |               |              |          |            |           |
|--|--|----------|------|---------------|--------------|----------|------------|-----------|
|  |  |          |      | Spike         | Recovery (%) | Recovery | Limits (%) |           |
| Analyte  | CAS Number Method                      | LOR      | Unit | Concentration | LCS          | Low      | High       | Qualifier |
| Anions and Nutrients (QCLot: 649627) - continu | ued                                    |          |      |               |              |          |            |           |
| phosphate, ortho-, dissolved (as P)            | 14265-44-2 E378-U                      | 0.001    | mg/L | 0.03 mg/L     | 102          | 80.0     | 120        |           |
|  |  |          |      |               |              |          |            |           |
| Organic / Inorganic Carbon (QCLot: 649550)     |  |          |      |               |              |          |            |           |
| carbon, dissolved organic [DOC]                | E358-L                                 | 0.5      | mg/L | 8.57 mg/L     | 90.6         | 80.0     | 120        |           |
| Organic / Inorganic Carbon (QCLot: 649551)     |  |          |      |               |              |          |            |           |
| carbon, total organic [TOC]                    | E355-L                                 | 0.5      | mg/L | 8.57 mg/L     | 97.1         | 80.0     | 120        |           |
|  |  |          |      |               |              |          |            |           |
| Total Metals (QCLot: 649992)                   |  |          |      |               |              |          |            |           |
| chromium, total                                | 7440-47-3 E420.Cr-L                    | 0.0001   | mg/L | 0.25 mg/L     | 103          | 80.0     | 120        |           |
| Total Metals (QCLot: 649993)                   |  |          |      |               |              |          |            |           |
| aluminum, total                                | 7429-90-5 E420                         | 0.003    | mg/L | 2 mg/L        | 101          | 80.0     | 120        |           |
| antimony, total                                | 7440-36-0 E420                         | 0.0001   | mg/L | 1 mg/L        | 107          | 80.0     | 120        |           |
| arsenic, total                                 | 7440-38-2 E420                         | 0.0001   | mg/L | 1 mg/L        | 100          | 80.0     | 120        |           |
| barium, total                                  | 7440-39-3 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 102          | 80.0     | 120        |           |
| beryllium, total                               | 7440-41-7 E420                         | 0.00002  | mg/L | 0.1 mg/L      | 99.5         | 80.0     | 120        |           |
| bismuth, total                                 | 7440-69-9 E420                         | 0.00005  | mg/L | 1 mg/L        | 97.9         | 80.0     | 120        |           |
| boron, total                                   | 7440-42-8 E420                         | 0.01     | mg/L | 1 mg/L        | 94.4         | 80.0     | 120        |           |
| cadmium, total                                 | 7440-43-9 E420                         | 0.000005 | mg/L | 0.1 mg/L      | 101          | 80.0     | 120        |           |
| calcium, total                                 | 7440-70-2 E420                         | 0.05     | mg/L | 50 mg/L       | 97.0         | 80.0     | 120        |           |
| cobalt, total                                  | 7440-48-4 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 101          | 80.0     | 120        |           |
| copper, total                                  | 7440-50-8 E420                         | 0.0005   | mg/L | 0.25 mg/L     | 101          | 80.0     | 120        |           |
| iron, total                                    | 7439-89-6 E420                         | 0.01     | mg/L | 1 mg/L        | 115          | 80.0     | 120        |           |
| lead, total                                    | 7439-92-1 E420                         | 0.00005  | mg/L | 0.5 mg/L      | 100          | 80.0     | 120        |           |
| lithium, total                                 | 7439-93-2 E420                         | 0.001    | mg/L | 0.25 mg/L     | 94.7         | 80.0     | 120        |           |
| magnesium, total                               | 7439-95-4 E420                         | 0.005    | mg/L | 50 mg/L       | 103          | 80.0     | 120        |           |
| manganese, total                               | 7439-96-5 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 99.8         | 80.0     | 120        |           |
| molybdenum, total                              | 7439-98-7 E420                         | 0.00005  | mg/L | 0.25 mg/L     | 104          | 80.0     | 120        |           |
| nickel, total                                  | 7440-02-0 E420                         | 0.0005   | mg/L | 0.5 mg/L      | 103          | 80.0     | 120        |           |
| potassium, total                               | 7440-09-7 E420                         | 0.05     | mg/L | 50 mg/L       | 103          | 80.0     | 120        |           |
| selenium, total                                | 7782-49-2 E420                         | 0.00005  | mg/L | 1 mg/L        | 99.0         | 80.0     | 120        |           |
| silicon, total                                 | 7440-21-3 E420                         | 0.1      | mg/L | 10 mg/L       | 106          | 60.0     | 140        |           |
| silver, total                                  | 7440-22-4 E420                         | 0.00001  | mg/L | 0.1 mg/L      | 97.7         | 80.0     | 120        |           |
| sodium, total                                  | 7440-23-5 E420                         | 0.05     | mg/L | 50 mg/L       | 106          | 80.0     | 120        |           |
| strontium, total                               | 7440-24-6 E420                         | 0.0002   | mg/L | 0.25 mg/L     | 104          | 80.0     | 120        |           |
| sulfur, total                                  | 7704-34-9 E420                         | 0.5      | mg/L | 50 mg/L       | 111          | 80.0     | 120        |           |
| thallium, total                                | 7440-28-0 E420                         | 0.00001  | mg/L | 1 mg/L        | 101          | 80.0     | 120        |           |
| tin, total                                     | 7440-31-5 E420                         | 0.0001   | mg/L | 0.5 mg/L      | 104          | 80.0     | 120        |           |

 Page
 : 13 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| Sub-Matrix: Water                        |                 |        |          |      | Laboratory Control Sample (LCS) Report |              |          |            |           |  |
|--|-----------------|--------|----------|------|--|--------------|----------|------------|-----------|--|
|  |                 |        |          |      | Spike                                  | Recovery (%) | Recovery | Limits (%) |           |  |
| Analyte                                  | CAS Number Meth | hod    | LOR      | Unit | Concentration                          | LCS          | Low      | High       | Qualifier |  |
| Total Metals (QCLot: 649993) - continued |                 |        |          |      |  |              |          |            |           |  |
| titanium, total                          | 7440-32-6 E420  | 0      | 0.0003   | mg/L | 0.25 mg/L                              | 104          | 80.0     | 120        |           |  |
| uranium, total                           | 7440-61-1 E420  | 0      | 0.00001  | mg/L | 0.005 mg/L                             | 103          | 80.0     | 120        |           |  |
| vanadium, total                          | 7440-62-2 E420  | 0      | 0.0005   | mg/L | 0.5 mg/L                               | 104          | 80.0     | 120        |           |  |
| zinc, total                              | 7440-66-6 E420  | 0      | 0.003    | mg/L | 0.5 mg/L                               | 104          | 80.0     | 120        |           |  |
| Total Metals (QCLot: 650164)             |                 |        |          |      |  |              | ·        |            |           |  |
| mercury, total                           | 7439-97-6 E508  | 3      | 0.000005 | mg/L | 0.0001 mg/L                            | 101          | 80.0     | 120        |           |  |
|  |                 |        |          |      |  |              |          |            |           |  |
| Dissolved Metals (QCLot: 650008)         |                 |        |          |      |  |              |          |            |           |  |
| chromium, dissolved                      | 7440-47-3 E421  | 1.Cr-L | 0.0001   | mg/L | 0.25 mg/L                              | 95.8         | 80.0     | 120        |           |  |
| Dissolved Metals (QCLot: 650009)         |                 |        |          |      |  |              |          |            |           |  |
| aluminum, dissolved                      | 7429-90-5 E421  | 1      | 0.001    | mg/L | 2 mg/L                                 | 98.2         | 80.0     | 120        |           |  |
| antimony, dissolved                      | 7440-36-0 E421  | 1      | 0.0001   | mg/L | 1 mg/L                                 | 101          | 80.0     | 120        |           |  |
| arsenic, dissolved                       | 7440-38-2 E421  | 1      | 0.0001   | mg/L | 1 mg/L                                 | 96.9         | 80.0     | 120        |           |  |
| barium, dissolved                        | 7440-39-3 E421  | 1      | 0.0001   | mg/L | 0.25 mg/L                              | 95.4         | 80.0     | 120        |           |  |
| beryllium, dissolved                     | 7440-41-7 E421  | 1      | 0.00002  | mg/L | 0.1 mg/L                               | 95.9         | 80.0     | 120        |           |  |
| bismuth, dissolved                       | 7440-69-9 E421  | 1      | 0.00005  | mg/L | 1 mg/L                                 | 97.9         | 80.0     | 120        |           |  |
| boron, dissolved                         | 7440-42-8 E421  | 1      | 0.01     | mg/L | 1 mg/L                                 | 102          | 80.0     | 120        |           |  |
| cadmium, dissolved                       | 7440-43-9 E421  | 1      | 0.000005 | mg/L | 0.1 mg/L                               | 96.6         | 80.0     | 120        |           |  |
| calcium, dissolved                       | 7440-70-2 E421  | 1      | 0.05     | mg/L | 50 mg/L                                | 97.2         | 80.0     | 120        |           |  |
| cobalt, dissolved                        | 7440-48-4 E421  | 1      | 0.0001   | mg/L | 0.25 mg/L                              | 97.9         | 80.0     | 120        |           |  |
| copper, dissolved                        | 7440-50-8 E421  | 1      | 0.0002   | mg/L | 0.25 mg/L                              | 94.6         | 80.0     | 120        |           |  |
| iron, dissolved                          | 7439-89-6 E421  | 1      | 0.01     | mg/L | 1 mg/L                                 | 109          | 80.0     | 120        |           |  |
| lead, dissolved                          | 7439-92-1 E421  | 1      | 0.00005  | mg/L | 0.5 mg/L                               | 96.5         | 80.0     | 120        |           |  |
| lithium, dissolved                       | 7439-93-2 E421  | 1      | 0.001    | mg/L | 0.25 mg/L                              | 94.5         | 80.0     | 120        |           |  |
| magnesium, dissolved                     | 7439-95-4 E421  | 1      | 0.005    | mg/L | 50 mg/L                                | 97.6         | 80.0     | 120        |           |  |
| manganese, dissolved                     | 7439-96-5 E421  | 1      | 0.0001   | mg/L | 0.25 mg/L                              | 97.9         | 80.0     | 120        |           |  |
| molybdenum, dissolved                    | 7439-98-7 E421  | 1      | 0.00005  | mg/L | 0.25 mg/L                              | 97.4         | 80.0     | 120        |           |  |
| nickel, dissolved                        | 7440-02-0 E421  | 1      | 0.0005   | mg/L | 0.5 mg/L                               | 95.6         | 80.0     | 120        |           |  |
| potassium, dissolved                     | 7440-09-7 E421  | 1      | 0.05     | mg/L | 50 mg/L                                | 98.3         | 80.0     | 120        |           |  |
| selenium, dissolved                      | 7782-49-2 E421  | 1      | 0.00005  | mg/L | 1 mg/L                                 | 96.2         | 80.0     | 120        |           |  |
| silicon, dissolved                       | 7440-21-3 E421  | 1      | 0.05     | mg/L | 10 mg/L                                | 102          | 60.0     | 140        |           |  |
| silver, dissolved                        | 7440-22-4 E421  | 1      | 0.00001  | mg/L | 0.1 mg/L                               | 88.6         | 80.0     | 120        |           |  |
| sodium, dissolved                        | 7440-23-5 E421  | 1      | 0.05     | mg/L | 50 mg/L                                | 96.6         | 80.0     | 120        |           |  |
| strontium, dissolved                     | 7440-24-6 E421  | 1      | 0.0002   | mg/L | 0.25 mg/L                              | 94.4         | 80.0     | 120        |           |  |
| sulfur, dissolved                        | 7704-34-9 E421  | 1      | 0.5      | mg/L | 50 mg/L                                | 117          | 80.0     | 120        |           |  |
| thallium, dissolved                      | 7440-28-0 E421  | 1      | 0.00001  | mg/L | 1 mg/L                                 | 97.1         | 80.0     | 120        |           |  |
| tin, dissolved                           | 7440-31-5 E421  | 1      | 0.0001   | mg/L | 0.5 mg/L                               | 96.2         | 80.0     | 120        |           |  |

 Page
 : 14 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| Sub-Matrix: Water                          | p-Matrix: Water |        |          |      |               |      | Laboratory Control Sample (LCS) Report |      |           |  |  |  |  |
|--|-----------------|--------|----------|------|---------------|------|--|------|-----------|--|--|--|--|
|  |                 |        |          |      |               |      | Recovery (%) Recovery Limits (%        |      |           |  |  |  |  |
| Analyte                                    | CAS Number      | Method | LOR      | Unit | Concentration | LCS  | Low                                    | High | Qualifier |  |  |  |  |
| Dissolved Metals (QCLot: 650009) - continu | ed              |        |          |      |               |      |  |      |           |  |  |  |  |
| titanium, dissolved                        | 7440-32-6       | E421   | 0.0003   | mg/L | 0.25 mg/L     | 100  | 80.0                                   | 120  |           |  |  |  |  |
| uranium, dissolved                         | 7440-61-1       | E421   | 0.00001  | mg/L | 0.005 mg/L    | 93.1 | 80.0                                   | 120  |           |  |  |  |  |
| vanadium, dissolved                        | 7440-62-2       | E421   | 0.0005   | mg/L | 0.5 mg/L      | 95.8 | 80.0                                   | 120  |           |  |  |  |  |
| zinc, dissolved                            | 7440-66-6       | E421   | 0.001    | mg/L | 0.5 mg/L      | 94.3 | 80.0                                   | 120  |           |  |  |  |  |
| mercury, dissolved                         | 7439-97-6       | E509   | 0.000005 | mg/L | 0.0001 mg/L   | 99.9 | 80.0                                   | 120  |           |  |  |  |  |
|  |                 |        |          |      |               |      |  |      |           |  |  |  |  |

 Page
 : 15 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Matrix Spike (MS) Report

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

| ub-Matrix: Water       |                       |                                     |            |            |               | Matrix Spike (MS) Report |              |                     |      |           |  |  |  |  |  |
|------------------------|-----------------------|-------------------------------------|------------|------------|---------------|--------------------------|--------------|---------------------|------|-----------|--|--|--|--|--|
|                        |                       |                                     |            |            | Spike         |                          | Recovery (%) | Recovery Limits (%) |      |           |  |  |  |  |  |
| Laboratory sample<br>D | Client sample ID      | Analyte                             | CAS Number | Method     | Concentration | Target                   | MS           | Low                 | High | Qualifier |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649378) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212550-002          | Anonymous             | Kjeldahl nitrogen, total [TKN]      |            | E318       | 2.82 mg/L     | 2.5 mg/L                 | 113          | 70.0                | 130  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649482) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | fluoride                            | 16984-48-8 | E235.F     | 1.05 mg/L     | 1 mg/L                   | 105          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649483) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | bromide                             | 24959-67-9 | E235.Br-L  | 0.448 mg/L    | 0.5 mg/L                 | 89.6         | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649484) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | chloride                            | 16887-00-6 | E235.CI-L  | 101 mg/L      | 100 mg/L                 | 101          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649485) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 2.72 mg/L     | 2.5 mg/L                 | 109          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649486) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.509 mg/L    | 0.5 mg/L                 | 102          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649487) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-004          | Anonymous             | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 105 mg/L      | 100 mg/L                 | 105          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649577) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212550-002          | Anonymous             | ammonia, total (as N)               | 7664-41-7  | E298       | 0.102 mg/L    | 0.1 mg/L                 | 102          | 75.0                | 125  |           |  |  |  |  |  |
| Anions and Nutr        | ients (QCLot: 649627) |                                     |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212545-002          | Anonymous             | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0468 mg/L   | 0.05 mg/L                | 93.6         | 70.0                | 130  |           |  |  |  |  |  |
| Organic / Inorga       | nic Carbon (QCLot: 64 | 9550)                               |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212550-001          | Anonymous             | carbon, dissolved organic [DOC]     |            | E358-L     | 5.18 mg/L     | 5 mg/L                   | 104          | 70.0                | 130  |           |  |  |  |  |  |
| Organic / Inorga       | nic Carbon (QCLot: 64 | 9551)                               |            |            |               |                          |              |                     |      |           |  |  |  |  |  |
| CG2212550-001          | Anonymous             | carbon, total organic [TOC]         |            | E355-L     | 5.41 mg/L     | 5 mg/L                   | 108          | 70.0                | 130  |           |  |  |  |  |  |
| Total Metals (Q0       | CLot: 649992)         |                                     |            |            |               |                          |              |                     | 1    |           |  |  |  |  |  |
| CG2212550-002          | Anonymous             | chromium, total                     | 7440-47-3  | E420.Cr-L  | 0.374 mg/L    | 0.4 mg/L                 | 93.5         | 70.0                | 130  |           |  |  |  |  |  |
| otal Metals (Q0        | CLot: 649993)         |                                     |            |            |               |                          |              |                     |      | -         |  |  |  |  |  |
| CG2212550-002          | Anonymous             | aluminum, total                     | 7429-90-5  | E420       | 1.82 mg/L     | 2 mg/L                   | 90.9         | 70.0                | 130  |           |  |  |  |  |  |
|                        |                       | antimony, total                     | 7440-36-0  | E420       | 0.195 mg/L    | 0.2 mg/L                 | 97.5         | 70.0                | 130  |           |  |  |  |  |  |
|                        |                       | arsenic, total                      | 7440-38-2  | E420       | 0.178 mg/L    | 0.2 mg/L                 | 88.8         | 70.0                | 130  |           |  |  |  |  |  |
|                        |                       | barium, total                       | 7440-39-3  | E420       | 0.178 mg/L    | 0.2 mg/L                 | 88.8         | 70.0                | 130  |           |  |  |  |  |  |
|                        | 1                     | beryllium, total                    | 7440-41-7  | E420       | 0.352 mg/L    | 0.4 mg/L                 | 88.1         | 70.0                | 130  |           |  |  |  |  |  |

 Page
 : 16 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| ub-Matrix: Water | -Matrix: Water       |                      |            |           |                | Matrix Spike (MS) Report |              |          |      |          |  |  |  |  |
|------------------|----------------------|----------------------|------------|-----------|----------------|--------------------------|--------------|----------|------|----------|--|--|--|--|
|                  |                      |                      |            |           |                | ke                       | Recovery (%) | Recovery |      |          |  |  |  |  |
| aboratory sample | Client sample ID     | Analyte              | CAS Number | Method    | Concentration  | Target                   | MS           | Low      | High | Qualifie |  |  |  |  |
| otal Metals (QC  | Lot: 649993) - conti | nued                 |            |           |                |                          |              |          |      |          |  |  |  |  |
| CG2212550-002    | Anonymous            | bismuth, total       | 7440-69-9  | E420      | 0.0936 mg/L    | 0.1 mg/L                 | 93.6         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | boron, total         | 7440-42-8  | E420      | 0.872 mg/L     | 1 mg/L                   | 87.2         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | cadmium, total       | 7440-43-9  | E420      | 0.0377 mg/L    | 0.04 mg/L                | 94.3         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | calcium, total       | 7440-70-2  | E420      | ND mg/L        | 40 mg/L                  | ND           | 70.0     | 130  |          |  |  |  |  |
|                  |                      | cobalt, total        | 7440-48-4  | E420      | 0.184 mg/L     | 0.2 mg/L                 | 91.8         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | copper, total        | 7440-50-8  | E420      | 0.189 mg/L     | 0.2 mg/L                 | 94.4         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | iron, total          | 7439-89-6  | E420      | 18.6 mg/L      | 20 mg/L                  | 93.1         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | lead, total          | 7439-92-1  | E420      | 0.185 mg/L     | 0.2 mg/L                 | 92.6         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | lithium, total       | 7439-93-2  | E420      | 0.808 mg/L     | 1 mg/L                   | 80.8         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | magnesium, total     | 7439-95-4  | E420      | ND mg/L        | 10 mg/L                  | ND           | 70.0     | 130  |          |  |  |  |  |
|                  |                      | manganese, total     | 7439-96-5  | E420      | 0.177 mg/L     | 0.2 mg/L                 | 88.7         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | molybdenum, total    | 7439-98-7  | E420      | 0.188 mg/L     | 0.2 mg/L                 | 94.2         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | nickel, total        | 7440-02-0  | E420      | 0.384 mg/L     | 0.4 mg/L                 | 96.1         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | potassium, total     | 7440-09-7  | E420      | 36.2 mg/L      | 40 mg/L                  | 90.5         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | selenium, total      | 7782-49-2  | E420      | 0.386 mg/L     | 0.4 mg/L                 | 96.6         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | silicon, total       | 7440-21-3  | E420      | 89.8 mg/L      | 100 mg/L                 | 89.8         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | silver, total        | 7440-22-4  | E420      | 0.0393 mg/L    | 0.04 mg/L                | 98.2         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | sodium, total        | 7440-23-5  | E420      | 18.0 mg/L      | 20 mg/L                  | 90.2         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | strontium, total     | 7440-24-6  | E420      | 0.178 mg/L     | 0.2 mg/L                 | 89.0         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | sulfur, total        | 7704-34-9  | E420      | 176 mg/L       | 200 mg/L                 | 88.1         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | thallium, total      | 7440-28-0  | E420      | 0.0374 mg/L    | 0.04 mg/L                | 93.4         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | tin, total           | 7440-31-5  | E420      | 0.191 mg/L     | 0.2 mg/L                 | 95.5         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | titanium, total      | 7440-32-6  | E420      | 0.386 mg/L     | 0.4 mg/L                 | 96.4         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | uranium, total       | 7440-61-1  | E420      | 0.0384 mg/L    | 0.04 mg/L                | 96.0         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | vanadium, total      | 7440-62-2  | E420      | 0.926 mg/L     | 1 mg/L                   | 92.6         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | zinc, total          | 7440-66-6  | E420      | 3.88 mg/L      | 4 mg/L                   | 97.1         | 70.0     | 130  |          |  |  |  |  |
| otal Metals (QC  | Lot: 650164)         |                      |            |           |                |                          |              |          |      |          |  |  |  |  |
| G2212515-002     | Anonymous            | mercury, total       | 7439-97-6  | E508      | 0.0000968 mg/L | 0.0001 mg/L              | 96.8         | 70.0     | 130  |          |  |  |  |  |
| issolved Metals  | (QCLot: 650008)      |                      |            |           |                |                          |              |          |      |          |  |  |  |  |
| G2212268-002     | Anonymous            | chromium, dissolved  | 7440-47-3  | E421.Cr-L | 0.385 mg/L     | 0.4 mg/L                 | 96.3         | 70.0     | 130  |          |  |  |  |  |
| issolved Metals  | (QCLot: 650009)      |                      |            |           |                |                          |              |          |      |          |  |  |  |  |
| G2212268-002     | Anonymous            | aluminum, dissolved  | 7429-90-5  | E421      | 1.90 mg/L      | 2 mg/L                   | 95.1         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | antimony, dissolved  | 7440-36-0  | E421      | 0.195 mg/L     | 0.2 mg/L                 | 97.7         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | arsenic, dissolved   | 7440-38-2  | E421      | 0.189 mg/L     | 0.2 mg/L                 | 94.6         | 70.0     | 130  |          |  |  |  |  |
|                  |                      | barium, dissolved    | 7440-39-3  | E421      | 0.186 mg/L     | 0.2 mg/L                 | 93.2         | 70.0     | 130  |          |  |  |  |  |
|                  | 1                    | beryllium, dissolved | 7440-41-7  | E421      | 0.380 mg/L     | 0.4 mg/L                 | 94.9         | 70.0     | 130  |          |  |  |  |  |

 Page
 : 17 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



| Sub-Matrix: Water |                   |                       |            |        |                | Matrix Spike (MS) Report |              |          |            |           |  |  |  |  |  |
|-------------------|-------------------|-----------------------|------------|--------|----------------|--------------------------|--------------|----------|------------|-----------|--|--|--|--|--|
|                   | CAS Number Market |                       |            |        |                |                          | Recovery (%) | Recovery | Limits (%) |           |  |  |  |  |  |
| aboratory sample  | Client sample ID  | Analyte               | CAS Number | Method | Concentration  | Target                   | MS           | Low      | High       | Qualifier |  |  |  |  |  |
|                   | (QCLot: 650009) - | continued             |            |        |                |                          |              |          |            |           |  |  |  |  |  |
| CG2212268-002     | Anonymous         | bismuth, dissolved    | 7440-69-9  | E421   | 0.0910 mg/L    | 0.1 mg/L                 | 91.0         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | boron, dissolved      | 7440-42-8  | E421   | 0.974 mg/L     | 1 mg/L                   | 97.4         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | cadmium, dissolved    | 7440-43-9  | E421   | 0.0388 mg/L    | 0.04 mg/L                | 97.0         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | calcium, dissolved    | 7440-70-2  | E421   | ND mg/L        | 40 mg/L                  | ND           | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | cobalt, dissolved     | 7440-48-4  | E421   | 0.192 mg/L     | 0.2 mg/L                 | 95.8         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | copper, dissolved     | 7440-50-8  | E421   | 0.189 mg/L     | 0.2 mg/L                 | 94.4         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | iron, dissolved       | 7439-89-6  | E421   | 19.1 mg/L      | 20 mg/L                  | 95.5         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | lead, dissolved       | 7439-92-1  | E421   | 0.185 mg/L     | 0.2 mg/L                 | 92.6         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | lithium, dissolved    | 7439-93-2  | E421   | 0.944 mg/L     | 1 mg/L                   | 94.4         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | magnesium, dissolved  | 7439-95-4  | E421   | ND mg/L        | 10 mg/L                  | ND           | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | manganese, dissolved  | 7439-96-5  | E421   | 0.192 mg/L     | 0.2 mg/L                 | 96.2         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | molybdenum, dissolved | 7439-98-7  | E421   | 0.191 mg/L     | 0.2 mg/L                 | 95.6         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | nickel, dissolved     | 7440-02-0  | E421   | 0.382 mg/L     | 0.4 mg/L                 | 95.6         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | potassium, dissolved  | 7440-09-7  | E421   | 37.7 mg/L      | 40 mg/L                  | 94.4         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | selenium, dissolved   | 7782-49-2  | E421   | 0.392 mg/L     | 0.4 mg/L                 | 98.0         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | silicon, dissolved    | 7440-21-3  | E421   | 97.6 mg/L      | 100 mg/L                 | 97.6         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | silver, dissolved     | 7440-22-4  | E421   | 0.0393 mg/L    | 0.04 mg/L                | 98.2         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | sodium, dissolved     | 7440-23-5  | E421   | 19.0 mg/L      | 20 mg/L                  | 95.2         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | strontium, dissolved  | 7440-24-6  | E421   | ND mg/L        | 0.2 mg/L                 | ND           | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | sulfur, dissolved     | 7704-34-9  | E421   | 206 mg/L       | 200 mg/L                 | 103          | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | thallium, dissolved   | 7440-28-0  | E421   | 0.0363 mg/L    | 0.04 mg/L                | 90.7         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | tin, dissolved        | 7440-31-5  | E421   | 0.189 mg/L     | 0.2 mg/L                 | 94.7         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | titanium, dissolved   | 7440-32-6  | E421   | 0.346 mg/L     | 0.4 mg/L                 | 86.6         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | uranium, dissolved    | 7440-61-1  | E421   | 0.0362 mg/L    | 0.04 mg/L                | 90.5         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | vanadium, dissolved   | 7440-62-2  | E421   | 0.939 mg/L     | 1 mg/L                   | 93.9         | 70.0     | 130        |           |  |  |  |  |  |
|                   |                   | zinc, dissolved       | 7440-66-6  | E421   | 3.79 mg/L      | 4 mg/L                   | 94.9         | 70.0     | 130        |           |  |  |  |  |  |
| issolved Metals   | (QCLot: 650160)   |                       |            |        |                |                          |              |          |            |           |  |  |  |  |  |
| CG2212336-002     | Anonymous         | mercury, dissolved    | 7439-97-6  | E509   | 0.0000785 mg/L | 0.0001 mg/L              | 78.5         | 70.0     | 130        |           |  |  |  |  |  |

 Page
 : 18 of 18

 Work Order
 : CG2212551

 Client
 : Teck Coal Limited



algary Work Order Reference

|  | COC ID:   | rco_r        |  | AIC             | J44-   | TURNA  | AROUN    | D TIME:       |  | 2.            | -3 Busine  | ess Dave              | s                                     |                    | RUSH: Priori          | ty                  |            |          |
|--|---|--------------|--|-----------------|--|--|----------|---------------|--|---------------|--|-----------------------|---------------------------------------|--------------------|-----------------------|---------------------|------------|----------|
| The state of the s | ROJECT/CLIENT INFO  |              |  |                 |  |  |          | LABOR         | ATORY  |               |  |                       |                                       |                    | OTHER INFO            |                     |            |          |
|  | Job# Line Creek Operations                                      |              |  |                 |  |  |          | ALS Calga     |  |               |  |                       |                                       | mat / Di           | stribution            | Excel               | PDF        | ED       |
|  | ager Nicole Zathey  |              |  |                 |  | Lab  |          | Lyudmyla      |  |               |  |                       | ail I:                                | Apun Schab (P. Lac | z.eog                 | x                   | <u>x</u>   | X        |
|  | mail Nicole Zathey@Teck.co                                      | om_          |  |                 |  | ļ  |          | Lyudmyla.Sh   |  | Global.com    |  | Ema                   | ail 2:                                |                    | al@equisonline        |                     |            | X        |
| Ad   | dress 421 Pine Avenune  |              |  |                 |  | ļ  | Address  | 2559 29 St    | reet NE  |               |  |                       | ail 3:                                | Teck.L             | ab.Results@te         | X                   | X          | X        |
|  |   |              |  | ,               | · · · ·  |  |          | ·             |  |               |  |                       | ail 4:                                | Lisa.Bowr          | on@minnow.ca          | X                   | X          | X        |
|  | City Sparw  | _            |  | Province BC     |  |  |          | Calgary       |  | Province      | AB   | Ema                   | ail 5:                                |                    | lleau@minnow.ca       | X                   | X          | X        |
| Postal   |   | G1           |  | Country Ca      | nada   |  |          | TIY 7B5       |  | Country       | Canada   | Ema                   | ail 5:                                | Jessica            | .Ritz@Teck.com        |                     | X          | X        |
| Phone Nu   | mber 1-250-865-3048   |              |  |                 |  | Phone 1  | Number   | 403 407 13    |  |               |  |                       | umber                                 |                    |                       | 0817033             |            |          |
| 5  | SAMPLE DETAIL   | S            |  |                 |  | T  | *        | <del></del>   | ANA  | LYSIS RE      | QUESTI   | ED                    | · · · · · · · · · · · · · · · · · · · | r                  | Filtered - F: Fi      | ld, L: Lab, F       | L: Field & | Lab, N:  |
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|  |   |              |  | 4               | -  |  |          | H2SO4         |  |               |  |                       |                                       |                    |                       |                     |            | ]-       |
|  |   |              | 9  |                 |  |  |          | #2SO4         | HCL  |               | NO3  | NO3                   | ]                                     | H2SO4              |                       |                     |            |          |
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|  |   |              | ) je   |                 |  | 1  |          |               | -  |               | TECKCOAL_METNH                                   | Z ·                   | 15                                    | İ                  |                       |                     |            | 1        |
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|  |   |              | 흥  |                 |  | G=Grab   | 1 1      | `             | <u>`</u>   | _ 5.          | 5  | $\mathcal{Z}$         | 2                                     | X                  | 1 .                   |                     |            | i        |
|  | Sample Location   | Field        | zar  |                 | Time   | C=Com  | # Of     | ုပ္           | Mercury_Dissolved                                | ₽,            | L Č  | \<br>₹_               | 🕇                                     | - ان ا             |                       | İ                   | ١.         | . J      |
| Sample ID  | (sys loc code)  | Matrix       | ⊥Ha  | Date            | (24hr)   | р  | Cont.    | D0C           | ξ  | Mercury_Total |  | TECKCOAL_METNH<br>G_T | TECKCOAL_ROUTINE                      | TOC_TKN_PT         | Environ               | ments               | al Div     | مامان    |
| LC_DCEF_WS_LAEMP_DRY_2022-09_N   | LC_DCEF   | ws           |  | 2022/09/12      | 14:30  | G  | 7        | 1             | 1  | 1             | 1  | 1                     | 1                                     | 1                  | Calgary<br>Work<br>CC | ///O/IE             |            | 13101    |
|  |   |              |  |                 | 1.   | -  |          |               |  | <u> </u>      | j  |                       |                                       |                    | Work                  | Order A             | lefere     | nce      |
|  |   |              | <del>                                     </del> |                 |  |  |          |               | -  | <del> </del>  | <del> </del>                                     |                       | <u> </u>                              | <del></del>        | CG                    | 199                 | 101        | 55       |
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| ·  |   |              | i .  |                 |  |  |          |               |  |               |  |                       | 1                                     |                    | Telephone :           | + 1 403 40          | 7 180n     |          |
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| ADDITIONAL COMMENTS/SPE  | CIAL INSTRUCTIONS   | <u> </u>     | <del> </del> -                                   | RELINQUISH      | L<br>ED RV/AF                                    | <br>FILIATIO                                     |          | DATE/         | TIME   | ACC           | EPTED I  | DV/A125               | 11 1 47114                            | ON:                |                       | <u> </u><br>ATE/TIN | 4 F        | <u> </u> |
| · ADDITIONAL COMMISSIONS   | CHAE MOINDETTONS  |              | <del> </del>                                     |                 | Ings/Mir   |  | **       | 13-8          |  | ACC           | EI IED   | J I /AIT              | ILIAIN                                | 0.1                | 0.01                  | AL 12/11/           | 116        |          |
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|  | ***************************************                         |              | ļ  |                 |  |  |          |               |  | <u> </u>      |  |                       | , .                                   |                    | -                     | <u> </u>            |            |          |
| SERVICE REQUEST (rush - s  |   | <del>,</del> |  |                 |  | <del>,</del>                                     |          | ·             |  |               |  |                       | ·                                     |                    |                       |                     |            |          |
| The first  | Regular   | (default)    | 4  | Sampler's Na    | me   |  | J        | ennifer 11    | igs  |               | Mob  | ile#                  |                                       |                    | 51950034              | 144                 |            |          |
| Finance  | ty (2-3 business days) - 50% :<br>icy (1 Business Day) - 100% : | surcharge X  |  | <u>·</u>        |  | <del> </del>                                     |          |               |  |               | <del>                                     </del> |                       |                                       |                    |                       |                     |            |          |
| For Emergency < 1 F  | Day, ASAP or Weekend - Con                                      | surcharge    | 1 8  | Sampler's Sign: | ature  |  | -        | land &        | , <del>•</del>                                   |               | Date/  | Time                  |                                       |                    | September 1           | 3, 2022             |            |          |
| 1 Of Emergency 11 E  | my, ABAI OF WEEKEING - COI                                      | naci ALO     | ـــــــــــــــــــــــــــــــــــ              |                 |  |  |          |               |  |               | <b>└</b>   |                       | L                                     |                    |                       |                     |            |          |

# **WATER CHEMISTRY**

ALS Laboratory Report CG2212647 (Finalized 26-Sept-22)



# **CERTIFICATE OF ANALYSIS**

Work Order : CG2212647

: Teck Coal Limited

Contact : Nicole Zathey

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : --

Client

Project : LINE CREEK OPERATIONS

PO : VPO00816101

C-O-C number : LCO\_LAEMP\_DRY\_2022-09\_ALS

Sampler : Jennifer Ings

Site : ---

Quote number : Teck Coal Master Quote

No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 6

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary AB Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 16-Sep-2022 08:50

Date Analysis Commenced : 16-Sep-2022

Issue Date : 26-Sep-2022 17:38

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

#### **Signatories**

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

| Signatories         | Position                 | Laboratory Department        |  |
|---------------------|--------------------------|------------------------------|--|
| Anthony Calero      | Supervisor - Inorganic   | Inorganics, Calgary, Alberta |  |
| Anthony Calero      | Supervisor - Inorganic   | Metals, Calgary, Alberta     |  |
| Elke Tabora         |                          | Inorganics, Calgary, Alberta |  |
| Harpreet Chawla     | Team Leader - Inorganics | Inorganics, Calgary, Alberta |  |
| Harpreet Chawla     | Team Leader - Inorganics | Metals, Calgary, Alberta     |  |
| Millicent Brentnall | Laboratory Analyst       | Metals, Calgary, Alberta     |  |
| Parker Sgarbossa    | Laboratory Analyst       | Inorganics, Calgary, Alberta |  |
| Ruifang Zheng       | Analyst                  | Inorganics, Calgary, Alberta |  |
| Sara Niroomand      |                          | Inorganics, Calgary, Alberta |  |

Page : 2 of 6
Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



#### **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).

| - No Unit % percent μg/L micrograms per litre |  |
|---|--|
| ·   |  |
| micrograms per litro                          |  |
| µg/L micrograms per litte                     |  |
| μS/cm Microsiemens per centimetre             |  |
| meq/L milliequivalents per litre              |  |
| mg/L milligrams per litre                     |  |
| mV millivolts                                 |  |
| NTU nephelometric turbidity units             |  |
| pH units pH units                             |  |

<sup>&</sup>lt;: less than.

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

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

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

#### **Qualifiers**

| Qualifier | Description   |
|-----------|---|
| DLB       | Detection Limit Raised. Analyte detected at comparable level in Method Blank.                       |
| HTD       | Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time. |

<sup>&</sup>gt;: greater than.

Page : 3 of 6
Work Order : CG2212647
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| (Matrix: Water)                     | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-09_N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-09_N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-09_N | <br><del></del>   |                      |                      |                      |      |
|-------------------------------------|--|---------------------------------------|---------------------------------------|-------------------|----------------------|----------------------|----------------------|------|
|                                     |  |                                       | Client samp                           | oling date / time | 14-Sep-2022<br>13:30 | 14-Sep-2022<br>13:30 | 14-Sep-2022<br>13:30 | <br> |
| Analyte                             | CAS Number                             | Method                                | LOR                                   | Unit              | CG2212647-001        | CG2212647-002        | CG2212647-003        | <br> |
|                                     |  |                                       |                                       |                   | Result               | Result               | Result               | <br> |
| Physical Tests                      |  |                                       |                                       |                   |                      |                      |                      |      |
| acidity (as CaCO3)                  |  | E283                                  | 2.0                                   | mg/L              | <2.0                 | <2.0                 | <2.0                 | <br> |
| alkalinity, bicarbonate (as CaCO3)  |  | E290                                  | 1.0                                   | mg/L              | 161                  | <1.0                 | 170                  | <br> |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3                                | E290                                  | 1.0                                   | mg/L              | 196                  | <1.0                 | 207                  | <br> |
| alkalinity, carbonate (as CaCO3)    |  | E290                                  | 1.0                                   | mg/L              | 6.6                  | <1.0                 | 5.6                  | <br> |
| alkalinity, carbonate (as CO3)      | 3812-32-6                              | E290                                  | 1.0                                   | mg/L              | 4.0                  | <1.0                 | 3.4                  | <br> |
| alkalinity, hydroxide (as CaCO3)    |  | E290                                  | 1.0                                   | mg/L              | <1.0                 | <1.0                 | <1.0                 | <br> |
| alkalinity, hydroxide (as OH)       | 14280-30-9                             | E290                                  | 1.0                                   | mg/L              | <1.0                 | <1.0                 | <1.0                 | <br> |
| alkalinity, total (as CaCO3)        |  | E290                                  | 1.0                                   | mg/L              | 167                  | <1.0                 | 175                  | <br> |
| conductivity                        |  | E100                                  | 2.0                                   | μS/cm             | 374                  | <2.0                 | 374                  | <br> |
| hardness (as CaCO3), dissolved      |  | EC100                                 | 0.50                                  | mg/L              | 214                  | <0.50                | 215                  | <br> |
| oxidation-reduction potential [ORP] |  | E125                                  | 0.10                                  | mV                | 294                  | 519                  | 282                  | <br> |
| pH                                  |  | E108                                  | 0.10                                  | pH units          | 8.33                 | 5.21                 | 8.31                 | <br> |
| solids, total dissolved [TDS]       |  | E162                                  | 10                                    | mg/L              | 237                  | <10                  | 248                  | <br> |
| solids, total suspended [TSS]       |  | E160-L                                | 1.0                                   | mg/L              | 1.4                  | <1.0                 | 1.4                  | <br> |
| turbidity                           |  | E121                                  | 0.10                                  | NTU               | 0.60                 | <0.10                | 0.75                 | <br> |
| Anions and Nutrients                |  |                                       |                                       |                   |                      |                      |                      |      |
| ammonia, total (as N)               | 7664-41-7                              | E298                                  | 0.0050                                | mg/L              | <0.0050              | <0.0050              | <0.0050              | <br> |
| bromide                             | 24959-67-9                             | E235.Br-L                             | 0.050                                 | mg/L              | <0.050               | <0.050               | <0.050               | <br> |
| chloride                            | 16887-00-6                             | E235.CI-L                             | 0.10                                  | mg/L              | 0.17                 | <0.10                | 0.18                 | <br> |
| fluoride                            | 16984-48-8                             | E235.F                                | 0.020                                 | mg/L              | 0.144                | <0.020               | 0.146                | <br> |
| Kjeldahl nitrogen, total [TKN]      |  | E318                                  | 0.050                                 | mg/L              | <0.050               | <0.050               | <0.050               | <br> |
| nitrate (as N)                      | 14797-55-8                             | E235.NO3-L                            | 0.0050                                | mg/L              | 0.0455               | <0.0050 HTD          | 0.0434               | <br> |
| nitrite (as N)                      | 14797-65-0                             | E235.NO2-L                            | 0.0010                                | mg/L              | <0.0010              | <0.0010              | <0.0010              | <br> |
| phosphate, ortho-, dissolved (as P) | 14265-44-2                             | E378-U                                | 0.0010                                | mg/L              | <0.0010              | <0.0010              | <0.0010              | <br> |
| phosphorus, total                   | 7723-14-0                              | E372-U                                | 0.0020                                | mg/L              | 0.0054               | <0.0020              | 0.0048               | <br> |
| sulfate (as SO4)                    | 14808-79-8                             | E235.SO4                              | 0.30                                  | mg/L              | 46.8                 | <0.30                | 47.0                 | <br> |
| Organic / Inorganic Carbon          |  |                                       |                                       |                   |                      |                      |                      |      |
| carbon, dissolved organic [DOC]     |  | E358-L                                | 0.50                                  | mg/L              | <0.50                | <0.50                | <0.50                | <br> |
| carbon, total organic [TOC]         |  | E355-L                                | 0.50                                  | mg/L              | <0.50                | <0.50                | <0.50                | <br> |

Page : 4 of 6
Work Order : CG2212647
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ient sample ID   | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-09_N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-09_N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-09_N | <br> |
|-----------------------------------|------------|-----------|-------------|------------------|--|---------------------------------------|---------------------------------------|------|
|                                   |            |           | Client samp | ling date / time | 14-Sep-2022<br>13:30                   | 14-Sep-2022<br>13:30                  | 14-Sep-2022<br>13:30                  | <br> |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2212647-001                          | CG2212647-002                         | CG2212647-003                         | <br> |
|                                   |            |           |             |                  | Result                                 | Result                                | Result                                | <br> |
| Ion Balance                       |            |           |             |                  |  |                                       |                                       |      |
| anion sum                         |            | EC101     | 0.10        | meq/L            | 4.33                                   | <0.10                                 | 4.49                                  | <br> |
| cation sum                        |            | EC101     | 0.10        | meq/L            | 4.41                                   | <0.10                                 | 4.44                                  | <br> |
| ion balance (cations/anions)      |            | EC101     | 0.010       | %                | 102                                    | 100                                   | 98.9                                  | <br> |
| ion balance (APHA)                |            | EC101     | 0.010       | %                | 0.915                                  | <0.010                                | 0.560                                 | <br> |
| Total Metals                      |            |           |             |                  |  |                                       |                                       |      |
| aluminum, total                   | 7429-90-5  | E420      | 0.0030      | mg/L             | <0.0150 DLB                            | <0.0030                               | <0.0150 DLB                           | <br> |
| antimony, total                   | 7440-36-0  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                              | <0.00010                              | <br> |
| arsenic, total                    | 7440-38-2  | E420      | 0.00010     | mg/L             | 0.00015                                | <0.00010                              | 0.00017                               | <br> |
| barium, total                     | 7440-39-3  | E420      | 0.00010     | mg/L             | 0.0634                                 | <0.00010                              | 0.0625                                | <br> |
| beryllium, total                  | 7440-41-7  | E420      | 0.020       | μg/L             | <0.020                                 | <0.020                                | <0.020                                | <br> |
| bismuth, total                    | 7440-69-9  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <br> |
| boron, total                      | 7440-42-8  | E420      | 0.010       | mg/L             | 0.016                                  | <0.010                                | 0.017                                 | <br> |
| cadmium, total                    | 7440-43-9  | E420      | 0.0050      | μg/L             | 0.0061                                 | <0.0050                               | 0.0063                                | <br> |
| calcium, total                    | 7440-70-2  | E420      | 0.050       | mg/L             | 49.2                                   | <0.050                                | 49.3                                  | <br> |
| chromium, total                   | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L             | 0.00022                                | <0.00010                              | 0.00023                               | <br> |
| cobalt, total                     | 7440-48-4  | E420      | 0.10        | μg/L             | <0.10                                  | <0.10                                 | <0.10                                 | <br> |
| copper, total                     | 7440-50-8  | E420      | 0.00050     | mg/L             | <0.00050                               | <0.00050                              | <0.00050                              | <br> |
| iron, total                       | 7439-89-6  | E420      | 0.010       | mg/L             | 0.017                                  | <0.010                                | 0.017                                 | <br> |
| lead, total                       | 7439-92-1  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <br> |
| lithium, total                    | 7439-93-2  | E420      | 0.0010      | mg/L             | 0.0073                                 | <0.0010                               | 0.0072                                | <br> |
| magnesium, total                  | 7439-95-4  | E420      | 0.0050      | mg/L             | 18.1                                   | <0.0050                               | 17.7                                  | <br> |
| manganese, total                  | 7439-96-5  | E420      | 0.00010     | mg/L             | 0.00378                                | <0.00010                              | 0.00357                               | <br> |
| mercury, total                    | 7439-97-6  | E508      | 0.0000050   | mg/L             | <0.000050                              | <0.0000050                            | <0.0000050                            | <br> |
| molybdenum, total                 | 7439-98-7  | E420      | 0.000050    | mg/L             | 0.00134                                | <0.000050                             | 0.00139                               | <br> |
| nickel, total                     | 7440-02-0  | E420      | 0.00050     | mg/L             | <0.00050                               | <0.00050                              | <0.00050                              | <br> |
| potassium, total                  | 7440-09-7  | E420      | 0.050       | mg/L             | 0.653                                  | <0.050                                | 0.642                                 | <br> |
| selenium, total                   | 7782-49-2  | E420      | 0.050       | μg/L             | 1.82                                   | <0.050                                | 1.86                                  | <br> |
| silicon, total                    | 7440-21-3  | E420      | 0.10        | mg/L             | 2.88                                   | <0.10                                 | 2.81                                  | <br> |
| silver, total                     | 7440-22-4  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                             | <0.000010                             | <br> |
| sodium, total                     | 7440-23-5  | E420      | 0.050       | mg/L             | 2.56                                   | <0.050                                | 2.53                                  | <br> |

Page : 5 of 6
Work Order : CG2212647
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# Analytical Results

| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ent sample ID    | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-09_N | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-09_N | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-09_N | <br> |
|-----------------------------------|------------|-----------|-------------|------------------|--|---------------------------------------|---------------------------------------|------|
|                                   |            |           | Client samp | ling date / time | 14-Sep-2022<br>13:30                   | 14-Sep-2022<br>13:30                  | 14-Sep-2022<br>13:30                  | <br> |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2212647-001<br>Result                | CG2212647-002<br>Result               | <b>CG2212647-003</b> Result           | <br> |
| Total Metals                      |            |           |             |                  | Result                                 | Result                                | Result                                | <br> |
| strontium, total                  | 7440-24-6  | E420      | 0.00020     | mg/L             | 0.189                                  | <0.00020                              | 0.190                                 | <br> |
| sulfur, total                     | 7704-34-9  | E420      | 0.50        | mg/L             | 15.5                                   | <0.50                                 | 15.4                                  | <br> |
| thallium, total                   | 7440-28-0  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                             | <0.000010                             | <br> |
| tin, total                        | 7440-31-5  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                              | <0.00010                              | <br> |
| titanium, total                   | 7440-32-6  | E420      | 0.00030     | mg/L             | <0.00030                               | <0.00030                              | <0.00030                              | <br> |
| uranium, total                    | 7440-61-1  | E420      | 0.000010    | mg/L             | 0.000918                               | <0.000010                             | 0.000943                              | <br> |
| vanadium, total                   | 7440-62-2  | E420      | 0.00050     | mg/L             | 0.00068                                | <0.00050                              | 0.00069                               | <br> |
| zinc, total                       | 7440-66-6  | E420      | 0.0030      | mg/L             | <0.0030                                | <0.0030                               | <0.0030                               | <br> |
| Dissolved Metals                  |            |           |             |                  |  |                                       |                                       |      |
| aluminum, dissolved               | 7429-90-5  | E421      | 0.0010      | mg/L             | <0.0010                                | <0.0010                               | 0.0015                                | <br> |
| antimony, dissolved               | 7440-36-0  | E421      | 0.00010     | mg/L             | <0.00010                               | <0.00010                              | <0.00010                              | <br> |
| arsenic, dissolved                | 7440-38-2  | E421      | 0.00010     | mg/L             | <0.00010                               | <0.00010                              | <0.00010                              | <br> |
| barium, dissolved                 | 7440-39-3  | E421      | 0.00010     | mg/L             | 0.0748                                 | <0.00010                              | 0.0761                                | <br> |
| beryllium, dissolved              | 7440-41-7  | E421      | 0.020       | μg/L             | <0.020                                 | <0.020                                | <0.020                                | <br> |
| bismuth, dissolved                | 7440-69-9  | E421      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <br> |
| boron, dissolved                  | 7440-42-8  | E421      | 0.010       | mg/L             | 0.016                                  | <0.010                                | 0.015                                 | <br> |
| cadmium, dissolved                | 7440-43-9  | E421      | 0.0050      | μg/L             | 0.0060                                 | <0.0050                               | 0.0058                                | <br> |
| calcium, dissolved                | 7440-70-2  | E421      | 0.050       | mg/L             | 51.0                                   | <0.050                                | 51.6                                  | <br> |
| chromium, dissolved               | 7440-47-3  | E421.Cr-L | 0.00010     | mg/L             | 0.00025                                | <0.00010                              | 0.00020                               | <br> |
| cobalt, dissolved                 | 7440-48-4  | E421      | 0.10        | μg/L             | <0.10                                  | <0.10                                 | <0.10                                 | <br> |
| copper, dissolved                 | 7440-50-8  | E421      | 0.00020     | mg/L             | <0.00020                               | <0.00020                              | <0.00020                              | <br> |
| iron, dissolved                   | 7439-89-6  | E421      | 0.010       | mg/L             | <0.010                                 | <0.010                                | <0.010                                | <br> |
| lead, dissolved                   | 7439-92-1  | E421      | 0.000050    | mg/L             | <0.000050                              | <0.000050                             | <0.000050                             | <br> |
| lithium, dissolved                | 7439-93-2  | E421      | 0.0010      | mg/L             | 0.0071                                 | <0.0010                               | 0.0070                                | <br> |
| magnesium, dissolved              | 7439-95-4  | E421      | 0.0050      | mg/L             | 21.0                                   | <0.0050                               | 21.0                                  | <br> |
| manganese, dissolved              | 7439-96-5  | E421      | 0.00010     | mg/L             | 0.00084                                | <0.00010                              | 0.00072                               | <br> |
| mercury, dissolved                | 7439-97-6  | E509      | 0.0000050   | mg/L             | <0.0000050                             | <0.0000050                            | <0.0000050                            | <br> |
| molybdenum, dissolved             | 7439-98-7  | E421      | 0.000050    | mg/L             | 0.00149                                | <0.000050                             | 0.00143                               | <br> |
| nickel, dissolved                 | 7440-02-0  | E421      | 0.00050     | mg/L             | <0.00050                               | <0.00050                              | <0.00050                              | <br> |
| potassium, dissolved              | 7440-09-7  | E421      | 0.050       | mg/L             | 0.649                                  | <0.050                                | 0.654                                 | <br> |

Page : 6 of 6
Work Order : CG2212647
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Analytical Results

| Sub-Matrix: Water                     |            |        | CI          | ient sample ID   | LC_GRCK_WS_<br>LAEMP DRY 2 | LC_MT1_WS_L<br>AEMP DRY 20 | LC_CC1_WS_L<br>AEMP_DRY_20 | <br> |
|---------------------------------------|------------|--------|-------------|------------------|----------------------------|----------------------------|----------------------------|------|
| (Matrix: Water)                       |            |        |             |                  | 022-09_N                   | 22-09_N                    | 22-09_N                    |      |
|                                       |            |        | Client samp | ling date / time | 14-Sep-2022<br>13:30       | 14-Sep-2022<br>13:30       | 14-Sep-2022<br>13:30       | <br> |
| Analyte                               | CAS Number | Method | LOR         | Unit             | CG2212647-001              | CG2212647-002              | CG2212647-003              | <br> |
|                                       |            |        |             |                  | Result                     | Result                     | Result                     | <br> |
| Dissolved Metals                      |            |        |             |                  |                            |                            |                            |      |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050       | μg/L             | 2.43                       | <0.050                     | 2.35                       | <br> |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050       | mg/L             | 2.92                       | <0.050                     | 2.97                       | <br> |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010    | mg/L             | <0.000010                  | <0.000010                  | <0.000010                  | <br> |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050       | mg/L             | 2.80                       | <0.050                     | 2.80                       | <br> |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020     | mg/L             | 0.186                      | <0.00020                   | 0.189                      | <br> |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50        | mg/L             | 16.8                       | <0.50                      | 16.3                       | <br> |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010    | mg/L             | <0.000010                  | <0.000010                  | <0.000010                  | <br> |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010     | mg/L             | <0.00010                   | <0.00010                   | <0.00010                   | <br> |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030     | mg/L             | <0.00030                   | <0.00030                   | <0.00030                   | <br> |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010    | mg/L             | 0.000902                   | <0.000010                  | 0.000898                   | <br> |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050     | mg/L             | <0.00050                   | <0.00050                   | <0.00050                   | <br> |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010      | mg/L             | <0.0010                    | <0.0010                    | <0.0010                    | <br> |
| dissolved mercury filtration location |            | EP509  | -           | -                | Field                      | Field                      | Field                      | <br> |
| dissolved metals filtration location  |            | EP421  | -           | -                | Field                      | Field                      | Field                      | <br> |

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



## **QUALITY CONTROL INTERPRETIVE REPORT**

**Work Order** : **CG2212647** Page : 1 of 18

Client : Teck Coal Limited Laboratory : Calgary - Environmental
Contact : Nicole Zathey Account Manager : Lyudmyla Shvets

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43 Address : 2559 29th Street NE

Sparwood BC Canada V0B 2G0 Calgary, Alberta Canada T1Y 7B5

Telephone : +1 403 407 1800

 Project
 : LINE CREEK OPERATIONS
 Date Samples Received
 : 16-Sep-2022 08:50

 PO
 : VPO00816101
 Issue Date
 : 26-Sep-2022 17:39

C-O-C number : LCO\_LAEMP\_DRY\_2022-09\_ALS

Sampler : Jennifer Ings

Site : ----

Quote number : Teck Coal Master Quote

No. of samples received : 3
No. of samples analysed : 3

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

#### Key

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

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

**DQO: Data Quality Objective.** 

LOR: Limit of Reporting (detection limit).

**RPD: Relative Percent Difference.** 

#### **Workorder Comments**

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

## **Summary of Outliers**

### **Outliers: Quality Control Samples**

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

### Outliers: Reference Material (RM) Samples

• No Reference Material (RM) Sample outliers occur.

### **Outliers : Analysis Holding Time Compliance (Breaches)**

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

### **Outliers: Frequency of Quality Control Samples**

• No Quality Control Sample Frequency Outliers occur.



Page : 3 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

### Matrix: Water

| Analyte Group            | Laboratory sample ID | Client/Ref Sample ID | Analyte         | CAS Number | Method | Result        | Limits     | Comment              |
|--------------------------|----------------------|----------------------|-----------------|------------|--------|---------------|------------|----------------------|
| Method Blank (MB) Values |                      |                      |                 |            |        |               |            |                      |
| Total Metals             | QC-MRG2-6602610      |                      | aluminum, total | 7429-90-5  | E420   | 0.0034 MB-LOR | 0.003 mg/L | Blank result exceeds |
|                          | 01                   |                      |                 |            |        | mg/L          |            | permitted value      |

### **Result Qualifiers**

| Qualifier | Description   |
|-----------|---|
| MB-LOR    | Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level. |

Page : 4 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## **Analysis Holding Time Compliance**

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

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

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

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

| Matrix: Water   |           |               |             |              | Ev        | /aluation: 🗴 = | Holding time exce | edance ; 🔻 | = Within | Holding Time |
|---|-----------|---------------|-------------|--------------|-----------|----------------|-------------------|------------|----------|--------------|
| Analyte Group   | Method    | Sampling Date | Ext         | raction / Pr | eparation |                |                   | Analys     | is       |              |
| Container / Client Sample ID(s)                                 |           |               | Preparation | Holding      | g Times   | Eval           | Analysis Date     | Holding    | Times    | Eval         |
|   |           |               | Date        | Rec          | Actual    |                |                   | Rec        | Actual   |              |
| Anions and Nutrients : Ammonia by Fluorescence                  |           |               |             |              |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                               |           |               |             |              |           |                |                   |            |          |              |
| LC_CC1_WS_LAEMP_DRY_2022-09_N                                   | E298      | 14-Sep-2022   | 17-Sep-2022 |              |           |                | 17-Sep-2022       | 28 days    | 3 days   | ✓            |
|   |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence                  |           |               |             |              |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                               |           |               |             |              |           |                |                   |            |          |              |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N                                  | E298      | 14-Sep-2022   | 17-Sep-2022 |              |           |                | 17-Sep-2022       | 28 days    | 3 days   | ✓            |
|   |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Ammonia by Fluorescence                  |           |               |             |              |           |                |                   |            |          |              |
| Amber glass total (sulfuric acid)                               |           |               |             |              |           |                |                   |            |          |              |
| LC_MT1_WS_LAEMP_DRY_2022-09_N                                   | E298      | 14-Sep-2022   | 17-Sep-2022 |              |           |                | 17-Sep-2022       | 28 days    | 3 days   | ✓            |
|   |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level)       |           |               |             |              |           |                |                   |            |          |              |
| HDPE  | 5005 D. I | 44.0 0000     | 40.0        |              |           |                | 40.0 0000         | 00.1       |          | ,            |
| LC_CC1_WS_LAEMP_DRY_2022-09_N                                   | E235.Br-L | 14-Sep-2022   | 16-Sep-2022 |              |           |                | 16-Sep-2022       | 28 days    | 2 days   | ✓            |
|   |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level)       |           |               |             |              |           |                |                   |            |          |              |
| HDPE LC GRCK WS LAEMP DRY 2022-09 N                             | E235.Br-L | 14-Sep-2022   | 16-Sep-2022 |              |           |                | 16-Sep-2022       | 28 days    | 2 days   | 1            |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N                                  | E233.DI-L | 14-Sep-2022   | 16-Sep-2022 |              |           |                | 16-Sep-2022       | 20 days    | 2 days   | •            |
|   |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Bromide in Water by IC (Low Level) HDPE  |           | 1             |             |              |           |                |                   | 1          |          |              |
| LC MT1 WS LAEMP DRY 2022-09 N                                   | E235.Br-L | 14-Sep-2022   | 16-Sep-2022 |              |           |                | 16-Sep-2022       | 28 days    | 2 days   | ✓            |
| EO_WITI_VVO_EAEWII _BIXT_2022-09_IV                             |           | 11 000 2022   | 10-00p-2022 |              |           |                | 10-00p-2022       | 20 days    | 2 days   |              |
| Aniana and Nutrianta - Chlarida in Water by IC (Level aval)     |           |               |             |              |           |                |                   |            |          |              |
| Anions and Nutrients : Chloride in Water by IC (Low Level) HDPE |           |               |             |              |           |                |                   |            |          |              |
| LC CC1 WS LAEMP DRY 2022-09 N                                   | E235.CI-L | 14-Sep-2022   | 16-Sep-2022 |              |           |                | 16-Sep-2022       | 28 days    | 2 davs   | ✓            |
| 20_000_25   |           |               | P <b></b>   |              |           |                |                   |            | ,        |              |
|   |           |               |             |              |           |                |                   |            |          |              |

 Page
 : 5 of 18

 Work Order
 : CG2212647

Client : Teck Coal Limited





| latrix: Water   |            |               |             |              | Ev        | aluation: 🗴 = | Holding time exce | edance ; 🔻 | = Within | Holding Ti |
|---|------------|---------------|-------------|--------------|-----------|---------------|-------------------|------------|----------|------------|
| Analyte Group   | Method     | Sampling Date | Ext         | raction / Pr | eparation |               |                   | Analys     | is       |            |
| Container / Client Sample ID(s)   |            |               | Preparation |              | Times     | Eval          | Analysis Date     |            | Times    | Eval       |
|   |            |               | Date        | Rec          | Actual    |               |                   | Rec        | Actual   |            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |            |               |             |              |           |               |                   |            |          |            |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E235.CI-L  | 14-Sep-2022   | 16-Sep-2022 |              |           |               | 16-Sep-2022       | 28 days    | 2 days   | ✓          |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |            |               |             |              |           |               | 1                 |            |          |            |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N  | E235.CI-L  | 14-Sep-2022   | 16-Sep-2022 |              |           |               | 16-Sep-2022       | 28 days    | 2 days   | ✓          |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001  |               |             |              |           |               |                   |            |          |            |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N  | E378-U     | 14-Sep-2022   | 17-Sep-2022 |              |           |               | 17-Sep-2022       | 3 days     | 3 days   | ✓          |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | evel 0.001 |               |             |              |           |               |                   |            |          |            |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E378-U     | 14-Sep-2022   | 17-Sep-2022 |              |           |               | 17-Sep-2022       | 3 days     | 3 days   | ✓          |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001  |               |             |              |           |               |                   |            |          |            |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N  | E378-U     | 14-Sep-2022   | 17-Sep-2022 |              |           |               | 17-Sep-2022       | 3 days     | 3 days   | ✓          |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |             |              |           |               |                   |            |          |            |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N  | E235.F     | 14-Sep-2022   | 16-Sep-2022 |              |           |               | 16-Sep-2022       | 28 days    | 2 days   | ✓          |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |             |              |           |               |                   |            |          |            |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E235.F     | 14-Sep-2022   | 16-Sep-2022 |              |           |               | 16-Sep-2022       | 28 days    | 2 days   | ✓          |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |             |              |           |               | 1                 |            |          |            |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N  | E235.F     | 14-Sep-2022   | 16-Sep-2022 |              |           |               | 16-Sep-2022       | 28 days    | 2 days   | ✓          |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)                       |            |               |             |              |           |               |                   |            |          |            |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N  | E235.NO3-L | 14-Sep-2022   | 16-Sep-2022 | 3 days       | 2 days    | ✓             | 16-Sep-2022       | 3 days     | 0 days   | ✓          |

 Page
 : 6 of 18

 Work Order
 : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| Analyte Group  | Method     | Sampling Date | Date Extraction / Preparation |         |         |          | Analysis      |         |         | _               |
|--|------------|---------------|-------------------------------|---------|---------|----------|---------------|---------|---------|-----------------|
| Container / Client Sample ID(s)  |            |               | Preparation                   | Holding | g Times | Eval     | Analysis Date |         | g Times | Eval            |
|  |            |               | Date                          | Rec     | Actual  |          |               | Rec     | Actual  |                 |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)                  |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N  | E235.NO3-L | 14-Sep-2022   | 16-Sep-2022                   | 3 days  | 2 days  | <b>✓</b> | 16-Sep-2022   | 3 days  | 0 days  | ✓               |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)                  |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N   | E235.NO3-L | 14-Sep-2022   | 16-Sep-2022                   | 3 days  | 2 days  | ✓        | 26-Sep-2022   | 3 days  | 10 days | <b>*</b><br>EHT |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N   | E235.NO2-L | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 3 days  | 2 days  | ✓               |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N  | E235.NO2-L | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 3 days  | 2 days  | <b>4</b>        |
| Anions and Nutrients : Nitrite in Water by IC (Low Level)                  |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N   | E235.NO2-L | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 3 days  | 2 days  | ✓               |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N   | E235.SO4   | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 28 days | 2 days  | ✓               |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N  | E235.SO4   | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 28 days | 2 days  | ✓               |
| Anions and Nutrients : Sulfate in Water by IC                              |            |               |                               |         |         |          |               |         |         |                 |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N   | E235.SO4   | 14-Sep-2022   | 16-Sep-2022                   |         |         |          | 16-Sep-2022   | 28 days | 2 days  | <b>√</b>        |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |            |               |                               |         |         |          |               |         |         |                 |
| Amber glass total (sulfuric acid)  LC_CC1_WS_LAEMP_DRY_2022-09_N           | E318       | 14-Sep-2022   | 18-Sep-2022                   |         |         |          | 18-Sep-2022   | 28 days | 4 days  | ✓               |

Page : 7 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| water  |           |               |             |               |            | diddion. | noiding time exce | cuarioc , | - vviciiiii | riolaling rii |
|--|-----------|---------------|-------------|---------------|------------|----------|-------------------|-----------|-------------|---------------|
| Analyte Group  | Method    | Sampling Date | Ext         | traction / Pr | reparation |          |                   | Analys    | sis         |               |
| Container / Client Sample ID(s)  |           |               | Preparation | Holding       | g Times    | Eval     | Analysis Date     | Holding   | g Times     | Eval          |
|  |           |               | Date        | Rec           | Actual     |          |                   | Rec       | Actual      |               |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |             |               |            |          |                   |           |             |               |
| Amber glass total (sulfuric acid)  |           |               |             |               |            |          |                   |           |             |               |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E318      | 14-Sep-2022   | 18-Sep-2022 |               |            |          | 18-Sep-2022       | 28 days   | 4 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |           |               |             |               |            |          |                   |           |             |               |
| Amber glass total (sulfuric acid)  |           |               |             |               |            |          |                   |           |             |               |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E318      | 14-Sep-2022   | 18-Sep-2022 |               |            |          | 18-Sep-2022       | 28 days   | 4 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |            |          |                   |           |             |               |
| Amber glass total (sulfuric acid)  |           |               |             |               |            |          |                   |           |             |               |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E372-U    | 14-Sep-2022   | 21-Sep-2022 |               |            |          | 23-Sep-2022       | 28 days   | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |            |          |                   |           |             |               |
| Amber glass total (sulfuric acid)  |           |               |             |               |            |          |                   |           |             |               |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E372-U    | 14-Sep-2022   | 21-Sep-2022 |               |            |          | 23-Sep-2022       | 28 days   | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)       |           |               |             |               |            |          |                   |           |             |               |
| Amber glass total (sulfuric acid)  |           |               |             |               |            |          |                   |           |             |               |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E372-U    | 14-Sep-2022   | 21-Sep-2022 |               |            |          | 23-Sep-2022       | 28 days   | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |            |          |                   |           |             |               |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |          |                   |           |             |               |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E421.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |            |          | 23-Sep-2022       | 180       | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   | days      |             |               |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |            |          |                   |           |             |               |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |          |                   |           |             |               |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E421.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |            |          | 23-Sep-2022       | 180       | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   | days      |             |               |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)    |           |               |             |               |            |          |                   |           |             |               |
| HDPE dissolved (nitric acid)   |           |               |             |               |            |          |                   |           |             |               |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E421.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |            |          | 23-Sep-2022       | 180       | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   | days      |             |               |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                     |           |               |             |               |            |          |                   |           |             |               |
| Glass vial dissolved (hydrochloric acid)                                   |           |               |             |               |            |          |                   |           |             |               |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E509      | 14-Sep-2022   | 23-Sep-2022 |               |            |          | 23-Sep-2022       | 28 days   | 9 days      | ✓             |
|  |           |               |             |               |            |          |                   |           |             |               |

Page : 8 of 18 Work Order : CG2212647

Client : Teck Coal Limited

: LINE CREEK OPERATIONS Project



| Matrix: Water  |               |               |             |              | E۱         | valuation: <b>×</b> = | Holding time exce | edance ; 🗸  | ∕ = Within | Holding Tim |
|--|---------------|---------------|-------------|--------------|------------|-----------------------|-------------------|-------------|------------|-------------|
| Analyte Group  | Method        | Sampling Date | Ext         | raction / Pi | reparation |                       |                   | Analys      | is         |             |
| Container / Client Sample ID(s)  |               |               | Preparation | Holdin       | g Times    | Eval                  | Analysis Date     | Holding     | Times      | Eval        |
|  |               |               | Date        | Rec          | Actual     |                       | -                 | Rec         | Actual     |             |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                         |               |               |             |              |            |                       |                   |             |            |             |
| Glass vial dissolved (hydrochloric acid)                                       |               |               |             |              |            |                       |                   |             |            |             |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E509          | 14-Sep-2022   | 23-Sep-2022 |              |            |                       | 23-Sep-2022       | 28 days     | 9 days     | ✓           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                         |               |               |             |              |            |                       |                   |             |            |             |
| Glass vial dissolved (hydrochloric acid)                                       |               |               |             |              |            |                       |                   |             |            |             |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E509          | 14-Sep-2022   | 23-Sep-2022 |              |            |                       | 23-Sep-2022       | 28 days     | 9 days     | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |               |               |             |              |            |                       |                   |             |            |             |
| HDPE dissolved (nitric acid)   | <b></b> .     |               | 00.0        |              |            |                       | 00.0              |             |            | ,           |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E421          | 14-Sep-2022   | 23-Sep-2022 |              |            |                       | 23-Sep-2022       | 180<br>days | 9 days     | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |               |               |             |              |            |                       |                   |             |            |             |
| HDPE dissolved (nitric acid)   | E421          | 44.0 2000     | 00.0 0000   |              |            |                       | 00.0 0000         |             | 0 -1       | ✓           |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E421          | 14-Sep-2022   | 23-Sep-2022 |              |            |                       | 23-Sep-2022       | 180<br>days | 9 days     | •           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |               |               |             |              |            |                       |                   |             |            |             |
| HDPE dissolved (nitric acid)   | E421          | 44.0 2000     | 00.00000    |              |            |                       | 00.0 0000         |             | 0.1        | <b>√</b>    |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E421          | 14-Sep-2022   | 23-Sep-2022 |              |            |                       | 23-Sep-2022       | 180<br>days | 9 days     | •           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Leve  | el)           |               |             |              |            |                       |                   |             |            |             |
| Amber glass dissolved (sulfuric acid)  | E358-L        | 14 Con 2022   | 17 Can 2022 |              |            |                       | 10 Con 2022       | 20 days     | E dovo     | ✓           |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E356-L        | 14-Sep-2022   | 17-Sep-2022 |              |            |                       | 19-Sep-2022       | 28 days     | 5 days     | •           |
| Organic / Inorganic Carbon: Dissolved Organic Carbon by Combustion (Low Leve   | el)           |               |             |              |            |                       |                   |             |            |             |
| Amber glass dissolved (sulfuric acid)  | E358-L        | 14 Con 2022   | 47 0 2000   |              |            |                       | 40.0 2000         | 00 4        | F -1       | 1           |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E330-L        | 14-Sep-2022   | 17-Sep-2022 |              |            |                       | 19-Sep-2022       | 28 days     | 5 days     | •           |
| Organic / Inorganic Carbon: Dissolved Organic Carbon by Combustion (Low Leve   | el)           |               |             |              |            |                       |                   |             |            |             |
| Amber glass dissolved (sulfuric acid)  | F050 !        | 44.0. 0000    | 47.0        |              |            |                       | 10.0. 0005        | 00.1        | <b>5</b> 1 | ,           |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E358-L        | 14-Sep-2022   | 17-Sep-2022 |              |            |                       | 19-Sep-2022       | 28 days     | 5 days     | ✓           |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustic | n (Low Level) |               |             |              |            |                       |                   |             |            |             |
| Amber glass total (sulfuric acid)  | F255 !        | 44.0 0000     | 47.0 0000   |              |            |                       | 40.0 0000         | 00 4        | F -1       | ,           |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E355-L        | 14-Sep-2022   | 17-Sep-2022 |              |            |                       | 19-Sep-2022       | 28 days     | 5 days     | ✓           |
|  |               |               |             |              |            |                       |                   |             |            |             |

 Page
 : 9 of 18

 Work Order
 : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| viaurix: water   |                |               |             |               |            |      | noiding time exce | , ,     | *********** | rioidiiig riii |
|--|----------------|---------------|-------------|---------------|------------|------|-------------------|---------|-------------|----------------|
| Analyte Group  | Method         | Sampling Date | Ext         | traction / Pi | reparation |      |                   | Analys  | is          |                |
| Container / Client Sample ID(s)  |                |               | Preparation | Holdin        | g Times    | Eval | Analysis Date     | Holding | Times       | Eval           |
|  |                |               | Date        | Rec           | Actual     |      |                   | Rec     | Actual      |                |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustic | on (Low Level) |               |             |               |            |      |                   |         |             |                |
| Amber glass total (sulfuric acid)  |                |               |             |               |            |      |                   |         |             |                |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E355-L         | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 19-Sep-2022       | 28 days | 5 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combustic | on (Low Level) |               |             |               |            |      |                   |         |             |                |
| Amber glass total (sulfuric acid)  |                |               |             |               |            |      |                   |         |             |                |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E355-L         | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 19-Sep-2022       | 28 days | 5 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Acidity by Titration  |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             |                |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E283           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Acidity by Titration  |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             |                |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E283           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Acidity by Titration  |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             |                |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E283           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Alkalinity Species by Titration                               |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             |                |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E290           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Alkalinity Species by Titration                               |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             |                |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N   | E290           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Alkalinity Species by Titration                               |                |               |             |               |            |      |                   |         |             |                |
| HDPE   | _              |               |             |               |            |      |                   |         |             | _              |
| LC_MT1_WS_LAEMP_DRY_2022-09_N  | E290           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 14 days | 3 days      | ✓              |
|  |                |               |             |               |            |      |                   |         |             |                |
| Physical Tests : Conductivity in Water   |                |               |             |               |            |      |                   |         |             |                |
| HDPE   |                |               |             |               |            |      |                   |         |             | ,              |
| LC_CC1_WS_LAEMP_DRY_2022-09_N  | E100           | 14-Sep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | 28 days | 3 days      | ✓              |
| LO_CCI_WS_LAEMP_DRY_2022-09_N  | E100           | 14-5ep-2022   | 17-Sep-2022 |               |            |      | 17-Sep-2022       | ∠o days | 3 days      | <b>~</b>       |

Page : 10 of 18
Work Order : CG2212647

Client : Teck Coal Limited



| Analyte Group                          | Method | Sampling Date | Ex                  | traction / Pr  | reparation        |      |               | Analysis       |                   |              |
|--|--------|---------------|---------------------|----------------|-------------------|------|---------------|----------------|-------------------|--------------|
| Container / Client Sample ID(s)        |        |               | Preparation<br>Date | Holding<br>Rec | g Times<br>Actual | Eval | Analysis Date | Holding<br>Rec | g Times<br>Actual | Eval         |
| Physical Tests : Conductivity in Water |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N    | E100   | 14-Sep-2022   | 17-Sep-2022         |                |                   |      | 17-Sep-2022   | 28 days        | 3 days            | ✓            |
| Physical Tests : Conductivity in Water |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N     | E100   | 14-Sep-2022   | 17-Sep-2022         |                |                   |      | 17-Sep-2022   | 28 days        | 3 days            | 4            |
| Physical Tests : ORP by Electrode      |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N     | E125   | 14-Sep-2022   |                     |                |                   |      | 23-Sep-2022   | 0.25<br>hrs    | 219 hrs           | #<br>EHTR-FN |
| Physical Tests : ORP by Electrode      |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N    | E125   | 14-Sep-2022   |                     |                |                   |      | 23-Sep-2022   | 0.25<br>hrs    | 219 hrs           | #<br>EHTR-FN |
| Physical Tests : ORP by Electrode      |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N     | E125   | 14-Sep-2022   |                     |                |                   |      | 23-Sep-2022   | 0.25<br>hrs    | 219 hrs           | #<br>EHTR-FI |
| Physical Tests : pH by Meter           |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N     | E108   | 14-Sep-2022   | 17-Sep-2022         |                |                   |      | 17-Sep-2022   | 0.25<br>hrs    | 0.25<br>hrs       | #<br>EHTR-FN |
| Physical Tests : pH by Meter           |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N    | E108   | 14-Sep-2022   | 17-Sep-2022         |                |                   |      | 17-Sep-2022   | 0.25<br>hrs    | 0.25<br>hrs       | #<br>EHTR-FN |
| Physical Tests : pH by Meter           |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N     | E108   | 14-Sep-2022   | 17-Sep-2022         |                |                   |      | 17-Sep-2022   | 0.25<br>hrs    | 0.25<br>hrs       | #<br>EHTR-FI |
| Physical Tests : TDS by Gravimetry     |        |               |                     |                |                   |      |               |                |                   |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N     | E162   | 14-Sep-2022   |                     |                |                   |      | 19-Sep-2022   | 7 days         | 5 days            | <b>✓</b>     |

Page : 11 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| Analyte Group   | Method    | Sampling Date | Ext         | traction / Pr | eparation |      |               | Analys      | is     |          |
|---|-----------|---------------|-------------|---------------|-----------|------|---------------|-------------|--------|----------|
| Container / Client Sample ID(s)                                 |           |               | Preparation | Holding       | g Times   | Eval | Analysis Date | Holding     | Times  | Eval     |
|   |           |               | Date        | Rec           | Actual    |      |               | Rec         | Actual |          |
| Physical Tests : TDS by Gravimetry                              |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N                             | E162      | 14-Sep-2022   |             |               |           |      | 19-Sep-2022   | 7 days      | 5 days | <b>✓</b> |
| Physical Tests : TDS by Gravimetry                              |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N                              | E162      | 14-Sep-2022   |             |               |           |      | 19-Sep-2022   | 7 days      | 5 days | ✓        |
| Physical Tests : TSS by Gravimetry (Low Level)                  |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N                              | E160-L    | 14-Sep-2022   |             |               |           |      | 20-Sep-2022   | 7 days      | 6 days | <b>✓</b> |
| Physical Tests : TSS by Gravimetry (Low Level)                  |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N                             | E160-L    | 14-Sep-2022   |             |               |           |      | 20-Sep-2022   | 7 days      | 6 days | ✓        |
| Physical Tests : TSS by Gravimetry (Low Level)                  |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N                              | E160-L    | 14-Sep-2022   |             |               |           |      | 20-Sep-2022   | 7 days      | 6 days | <b>✓</b> |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-09_N                              | E121      | 14-Sep-2022   |             |               |           |      | 16-Sep-2022   | 3 days      | 2 days | <b>✓</b> |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-09_N                             | E121      | 14-Sep-2022   |             |               |           |      | 16-Sep-2022   | 3 days      | 2 days | ✓        |
| Physical Tests : Turbidity by Nephelometry                      |           |               |             |               |           |      |               |             |        |          |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-09_N                              | E121      | 14-Sep-2022   |             |               |           |      | 16-Sep-2022   | 3 days      | 2 days | ✓        |
| Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |           |      |               |             |        |          |
| HDPE total (nitric acid)  LC_CC1_WS_LAEMP_DRY_2022-09_N         | E420.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |           |      | 23-Sep-2022   | 180<br>days | 9 days | ✓        |

Page : 12 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



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

| atrix: water   |           |               |             |               |            | /aluation. ^ – | Holding time exce | euance, | - vviti iii i | Holding |
|--|-----------|---------------|-------------|---------------|------------|----------------|-------------------|---------|---------------|---------|
| Analyte Group  | Method    | Sampling Date | Ex          | traction / Pi | reparation |                |                   | Analys  | sis           |         |
| Container / Client Sample ID(s)                                |           |               | Preparation | Holdin        | g Times    | Eval           | Analysis Date     | Holding | g Times       | Eva     |
|  |           |               | Date        | Rec           | Actual     |                |                   | Rec     | Actual        |         |
| otal Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |            |                |                   |         |               |         |
| HDPE total (nitric acid)                                       |           |               |             |               |            |                |                   |         |               |         |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N                                 | E420.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 180     | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   | days    |               |         |
| otal Metals : Total Chromium in Water by CRC ICPMS (Low Level) |           |               |             |               |            |                |                   |         |               |         |
| HDPE total (nitric acid)                                       |           |               |             |               |            |                |                   |         |               |         |
| LC_MT1_WS_LAEMP_DRY_2022-09_N                                  | E420.Cr-L | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 180     | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   | days    |               |         |
| otal Metals : Total Mercury in Water by CVAAS                  |           |               |             |               |            |                |                   |         |               |         |
| Glass vial total (hydrochloric acid)                           |           |               |             |               |            |                |                   |         |               |         |
| LC_CC1_WS_LAEMP_DRY_2022-09_N                                  | E508      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 28 days | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   |         |               |         |
| otal Metals : Total Mercury in Water by CVAAS                  |           |               |             |               |            |                |                   |         |               |         |
| Glass vial total (hydrochloric acid)                           |           |               |             |               |            |                |                   |         |               |         |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N                                 | E508      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 28 days | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   |         |               |         |
| otal Metals : Total Mercury in Water by CVAAS                  |           |               |             |               |            |                |                   |         |               |         |
| Glass vial total (hydrochloric acid)                           |           |               |             |               |            |                |                   |         |               |         |
| LC_MT1_WS_LAEMP_DRY_2022-09_N                                  | E508      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 28 days | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   |         |               |         |
| otal Metals : Total Metals in Water by CRC ICPMS               |           |               |             |               |            |                |                   |         |               |         |
| HDPE total (nitric acid)                                       |           |               |             |               |            |                |                   |         |               |         |
| LC_CC1_WS_LAEMP_DRY_2022-09_N                                  | E420      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 180     | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   | days    |               |         |
| otal Metals : Total Metals in Water by CRC ICPMS               |           |               |             |               |            |                |                   |         |               |         |
| HDPE total (nitric acid)                                       |           |               |             |               |            |                |                   |         |               |         |
| LC_GRCK_WS_LAEMP_DRY_2022-09_N                                 | E420      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 180     | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   | days    |               |         |
| otal Metals : Total Metals in Water by CRC ICPMS               |           |               |             |               |            |                |                   |         |               |         |
| HDPE total (nitric acid)                                       |           |               |             |               |            |                |                   |         |               |         |
| LC_MT1_WS_LAEMP_DRY_2022-09_N                                  | E420      | 14-Sep-2022   | 23-Sep-2022 |               |            |                | 23-Sep-2022       | 180     | 9 days        | ✓       |
|  |           |               |             |               |            |                |                   | days    |               |         |

#### **Legend & Qualifier Definitions**

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Page : 13 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **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.

| Quality Control Sample Type   |            |          | C  | ount    |        | Frequency (%) | )          |
|---|------------|----------|----|---------|--------|---------------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected      | Evaluation |
| Laboratory Duplicates (DUP)   |            |          |    |         |        |               |            |
| Acidity by Titration  | E283       | 652501   | 1  | 11      | 9.0    | 5.0           | 1          |
| Alkalinity Species by Titration   | E290       | 652505   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Ammonia by Fluorescence   | E298       | 652189   | 1  | 19      | 5.2    | 5.0           | 1          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 651629   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 651630   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Conductivity in Water   | E100       | 652504   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 659978   | 1  | 17      | 5.8    | 5.0           | ✓          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 661779   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 659979   | 1  | 19      | 5.2    | 5.0           | ✓          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 652465   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 651930   | 1  | 9       | 11.1   | 5.0           | ✓          |
| Fluoride in Water by IC   | E235.F     | 651628   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 651631   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 651632   | 1  | 11      | 9.0    | 5.0           | ✓          |
| ORP by Electrode  | E125       | 660632   | 1  | 20      | 5.0    | 5.0           | ✓          |
| pH by Meter   | E108       | 652503   | 1  | 11      | 9.0    | 5.0           | 1          |
| Sulfate in Water by IC  | E235.SO4   | 651633   | 1  | 11      | 9.0    | 5.0           | ✓          |
| TDS by Gravimetry   | E162       | 652307   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 660261   | 1  | 3       | 33.3   | 5.0           | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 652134   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 661783   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Total Metals in Water by CRC ICPMS                                      | E420       | 660262   | 1  | 6       | 16.6   | 5.0           | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 652469   | 1  | 12      | 8.3    | 5.0           | ✓          |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 657682   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Turbidity by Nephelometry   | E121       | 651627   | 1  | 20      | 5.0    | 5.0           | ✓          |
| Laboratory Control Samples (LCS)  |            |          |    |         |        |               |            |
| Acidity by Titration  | E283       | 652501   | 1  | 11      | 9.0    | 5.0           | 1          |
| Alkalinity Species by Titration   | E290       | 652505   | 1  | 11      | 9.0    | 5.0           | <u> </u>   |
| Ammonia by Fluorescence   | E298       | 652189   | 1  | 19      | 5.2    | 5.0           | <u>√</u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 651629   | 1  | 11      | 9.0    | 5.0           | ✓          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 651630   | 1  | 11      | 9.0    | 5.0           | <u>√</u>   |
| Conductivity in Water   | E100       | 652504   | 1  | 11      | 9.0    | 5.0           | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 659978   | 1  | 17      | 5.8    | 5.0           | 1          |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 661779   | 1  | 20      | 5.0    | 5.0           | <u> </u>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 659979   | 1  | 19      | 5.2    | 5.0           | 1          |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 652465   | 1  | 11      | 9.0    | 5.0           | <u>√</u>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 651930   | 1  | 9       | 11.1   | 5.0           | 1          |

Page : 14 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Matrix: **Water**Evaluation: **×** = *QC frequency outside specification*; ✓ = *QC frequency within specification*.

| Quality Control Sample Type   |            | . Evaluati | Co | ount    |        | Frequency (%) | <u> </u>      |
|---|------------|------------|----|---------|--------|---------------|---------------|
| Analytical Methods  | Method     | QC Lot #   | QC | Regular | Actual | Expected      | Evaluation    |
| Laboratory Control Samples (LCS) - Continued                            |            |            |    |         |        |               |               |
| Fluoride in Water by IC   | E235.F     | 651628     | 1  | 11      | 9.0    | 5.0           | 1             |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 651631     | 1  | 11      | 9.0    | 5.0           |               |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 651632     | 1  | 11      | 9.0    | 5.0           |               |
| ORP by Electrode  | E125       | 660632     | 1  | 20      | 5.0    | 5.0           |               |
| pH by Meter   | E108       | 652503     | 1  | 11      | 9.0    | 5.0           |               |
| Sulfate in Water by IC  | E235.SO4   | 651633     | 1  | 11      | 9.0    | 5.0           |               |
| TDS by Gravimetry   | E162       | 652307     | 1  | 20      | 5.0    | 5.0           | <u> </u>      |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 660261     | 1  | 3       | 33.3   | 5.0           |               |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 652134     | 1  | 20      | 5.0    | 5.0           | <u> </u>      |
| Total Mercury in Water by CVAAS   | E508       | 661783     | 1  | 20      | 5.0    | 5.0           |               |
| Total Metals in Water by CRC ICPMS                                      | E420       | 660262     | 1  | 6       | 16.6   | 5.0           |               |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 652469     | 1  | 12      | 8.3    | 5.0           |               |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 657682     | 1  | 20      | 5.0    | 5.0           | <u> </u>      |
| TSS by Gravimetry (Low Level)   | E160-L     | 652301     | 1  | 15      | 6.6    | 5.0           | <u> </u>      |
| Turbidity by Nephelometry   | E121       | 651627     | 1  | 20      | 5.0    | 5.0           |               |
| Method Blanks (MB)  |            |            |    |         |        |               |               |
| Acidity by Titration  | E283       | 652501     | 1  | 11      | 9.0    | 5.0           | ✓             |
| Alkalinity Species by Titration   | E290       | 652505     | 1  | 11      | 9.0    | 5.0           |               |
| Ammonia by Fluorescence   | E298       | 652189     | 1  | 19      | 5.2    | 5.0           |               |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 651629     | 1  | 11      | 9.0    | 5.0           |               |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 651630     | 1  | 11      | 9.0    | 5.0           | <u> </u>      |
| Conductivity in Water   | E100       | 652504     | 1  | 11      | 9.0    | 5.0           |               |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 659978     | 1  | 17      | 5.8    | 5.0           |               |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 661779     | 1  | 20      | 5.0    | 5.0           |               |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 659979     | 1  | 19      | 5.2    | 5.0           | <u> </u>      |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 652465     | 1  | 11      | 9.0    | 5.0           |               |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 651930     | 1  | 9       | 11.1   | 5.0           | <u>√</u>      |
| Fluoride in Water by IC   | E235.F     | 651628     | 1  | 11      | 9.0    | 5.0           | <b>√</b>      |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 651631     | 1  | 11      | 9.0    | 5.0           | <u>-</u><br>✓ |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 651632     | 1  | 11      | 9.0    | 5.0           | <u>√</u>      |
| Sulfate in Water by IC  | E235.SO4   | 651633     | 1  | 11      | 9.0    | 5.0           | <b>√</b>      |
| TDS by Gravimetry   | E162       | 652307     | 1  | 20      | 5.0    | 5.0           | <u>√</u>      |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 660261     | 1  | 3       | 33.3   | 5.0           | <b>√</b>      |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 652134     | 1  | 20      | 5.0    | 5.0           | <u> </u>      |
| Total Mercury in Water by CVAAS   | E508       | 661783     | 1  | 20      | 5.0    | 5.0           | <b>√</b>      |
| Total Metals in Water by CRC ICPMS                                      | E420       | 660262     | 1  | 6       | 16.6   | 5.0           | <b>√</b>      |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 652469     | 1  | 12      | 8.3    | 5.0           | <u>√</u>      |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 657682     | 1  | 20      | 5.0    | 5.0           | <b>√</b>      |
| TSS by Gravimetry (Low Level)   | E160-L     | 652301     | 1  | 15      | 6.6    | 5.0           | <b>√</b>      |
| Turbidity by Nephelometry   | E121       | 651627     | 1  | 20      | 5.0    | 5.0           | <b>√</b>      |

Page : 15 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



Matrix: Water Evaluation: × = QC frequency outside specification, ✓ = QC frequency within specification.

| Width. Water  |            | Lvaidati | on Qo nega | crity butside spe | cincultori, | QO II CQUCITOY WIL | inin specification |
|---|------------|----------|------------|-------------------|-------------|--------------------|--------------------|
| Quality Control Sample Type   |            |          | Co         | ount              |             | Frequency (%)      | )                  |
| Analytical Methods  | Method     | QC Lot # | QC         | Regular           | Actual      | Expected           | Evaluation         |
| Matrix Spikes (MS)  |            |          |            |                   |             |                    |                    |
| Ammonia by Fluorescence   | E298       | 652189   | 1          | 19                | 5.2         | 5.0                | ✓                  |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 651629   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 651630   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 659978   | 1          | 17                | 5.8         | 5.0                | ✓                  |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 661779   | 1          | 20                | 5.0         | 5.0                | ✓                  |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 659979   | 1          | 19                | 5.2         | 5.0                | ✓                  |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 652465   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 651930   | 1          | 9                 | 11.1        | 5.0                | ✓                  |
| Fluoride in Water by IC   | E235.F     | 651628   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 651631   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 651632   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Sulfate in Water by IC  | E235.SO4   | 651633   | 1          | 11                | 9.0         | 5.0                | ✓                  |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 660261   | 1          | 3                 | 33.3        | 5.0                | ✓                  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 652134   | 1          | 20                | 5.0         | 5.0                | ✓                  |
| Total Mercury in Water by CVAAS   | E508       | 661783   | 1          | 20                | 5.0         | 5.0                | <b>✓</b>           |
| Total Metals in Water by CRC ICPMS                                      | E420       | 660262   | 1          | 6                 | 16.6        | 5.0                | ✓                  |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 652469   | 1          | 12                | 8.3         | 5.0                | ✓                  |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 657682   | 1          | 20                | 5.0         | 5.0                | <b>√</b>           |

Page : 16 of 18 Work Order : CG2212647

Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



# **Methodology References and Summaries**

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

| Analytical Methods                     | Method / Lab              | Matrix | Method Reference  | Method Descriptions   |
|--|---------------------------|--------|-------------------|---|
| Conductivity in Water                  | E100                      | Water  | APHA 2510 (mod)   | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water |
|  | Calgary - Environmental   |        |                   | sample. Conductivity measurements are temperature-compensated to 25°C.  |
| pH by Meter                            | E108                      | Water  | APHA 4500-H (mod) | pH is determined by potentiometric measurement with a pH electrode, and is conducted  |
|  | Calgary - Environmental   |        |                   | at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results,  |
| Trushidita ha Nasahalasa 4m.           | 0 7                       | \A/-4  | ADUA 0400 D (     | pH should be measured in the field within the recommended 15 minute hold time.  |
| Turbidity by Nephelometry              | E121                      | Water  | APHA 2130 B (mod) | Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.  |
|  | Calgary - Environmental   |        |                   | scatter under defined conditions.   |
| ORP by Electrode                       | E125                      | Water  | ASTM D1498 (mod)  | Oxidation redution potential is reported as the oxidation-reduction potential of the  |
|  |                           |        |                   | platinum metal-reference electrode employed, measured in mV. For high accuracy test   |
|  | Calgary - Environmental   |        |                   | results, it is recommended that this analysis be conducted in the field.  |
| TSS by Gravimetry (Low Level)          | E160-L                    | Water  | APHA 2540 D (mod) | Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre   |
|  |                           |        |                   | filter, following by drying of the filter at $104 \pm 1^{\circ}$ C, with gravimetric measurement of the   |
|  | Calgary - Environmental   |        |                   | filtered solids. Samples containing very high dissolved solid content (i.e. seawaters,  |
|  |                           |        |                   | brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.                                       |
| TDS by Gravimetry                      | E162                      | Water  | APHA 2540 C (mod) | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre   |
|  | 2102                      |        | ,                 | filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight,   |
|  | Calgary - Environmental   |        |                   | with gravimetric measurement of the residue.  |
| Bromide in Water by IC (Low Level)     | E235.Br-L                 | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  | Colorani. Faringana antal |        |                   | detection.  |
| Chlorida in Water by IC (Levy Leval)   | Calgary - Environmental   | Water  | EDA 200.1 (mad)   |   |
| Chloride in Water by IC (Low Level)    | E235.CI-L                 | water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.  |
|  | Calgary - Environmental   |        |                   | detection.  |
| Fluoride in Water by IC                | E235.F                    | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  |                           |        |                   | detection.  |
|  | Calgary - Environmental   |        |                   |   |
| Nitrite in Water by IC (Low Level)     | E235.NO2-L                | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  | Calgary - Environmental   |        |                   | detection.  |
| Nitrate in Water by IC (Low Level)     | E235.NO3-L                | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
| I with a te in water by 10 (Low Level) | E235.NO3-L                | vvater | Li A 300.1 (mod)  | detection.  |
|  | Calgary - Environmental   |        |                   | detection.  |
| Sulfate in Water by IC                 | E235.SO4                  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV   |
|  |                           |        |                   | detection.  |
|  | Calgary - Environmental   |        |                   |   |
| Acidity by Titration                   | E283                      | Water  | APHA 2310 B (mod) | Acidity is determined by potentiometric titration to pH endpoint of 8.3   |
|  | Calgary - Environmental   |        |                   |   |
|  | Jaigary - Environmental   |        |                   |   |

Page : 17 of 18 Work Order : CG2212647

Client : Teck Coal Limited



| Analytical Methods  | Method / Lab                      | Matrix | Method Reference              | Method Descriptions   |
|---|-----------------------------------|--------|-------------------------------|---|
| Alkalinity Species by Titration   | E290 Calgary - Environmental      | Water  | APHA 2320 B (mod)             | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.  |
| Ammonia by Fluorescence   | E298 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)  |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318 Calgary - Environmental      | Water  | Method Fialab 100,<br>2018    | TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).   |
| Total Organic Carbon (Non-Purgeable) by<br>Combustion (Low Level)       | E355-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct measurement of TOC after an acidified sample has been purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common), this method is more accurate and more reliable than the TOC by subtraction method (i.e. TC minus TIC).                                       |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L Calgary - Environmental    | Water  | APHA 5310 B (mod)             | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC). |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U  Calgary - Environmental   | Water  | APHA 4500-P E (mod).          | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U  Calgary - Environmental   | Water  | APHA 4500-P F (mod)           | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.  Field filtration is recommended to ensure test results represent conditions at time of sampling.   |
| Total Metals in Water by CRC ICPMS                                      | E420 Calgary - Environmental      | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L Calgary - Environmental | Water  | EPA 200.2/6020B<br>(mod)      | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.  |

Page : 18 of 18 Work Order : CG2212647

Client : Teck Coal Limited



| Analytical Methods                           | Method / Lab            | Matrix  | Method Reference              | Method Descriptions   |
|--|-------------------------|---------|-------------------------------|---|
| Dissolved Chromium in Water by CRC ICPMS     | E421.Cr-L               | Water   | APHA 3030 B/EPA               | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by   |
| (Low Level)                                  | Calgary - Environmental |         | 6020B (mod)                   | Collision/Reaction Cell ICPMS   |
| Total Mercury in Water by CVAAS              | E508                    | Water   | EPA 1631E (mod)               | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction  |
|  |                         |         | , ,                           | with stannous chloride, and analyzed by CVAAS   |
| Pinchal Manageria Water La OVAAO             | Calgary - Environmental | 144 - 4 |                               |   |
| Dissolved Mercury in Water by CVAAS          | E509                    | Water   | APHA 3030B/EPA<br>1631E (mod) | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by |
|  | Calgary - Environmental |         | 1001E (mod)                   | CVAAS.  |
| Dissolved Hardness (Calculated)              | EC100                   | Water   | APHA 2340B                    | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and  |
|  | Calgary - Environmental |         |                               | Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially        |
|  |                         |         |                               | calculated from dissolved Calcium and Magnesium concentrations, because it is a   |
|  |                         |         |                               | property of water due to dissolved divalent cations.  |
| Ion Balance using Dissolved Metals           | EC101                   | Water   | APHA 1030E                    | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA   |
|  | Calgary - Environmental |         |                               | Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present.                         |
|  |                         |         |                               | Ion Balance cannot be calculated accurately for waters with very low electrical   |
|  |                         |         |                               | conductivity (EC).  |
| Preparation Methods                          | Method / Lab            | Matrix  | Method Reference              | Method Descriptions   |
| Preparation for Ammonia                      | EP298                   | Water   |                               | Sample preparation for Preserved Nutrients Water Quality Analysis.  |
|  | Calgary - Environmental |         |                               |   |
| Digestion for TKN in water                   | EP318                   | Water   | APHA 4500-Norg D              | Samples are digested at high temperature using Sulfuric Acid with Copper catalyst,  |
|  | Calgary - Environmental |         | (mod)                         | which converts organic nitrogen sources to Ammonia, which is then quantified by the   |
|  | Calgary - Environmental |         |                               | analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be  |
|  |                         |         |                               | biased low.   |
| Preparation for Total Organic Carbon by      | EP355                   | Water   |                               | Preparation for Total Organic Carbon by Combustion  |
| Combustion                                   | Calgary - Environmental |         |                               |   |
| Preparation for Dissolved Organic Carbon for | EP358                   | Water   | APHA 5310 B (mod)             | Preparation for Dissolved Organic Carbon  |
| Combustion                                   |                         |         | , ,                           |   |
| Discretical for Total Discrete and in such a | Calgary - Environmental | 10/-4   | ADUA 4500 D.E. (              |   |
| Digestion for Total Phosphorus in water      | EP372                   | Water   | APHA 4500-P E (mod).          | Samples are heated with a persulfate digestion reagent.   |
|  | Calgary - Environmental |         |                               |   |
| Dissolved Metals Water Filtration            | EP421                   | Water   | APHA 3030B                    | Water samples are filtered (0.45 um), and preserved with HNO3.  |
|  | Calgary - Environmental |         |                               |   |
| Dissolved Mercury Water Filtration           | EP509                   | Water   | APHA 3030B                    | Water samples are filtered (0.45 um), and preserved with HCl.   |
|  |                         |         |                               |   |
|  | Calgary - Environmental |         |                               |   |



# **QUALITY CONTROL REPORT**

Work Order : CG2212647

Client : Teck Coal Limited
Contact : Nicole Zathey

Address : Line Creek Operations PO BOX 2003 15km North Hwy 43

Sparwood BC Canada V0B 2G0

Telephone : ---

Project : LINE CREEK OPERATIONS

PO : VPO00816101

C-O-C number : LCO LAEMP DRY 2022-09 ALS

Sampler : Jennifer Ings

Site :--

Quote number : Teck Coal Master Quote

No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 18

Laboratory : Calgary - Environmental

Account Manager : Lyudmyla Shvets

Address : 2559 29th Street NE

Calgary, Alberta Canada T1Y 7B5

Telephone : +1 403 407 1800

Date Samples Received : 16-Sep-2022 08:50

Date Analysis Commenced : 16-Sep-2022

Issue Date : 26-Sep-2022 17:38

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

This Quality Control Report contains the following information:

Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives

- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

### Signatories

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

| Signatories         | Position                 | Laboratory Department                |  |
|---------------------|--------------------------|--------------------------------------|--|
| Anthony Calero      | Supervisor - Inorganic   | Calgary Inorganics, Calgary, Alberta |  |
| Anthony Calero      | Supervisor - Inorganic   | Calgary Metals, Calgary, Alberta     |  |
| Elke Tabora         |                          | Calgary Inorganics, Calgary, Alberta |  |
| Harpreet Chawla     | Team Leader - Inorganics | Calgary Inorganics, Calgary, Alberta |  |
| Harpreet Chawla     | Team Leader - Inorganics | Calgary Metals, Calgary, Alberta     |  |
| Millicent Brentnall | Laboratory Analyst       | Calgary Metals, Calgary, Alberta     |  |
| Parker Sgarbossa    | Laboratory Analyst       | Calgary Inorganics, Calgary, Alberta |  |
| Ruifang Zheng       | Analyst                  | Calgary Inorganics, Calgary, Alberta |  |
| Sara Niroomand      |                          | Calgary Inorganics, Calgary, Alberta |  |

Page : 2 of 18 Work Order : CG2212647 Client

: Teck Coal Limited



Project : LINE CREEK OPERATIONS

### **General Comments**

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

#### Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

### **Workorder Comments**

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

Page : 3 of 18 Work Order : CG2212647

Project

: Teck Coal Limited Client : LINE CREEK OPERATIONS



## Laboratory Duplicate (DUP) Report

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

| Physical Tests (QC Lot: CG2212619-005 Anor Physical Tests (QC Lot: CG2212633-002 Anor Physical Tests (QC Lot: CG2212637-001 Anor Physical Tests (QC Lot: | 651627)<br>nymous<br>652307)<br>nymous | Analyte turbidity solids, total dissolved [TDS] | CAS Number | Method     | 0.10   | Unit     | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifie |
|--|--|---|------------|------------|--------|----------|--------------------|---------------------|-------------------------|---------------------|----------|
| CG2212619-005 Anor  Physical Tests (QC Lot: CG2212633-002 Anor  Physical Tests (QC Lot: CG2212637-001 Anor  Physical Tests (QC Lot:                      | 652307) nymous 652501)                 |   |            | E121       | 0.10   |          |                    |                     |                         |                     |          |
| Physical Tests (QC Lot: CG2212633-002 Anor Physical Tests (QC Lot: CG2212637-001 Anor Physical Tests (QC Lot:  | 652307)<br>nymous<br>652501)           |   |            | E121       | 0.10   |          |                    |                     |                         |                     |          |
| CG2212633-002 Anor<br>Physical Tests (QC Lot:<br>CG2212637-001 Anor<br>Physical Tests (QC Lot:   | 652501)                                | solids, total dissolved [TDS]                   |            |            |        | NTU      | <0.10              | <0.10               | 0                       | Diff <2x LOR        |          |
| Physical Tests (QC Lot:<br>CG2212637-001 Anor<br>Physical Tests (QC Lot:   | 652501)                                | solids, total dissolved [TDS]                   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212637-001 Anor<br>Physical Tests (QC Lot:  |  |   |            | E162       | 40     | mg/L     | 2050               | 2260                | 10.0%                   | 20%                 |          |
| Physical Tests (QC Lot:  | nymous                                 |   |            |            |        |          |                    |                     |                         |                     |          |
| <u> </u>   |  | acidity (as CaCO3)                              |            | E283       | 2.0    | mg/L     | 3.8                | 3.9                 | 0.08                    | Diff <2x LOR        |          |
| CC2212627 001 Apor   | 652503)                                |   |            |            |        |          |                    |                     |                         |                     |          |
| 2G2212037-001 Alloi  | nymous                                 | рН  |            | E108       | 0.10   | pH units | 8.06               | 8.10                | 0.495%                  | 4%                  |          |
| Physical Tests (QC Lot:  | 652504)                                |   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212637-001 Anor   | nymous                                 | conductivity                                    |            | E100       | 2.0    | μS/cm    | 1060               | 1060                | 0.755%                  | 10%                 |          |
| Physical Tests (QC Lot:  | 652505)                                |   |            |            |        |          |                    |                     |                         |                     |          |
|  | nymous                                 | alkalinity, bicarbonate (as CaCO3)              |            | E290       | 1.0    | mg/L     | 246                | 240                 | 2.72%                   | 20%                 |          |
|  |  | alkalinity, carbonate (as CaCO3)                |            | E290       | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |          |
|  |  | alkalinity, hydroxide (as CaCO3)                |            | E290       | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |          |
|  |  | alkalinity, total (as CaCO3)                    |            | E290       | 1.0    | mg/L     | 246                | 240                 | 2.72%                   | 20%                 |          |
| Physical Tests (QC Lot:  | 660632)                                |   |            |            |        | -        |                    |                     |                         |                     |          |
|  | nymous                                 | oxidation-reduction potential [ORP]             |            | E125       | 0.10   | mV       | 289                | 286                 | 1.01%                   | 15%                 |          |
| Anions and Nutrients (Q  | )C L at: CE4C20\                       | 1 2 2   |            |            |        |          |                    |                     |                         |                     |          |
|  | GRCK WS LAEMP D                        | fluoride  | 16984-48-8 | E235.F     | 0.020  | mg/L     | 0.144              | 0.144               | 0.0003                  | Diff <2x LOR        |          |
| · -  | 2022-09_N                              | illuoride                                       | 10004 40 0 | 2200.1     | 0.020  | mg/L     | 0.144              | 0.144               | 0.0000                  | Dill 2X LOT         |          |
| Anions and Nutrients (Q  | C Lot: 651629)                         |   |            |            |        |          |                    |                     |                         |                     |          |
| -  | GRCK_WS_LAEMP_D<br>2022-09 N           | bromide   | 24959-67-9 | E235.Br-L  | 0.050  | mg/L     | <0.050             | <0.050              | 0                       | Diff <2x LOR        |          |
| Anions and Nutrients (Q  |  |   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212647-001 LC_0   | GRCK_WS_LAEMP_D<br>2022-09 N           | chloride  | 16887-00-6 | E235.CI-L  | 0.10   | mg/L     | 0.17               | 0.18                | 0.009                   | Diff <2x LOR        |          |
| Anions and Nutrients (Q  | _                                      |   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212647-001 LC_0   | GRCK_WS_LAEMP_D<br>2022-09 N           | nitrate (as N)                                  | 14797-55-8 | E235.NO3-L | 0.0050 | mg/L     | 0.0455             | 0.0466              | 0.0011                  | Diff <2x LOR        |          |
| nions and Nutrients (Q   | _                                      |   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212647-001 LC_0   | GRCK_WS_LAEMP_D<br>2022-09 N           | nitrite (as N)                                  | 14797-65-0 | E235.NO2-L | 0.0010 | mg/L     | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |          |
| Anions and Nutrients (Q  | _                                      |   |            |            |        |          |                    |                     |                         |                     |          |
| CG2212647-001 LC_0   | GRCK_WS_LAEMP_D<br>2022-09 N           | sulfate (as SO4)                                | 14808-79-8 | E235.SO4   | 0.30   | mg/L     | 46.8               | 46.7                | 0.379%                  | 20%                 |          |

 Page
 : 4 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



| ub-Matrix: Water     |                                    |                                     |            |           |           |      | Labora             | tory Duplicate (D   | UP) Report              |                     |           |
|----------------------|------------------------------------|-------------------------------------|------------|-----------|-----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID                   | Analyte                             | CAS Number | Method    | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
|                      | ts (QC Lot: 651930) - co           | ontinued                            |            |           |           |      |                    |                     |                         |                     |           |
| CG2212636-004        | Anonymous                          | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U    | 0.0010    | mg/L | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient  | ts (QC Lot: 652134)                |                                     |            |           |           |      |                    |                     |                         |                     |           |
| CG2212616-001        | Anonymous                          | Kjeldahl nitrogen, total [TKN]      |            | E318      | 0.050     | mg/L | 0.770              | 0.768               | 0.260%                  | 20%                 |           |
| Anions and Nutrient  | ts (QC Lot: 652189)                |                                     |            |           |           |      |                    |                     |                         |                     |           |
| CG2212631-007        | Anonymous                          | ammonia, total (as N)               | 7664-41-7  | E298      | 0.125     | mg/L | 5.21               | 5.11                | 1.97%                   | 20%                 |           |
| Anions and Nutrient  | ts (QC Lot: 657682)                |                                     |            |           |           |      |                    |                     |                         |                     |           |
| CG2212633-005        | Anonymous                          | phosphorus, total                   | 7723-14-0  | E372-U    | 0.0020    | mg/L | <0.0020            | <0.0020             | 0                       | Diff <2x LOR        |           |
| Organic / Inorganic  | Carbon (QC Lot: 65246              | 5)                                  |            |           |           |      |                    |                     |                         |                     |           |
| CG2212626-001        | Anonymous                          | carbon, dissolved organic [DOC]     |            | E358-L    | 0.50      | mg/L | <0.50              | 0.53                | 0.03                    | Diff <2x LOR        |           |
| Organic / Inorganic  | Carbon (QC Lot: 65246              | 9)                                  |            |           |           |      |                    |                     |                         |                     |           |
| CG2212626-001        | Anonymous                          | carbon, total organic [TOC]         |            | E355-L    | 0.50      | mg/L | <0.50              | 0.55                | 0.05                    | Diff <2x LOR        |           |
| otal Metals (QC Lo   | ot: 660261)                        |                                     |            |           |           |      |                    |                     |                         |                     |           |
| CG2212647-001        | LC_GRCK_WS_LAEMP_D<br>RY_2022-09_N | chromium, total                     | 7440-47-3  | E420.Cr-L | 0.00010   | mg/L | 0.00022            | 0.00019             | 0.00004                 | Diff <2x LOR        |           |
| otal Metals (QC Lo   | ot: 660262)                        |                                     |            |           |           |      |                    |                     |                         |                     |           |
| G2212647-001         | LC_GRCK_WS_LAEMP_D<br>RY 2022-09 N | aluminum, total                     | 7429-90-5  | E420      | 0.0030    | mg/L | <0.0150            | 0.0095              | 0.0055                  | Diff <2x LOR        |           |
|                      |                                    | antimony, total                     | 7440-36-0  | E420      | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                                    | arsenic, total                      | 7440-38-2  | E420      | 0.00010   | mg/L | 0.00015            | 0.00018             | 0.00003                 | Diff <2x LOR        |           |
|                      |                                    | barium, total                       | 7440-39-3  | E420      | 0.00010   | mg/L | 0.0634             | 0.0621              | 1.96%                   | 20%                 |           |
|                      |                                    | beryllium, total                    | 7440-41-7  | E420      | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |           |
|                      |                                    | bismuth, total                      | 7440-69-9  | E420      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                      |                                    | boron, total                        | 7440-42-8  | E420      | 0.010     | mg/L | 0.016              | 0.016               | 0.0002                  | Diff <2x LOR        |           |
|                      |                                    | cadmium, total                      | 7440-43-9  | E420      | 0.0000050 | mg/L | 0.0061 µg/L        | 0.0000088           | 0.0000027               | Diff <2x LOR        |           |
|                      |                                    | calcium, total                      | 7440-70-2  | E420      | 0.050     | mg/L | 49.2               | 49.0                | 0.500%                  | 20%                 |           |
|                      |                                    | cobalt, total                       | 7440-48-4  | E420      | 0.00010   | mg/L | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                                    | copper, total                       | 7440-50-8  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                                    | iron, total                         | 7439-89-6  | E420      | 0.010     | mg/L | 0.017              | 0.018               | 0.0006                  | Diff <2x LOR        |           |
|                      |                                    | lead, total                         | 7439-92-1  | E420      | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                      |                                    | lithium, total                      | 7439-93-2  | E420      | 0.0010    | mg/L | 0.0073             | 0.0072              | 0.00003                 | Diff <2x LOR        |           |
|                      |                                    | magnesium, total                    | 7439-95-4  | E420      | 0.0050    | mg/L | 18.1               | 17.6                | 2.80%                   | 20%                 |           |
|                      |                                    | manganese, total                    | 7439-96-5  | E420      | 0.00010   | mg/L | 0.00378            | 0.00370             | 2.33%                   | 20%                 |           |
|                      |                                    | molybdenum, total                   | 7439-98-7  | E420      | 0.000050  | mg/L | 0.00134            | 0.00136             | 0.949%                  | 20%                 |           |
|                      |                                    | nickel, total                       | 7440-02-0  | E420      | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                                    | potassium, total                    | 7440-09-7  | E420      | 0.050     | mg/L | 0.653              | 0.628               | 3.92%                   | 20%                 |           |
|                      |                                    | selenium, total                     | 7782-49-2  | E420      | 0.000050  | mg/L | 1.82 µg/L          | 0.00190             | 4.25%                   | 20%                 |           |

 Page
 : 5 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



| ub-Matrix: Water     |                                    |                       |            |           |                     |              | Labora             | tory Duplicate (D   | UP) Report              |                     |          |
|----------------------|------------------------------------|-----------------------|------------|-----------|---------------------|--------------|--------------------|---------------------|-------------------------|---------------------|----------|
| Laboratory sample ID | Client sample ID                   | Analyte               | CAS Number | Method    | LOR                 | Unit         | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifie |
| Total Metals (QC Lo  | ot: 660262) - continued            |                       |            |           |                     |              |                    |                     |                         |                     |          |
| CG2212647-001        | LC_GRCK_WS_LAEMP_D<br>RY 2022-09 N | silicon, total        | 7440-21-3  | E420      | 0.10                | mg/L         | 2.88               | 2.82                | 2.04%                   | 20%                 |          |
|                      |                                    | silver, total         | 7440-22-4  | E420      | 0.000010            | mg/L         | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |          |
|                      |                                    | sodium, total         | 7440-23-5  | E420      | 0.050               | mg/L         | 2.56               | 2.48                | 2.95%                   | 20%                 |          |
|                      |                                    | strontium, total      | 7440-24-6  | E420      | 0.00020             | mg/L         | 0.189              | 0.187               | 0.901%                  | 20%                 |          |
|                      |                                    | sulfur, total         | 7704-34-9  | E420      | 0.50                | mg/L         | 15.5               | 15.3                | 1.22%                   | 20%                 |          |
|                      |                                    | thallium, total       | 7440-28-0  | E420      | 0.000010            | mg/L         | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |          |
|                      |                                    | tin, total            | 7440-31-5  | E420      | 0.00010             | mg/L         | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                                    | titanium, total       | 7440-32-6  | E420      | 0.00030             | mg/L         | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |          |
|                      |                                    | uranium, total        | 7440-61-1  | E420      | 0.000010            | mg/L         | 0.000918           | 0.000909            | 0.998%                  | 20%                 |          |
|                      |                                    | vanadium, total       | 7440-62-2  | E420      | 0.00050             | mg/L         | 0.00068            | 0.00068             | 0.000003                | Diff <2x LOR        |          |
|                      |                                    | zinc, total           | 7440-66-6  | E420      | 0.0030              | mg/L         | <0.0030            | <0.0030             | 0                       | Diff <2x LOR        |          |
| otal Metals (QC Lo   | ot: 661783)                        |                       |            |           |                     |              |                    |                     |                         |                     |          |
| G2212590-001         | Anonymous                          | mercury, total        | 7439-97-6  | E508      | 0.0000050           | mg/L         | <0.0000050         | <0.0000050          | 0                       | Diff <2x LOR        |          |
| issolved Metals (    | QC Lot: 659978)                    |                       |            |           |                     |              |                    |                     |                         |                     |          |
| G2212647-001         | LC_GRCK_WS_LAEMP_D<br>RY_2022-09_N | chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.00010             | mg/L         | 0.00025            | 0.00023             | 0.00003                 | Diff <2x LOR        |          |
| issolved Metals (    | QC Lot: 659979)                    |                       |            |           |                     |              |                    |                     |                         |                     |          |
| CG2212647-001        | LC_GRCK_WS_LAEMP_D<br>RY_2022-09_N | aluminum, dissolved   | 7429-90-5  | E421      | 0.0010              | mg/L         | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |          |
|                      |                                    | antimony, dissolved   | 7440-36-0  | E421      | 0.00010             | mg/L         | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                                    | arsenic, dissolved    | 7440-38-2  | E421      | 0.00010             | mg/L         | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                                    | barium, dissolved     | 7440-39-3  | E421      | 0.00010             | mg/L         | 0.0748             | 0.0759              | 1.40%                   | 20%                 |          |
|                      |                                    | beryllium, dissolved  | 7440-41-7  | E421      | 0.000020            | mg/L         | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |          |
|                      |                                    | bismuth, dissolved    | 7440-69-9  | E421      | 0.000050            | mg/L         | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |
|                      |                                    | boron, dissolved      | 7440-42-8  | E421      | 0.010               | mg/L         | 0.016              | 0.016               | 0.0002                  | Diff <2x LOR        |          |
|                      |                                    | cadmium, dissolved    | 7440-43-9  | E421      | 0.0000050           | mg/L         | 0.0060 µg/L        | 0.0000073           | 0.0000013               | Diff <2x LOR        |          |
|                      |                                    | calcium, dissolved    | 7440-70-2  | E421      | 0.050               | mg/L         | 51.0               | 51.4                | 0.665%                  | 20%                 |          |
|                      |                                    | cobalt, dissolved     | 7440-48-4  | E421      | 0.00010             | mg/L         | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |          |
|                      |                                    | copper, dissolved     | 7440-50-8  | E421      | 0.00020             | mg/L         | <0.00020           | <0.00020            | 0                       | Diff <2x LOR        |          |
|                      |                                    | iron, dissolved       | 7439-89-6  | E421      | 0.010               | mg/L         | <0.010             | <0.010              | 0                       | Diff <2x LOR        |          |
|                      |                                    | lead, dissolved       | 7439-92-1  | E421      | 0.000050            | mg/L         | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |          |
|                      |                                    | lithium, dissolved    | 7439-93-2  | E421      | 0.0010              | mg/L         | 0.0071             | 0.0070              | 0.0001                  | Diff <2x LOR        |          |
|                      |                                    | and the second second | 7439-95-4  | E421      | 0.0050              | mg/L         | 21.0               | 21.1                | 0.134%                  | 20%                 |          |
|                      |                                    | magnesium, dissolved  | 1400-00-4  |           |                     |              |                    |                     |                         |                     |          |
|                      |                                    | magnesium, dissolved  | 7439-96-5  | E421      | 0.00010             | mg/L         | 0.00084            | 0.00085             | 0.00001                 | Diff <2x LOR        |          |
|                      |                                    |                       |            |           | 0.00010<br>0.000050 | mg/L<br>mg/L | 0.00084<br>0.00149 | 0.00085<br>0.00147  | 0.00001<br>1.11%        | Diff <2x LOR        |          |

Page : 6 of 18
Work Order : CG2212647
Client : Teck Coal Limited



| Sub-Matrix: Water    |                                    |                      |            |        |           |      | Labora             | tory Duplicate (D   | UP) Report              |                     |           |
|----------------------|------------------------------------|----------------------|------------|--------|-----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID                   | Analyte              | CAS Number | Method | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Dissolved Metals (   | QC Lot: 659979) - contin           | ued                  |            |        |           |      |                    |                     |                         |                     |           |
| CG2212647-001        | LC_GRCK_WS_LAEMP_D<br>RY 2022-09 N | potassium, dissolved | 7440-09-7  | E421   | 0.050     | mg/L | 0.649              | 0.657               | 1.29%                   | 20%                 |           |
|                      |                                    | selenium, dissolved  | 7782-49-2  | E421   | 0.000050  | mg/L | 2.43 µg/L          | 0.00235             | 3.47%                   | 20%                 |           |
|                      |                                    | silicon, dissolved   | 7440-21-3  | E421   | 0.050     | mg/L | 2.92               | 2.92                | 0.0760%                 | 20%                 |           |
|                      |                                    | silver, dissolved    | 7440-22-4  | E421   | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                                    | sodium, dissolved    | 7440-23-5  | E421   | 0.050     | mg/L | 2.80               | 2.79                | 0.336%                  | 20%                 |           |
|                      |                                    | strontium, dissolved | 7440-24-6  | E421   | 0.00020   | mg/L | 0.186              | 0.185               | 0.616%                  | 20%                 |           |
|                      |                                    | sulfur, dissolved    | 7704-34-9  | E421   | 0.50      | mg/L | 16.8               | 16.5                | 1.95%                   | 20%                 |           |
|                      |                                    | thallium, dissolved  | 7440-28-0  | E421   | 0.000010  | mg/L | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |
|                      |                                    | tin, dissolved       | 7440-31-5  | E421   | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                      |                                    | titanium, dissolved  | 7440-32-6  | E421   | 0.00030   | mg/L | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |           |
|                      |                                    | uranium, dissolved   | 7440-61-1  | E421   | 0.000010  | mg/L | 0.000902           | 0.000894            | 0.900%                  | 20%                 |           |
|                      |                                    | vanadium, dissolved  | 7440-62-2  | E421   | 0.00050   | mg/L | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |
|                      |                                    | zinc, dissolved      | 7440-66-6  | E421   | 0.0010    | mg/L | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |
| Dissolved Metals (   | QC Lot: 661779)                    |                      |            |        |           |      |                    |                     |                         |                     |           |
| CG2212615-008        | Anonymous                          | mercury, dissolved   | 7439-97-6  | E509   | 0.0000050 | mg/L | 0.0000081          | 0.0000062           | 0.0000019               | Diff <2x LOR        |           |

 Page
 : 7 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



## Method Blank (MB) Report

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

#### Sub-Matrix: Water

| Analyte                              | CAS Number Method     | LOR   | Unit  | Result   | Qualifier |
|--------------------------------------|-----------------------|-------|-------|----------|-----------|
| Physical Tests (QCLot: 651627)       |                       |       |       |          |           |
| turbidity                            | E121                  | 0.1   | NTU   | <0.10    |           |
| Physical Tests (QCLot: 652301)       |                       |       |       |          |           |
| solids, total suspended [TSS]        | E160-L                | 1     | mg/L  | <1.0     |           |
| Physical Tests (QCLot: 652307)       |                       |       |       |          |           |
| solids, total dissolved [TDS]        | E162                  | 10    | mg/L  | <10      |           |
| Physical Tests (QCLot: 652501)       |                       |       |       |          |           |
| acidity (as CaCO3)                   | E283                  | 2     | mg/L  | <2.0     |           |
| Physical Tests (QCLot: 652504)       |                       |       |       |          |           |
| conductivity                         | E100                  | 1     | μS/cm | <1.0     |           |
| Physical Tests (QCLot: 652505)       |                       |       |       |          |           |
| alkalinity, bicarbonate (as CaCO3)   | E290                  | 1     | mg/L  | <1.0     |           |
| alkalinity, carbonate (as CaCO3)     | E290                  | 1     | mg/L  | <1.0     |           |
| alkalinity, hydroxide (as CaCO3)     | E290                  | 1     | mg/L  | <1.0     |           |
| alkalinity, total (as CaCO3)         | E290                  | 1     | mg/L  | <1.0     |           |
| Anions and Nutrients (QCLot: 651628) |                       |       |       |          |           |
| fluoride                             | 16984-48-8 E235.F     | 0.02  | mg/L  | <0.020   |           |
| Anions and Nutrients (QCLot: 651629) |                       |       |       |          |           |
| promide                              | 24959-67-9 E235.Br-L  | 0.05  | mg/L  | <0.050   |           |
| Anions and Nutrients (QCLot: 651630) |                       |       |       |          |           |
| chloride                             | 16887-00-6 E235.CI-L  | 0.1   | mg/L  | <0.10    |           |
| Anions and Nutrients (QCLot: 651631) |                       |       |       |          |           |
| nitrate (as N)                       | 14797-55-8 E235.NO3-L | 0.005 | mg/L  | <0.0050  |           |
| Anions and Nutrients (QCLot: 651632) |                       |       |       |          |           |
| nitrite (as N)                       | 14797-65-0 E235.NO2-L | 0.001 | mg/L  | <0.0010  |           |
| Anions and Nutrients (QCLot: 651633) |                       |       |       |          |           |
| sulfate (as SO4)                     | 14808-79-8 E235.SO4   | 0.3   | mg/L  | <0.30    |           |
| Anions and Nutrients (QCLot: 651930) |                       |       |       |          |           |
| ohosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U     | 0.001 | mg/L  | <0.0010  |           |
| Anions and Nutrients (QCLot: 652134) |                       |       |       |          |           |
| Kjeldahl nitrogen, total [TKN]       | E318                  | 0.05  | mg/L  | <0.050   |           |
| Anions and Nutrients (QCLot: 652189) |                       |       |       |          |           |
| ammonia, total (as N)                | 7664-41-7 E298        | 0.005 | mg/L  | < 0.0050 |           |

 Page
 : 8 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited

Project : LINE CREEK OPERATIONS



#### Sub-Matrix: Water

| Analyte                                | CAS Number Method   | LOR      | Unit | Result    | Qualifier |
|--|---------------------|----------|------|-----------|-----------|
| Anions and Nutrients (QCLot: 657682)   | - continued         |          |      |           |           |
| phosphorus, total                      | 7723-14-0 E372-U    | 0.002    | mg/L | <0.0020   |           |
| Organic / Inorganic Carbon  (QCLot: 65 | 2465)               |          |      |           |           |
| carbon, dissolved organic [DOC]        | E358-L              | 0.5      | mg/L | <0.50     |           |
| Organic / Inorganic Carbon  (QCLot: 65 | 2469)               |          |      |           |           |
| carbon, total organic [TOC]            | E355-L              | 0.5      | mg/L | <0.50     |           |
| Total Metals (QCLot: 660261)           |                     |          |      |           |           |
| chromium, total                        | 7440-47-3 E420.Cr-L | 0.0001   | mg/L | <0.00010  |           |
| Total Metals (QCLot: 660262)           |                     |          |      |           |           |
| aluminum, total                        | 7429-90-5 E420      | 0.003    | mg/L | # 0.0034  | MB-LOR    |
| antimony, total                        | 7440-36-0 E420      | 0.0001   | mg/L | <0.00010  |           |
| arsenic, total                         | 7440-38-2 E420      | 0.0001   | mg/L | <0.00010  |           |
| barium, total                          | 7440-39-3 E420      | 0.0001   | mg/L | <0.00010  |           |
| peryllium, total                       | 7440-41-7 E420      | 0.00002  | mg/L | <0.000020 |           |
| pismuth, total                         | 7440-69-9 E420      | 0.00005  | mg/L | <0.000050 |           |
| poron, total                           | 7440-42-8 E420      | 0.01     | mg/L | <0.010    |           |
| cadmium, total                         | 7440-43-9 E420      | 0.000005 | mg/L | <0.000050 |           |
| calcium, total                         | 7440-70-2 E420      | 0.05     | mg/L | <0.050    |           |
| cobalt, total                          | 7440-48-4 E420      | 0.0001   | mg/L | <0.00010  |           |
| copper, total                          | 7440-50-8 E420      | 0.0005   | mg/L | <0.00050  |           |
| ron, total                             | 7439-89-6 E420      | 0.01     | mg/L | <0.010    |           |
| ead, total                             | 7439-92-1 E420      | 0.00005  | mg/L | <0.000050 |           |
| ithium, total                          | 7439-93-2 E420      | 0.001    | mg/L | <0.0010   |           |
| nagnesium, total                       | 7439-95-4 E420      | 0.005    | mg/L | <0.0050   |           |
| nanganese, total                       | 7439-96-5 E420      | 0.0001   | mg/L | <0.00010  |           |
| molybdenum, total                      | 7439-98-7 E420      | 0.00005  | mg/L | <0.000050 |           |
| nickel, total                          | 7440-02-0 E420      | 0.0005   | mg/L | <0.00050  |           |
| potassium, total                       | 7440-09-7 E420      | 0.05     | mg/L | <0.050    |           |
| elenium, total                         | 7782-49-2 E420      | 0.00005  | mg/L | <0.000050 |           |
| silicon, total                         | 7440-21-3 E420      | 0.1      | mg/L | <0.10     |           |
| silver, total                          | 7440-22-4 E420      | 0.00001  | mg/L | <0.000010 |           |
| sodium, total                          | 7440-23-5 E420      | 0.05     | mg/L | <0.050    |           |
| trontium, total                        | 7440-24-6 E420      | 0.0002   | mg/L | <0.00020  |           |
| sulfur, total                          | 7704-34-9 E420      | 0.5      | mg/L | <0.50     |           |
| hallium, total                         | 7440-28-0 E420      | 0.00001  | mg/L | <0.000010 |           |
| tin, total                             | 7440-31-5 E420      | 0.0001   | mg/L | <0.00010  |           |
| titanium, total                        | 7440-32-6 E420      | 0.0003   | mg/L | <0.00030  |           |

Page : 9 of 18
Work Order : CG2212647
Client : Teck Coal Limited

Project : LINE CREEK OPERATIONS



#### Sub-Matrix: Water

| Analyte                        | CAS Number | Method    | LOR      | Unit | Result     | Qualifier |
|--------------------------------|------------|-----------|----------|------|------------|-----------|
| Total Metals (QCLot: 660262) - | continued  |           |          |      |            |           |
| uranium, total                 | 7440-61-1  | E420      | 0.00001  | mg/L | <0.000010  |           |
| vanadium, total                | 7440-62-2  | E420      | 0.0005   | mg/L | <0.00050   |           |
| zinc, total                    | 7440-66-6  | E420      | 0.003    | mg/L | <0.0030    |           |
| Total Metals (QCLot: 661783)   |            |           |          |      |            |           |
| mercury, total                 | 7439-97-6  | E508      | 0.000005 | mg/L | <0.0000050 |           |
| Dissolved Metals (QCLot: 6599) | 78)        |           |          |      |            |           |
| chromium, dissolved            | 7440-47-3  | E421.Cr-L | 0.0001   | mg/L | <0.00010   |           |
| Dissolved Metals (QCLot: 6599) | 79)        |           |          |      |            |           |
| aluminum, dissolved            | 7429-90-5  | E421      | 0.001    | mg/L | <0.0010    |           |
| antimony, dissolved            | 7440-36-0  | E421      | 0.0001   | mg/L | <0.00010   |           |
| arsenic, dissolved             | 7440-38-2  | E421      | 0.0001   | mg/L | <0.00010   |           |
| barium, dissolved              | 7440-39-3  | E421      | 0.0001   | mg/L | <0.00010   |           |
| peryllium, dissolved           | 7440-41-7  | E421      | 0.00002  | mg/L | <0.000020  |           |
| pismuth, dissolved             | 7440-69-9  | E421      | 0.00005  | mg/L | <0.000050  |           |
| ooron, dissolved               | 7440-42-8  | E421      | 0.01     | mg/L | <0.010     |           |
| cadmium, dissolved             | 7440-43-9  | E421      | 0.000005 | mg/L | <0.0000050 |           |
| calcium, dissolved             | 7440-70-2  | E421      | 0.05     | mg/L | <0.050     |           |
| cobalt, dissolved              | 7440-48-4  | E421      | 0.0001   | mg/L | <0.00010   |           |
| copper, dissolved              | 7440-50-8  | E421      | 0.0002   | mg/L | <0.00020   |           |
| ron, dissolved                 | 7439-89-6  | E421      | 0.01     | mg/L | <0.010     |           |
| ead, dissolved                 | 7439-92-1  | E421      | 0.00005  | mg/L | <0.000050  |           |
| ithium, dissolved              | 7439-93-2  | E421      | 0.001    | mg/L | <0.0010    |           |
| magnesium, dissolved           | 7439-95-4  | E421      | 0.005    | mg/L | <0.0050    |           |
| manganese, dissolved           | 7439-96-5  | E421      | 0.0001   | mg/L | <0.00010   |           |
| molybdenum, dissolved          | 7439-98-7  | E421      | 0.00005  | mg/L | <0.000050  |           |
| nickel, dissolved              | 7440-02-0  | E421      | 0.0005   | mg/L | <0.00050   |           |
| ootassium, dissolved           | 7440-09-7  | E421      | 0.05     | mg/L | <0.050     |           |
| selenium, dissolved            | 7782-49-2  | E421      | 0.00005  | mg/L | <0.000050  |           |
| silicon, dissolved             | 7440-21-3  | E421      | 0.05     | mg/L | <0.050     |           |
| silver, dissolved              | 7440-22-4  | E421      | 0.00001  | mg/L | <0.000010  |           |
| sodium, dissolved              | 7440-23-5  | E421      | 0.05     | mg/L | <0.050     |           |
| strontium, dissolved           | 7440-24-6  | E421      | 0.0002   | mg/L | <0.00020   |           |
| sulfur, dissolved              | 7704-34-9  | E421      | 0.5      | mg/L | <0.50      |           |
| thallium, dissolved            | 7440-28-0  | E421      | 0.00001  | mg/L | <0.000010  |           |
| tin, dissolved                 | 7440-31-5  | E421      | 0.0001   | mg/L | <0.00010   |           |
| titanium, dissolved            | 7440-32-6  | E421      | 0.0003   | mg/L | <0.00030   |           |

 Page
 : 10 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Lim

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Sub-Matrix: Water

| Analyte                               | CAS Number Method | LOR      | Unit | Result     | Qualifier |  |  |  |  |  |
|---------------------------------------|-------------------|----------|------|------------|-----------|--|--|--|--|--|
| Dissolved Metals (QCLot: 659979) - co | ntinued           |          |      |            |           |  |  |  |  |  |
| uranium, dissolved                    | 7440-61-1 E421    | 0.00001  | mg/L | <0.000010  |           |  |  |  |  |  |
| vanadium, dissolved                   | 7440-62-2 E421    | 0.0005   | mg/L | <0.00050   |           |  |  |  |  |  |
| zinc, dissolved                       | 7440-66-6 E421    | 0.001    | mg/L | <0.0010    |           |  |  |  |  |  |
| Dissolved Metals (QCLot: 661779)      |                   |          |      |            |           |  |  |  |  |  |
| mercury, dissolved                    | 7439-97-6 E509    | 0.000005 | mg/L | <0.0000050 |           |  |  |  |  |  |

## Qualifiers

Qualifier Description

MB-LOR Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

 Page
 : 11 of 18

 Work Order
 : CG2212647

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## Laboratory Control Sample (LCS) Report

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

| Sub-Matrix: Water                       | Laboratory Control Sample (LCS) Report |       |          |               |              |          |            |  |
|---|--|-------|----------|---------------|--------------|----------|------------|--|
|   |  |       |          | Spike         | Recovery (%) | Recovery | Limits (%) |  |
| Analyte CAS                             | Number Method                          | LOR   | Unit     | Concentration | LCS          | Low      | High       | Qualifier  |
| Physical Tests (QCLot: 651627)          |  |       |          |               |              |          |            |  |
| turbidity                               | E121                                   | 0.1   | NTU      | 200 NTU       | 113          | 85.0     | 115        |  |
| Physical Tests (QCLot: 652301)          |  |       |          |               |              |          |            |  |
| solids, total suspended [TSS]           | E160-L                                 | 1     | mg/L     | 150 mg/L      | 91.4         | 85.0     | 115        |  |
| Physical Tests (QCLot: 652307)          |  |       |          |               |              |          |            |  |
| solids, total dissolved [TDS]           | E162                                   | 10    | mg/L     | 1000 mg/L     | 100          | 85.0     | 115        |  |
| Physical Tests (QCLot: 652501)          |  |       |          |               |              |          |            |  |
| acidity (as CaCO3)                      | E283                                   | 2     | mg/L     | 50 mg/L       | 108          | 85.0     | 115        |  |
| Physical Tests (QCLot: 652503)          |  |       |          |               |              |          |            |  |
| рН                                      | E108                                   |       | pH units | 7 pH units    | 100          | 98.6     | 101        |  |
| Physical Tests (QCLot: 652504)          |  |       |          |               |              |          |            |  |
| conductivity                            | E100                                   | 1     | μS/cm    | 146.9 μS/cm   | 96.5         | 90.0     | 110        |  |
| Physical Tests (QCLot: 652505)          |  |       |          |               |              |          |            |  |
| alkalinity, total (as CaCO3)            | E290                                   | 1     | mg/L     | 500 mg/L      | 101          | 85.0     | 115        |  |
| Physical Tests (QCLot: 660632)          |  |       |          |               |              |          |            |  |
| oxidation-reduction potential [ORP]     | E125                                   |       | mV       | 220 mV        | 99.2         | 95.4     | 104        |  |
|   |  |       |          |               |              |          |            |  |
| Anions and Nutrients (QCLot: 651628)    |  |       |          | _             |              |          |            |  |
| fluoride 169                            | 984-48-8 E235.F                        | 0.02  | mg/L     | 1 mg/L        | 103          | 90.0     | 110        |  |
| Anions and Nutrients (QCLot: 651629)    |  |       |          |               |              |          |            |  |
| bromide 249                             | 959-67-9 E235.Br-L                     | 0.05  | mg/L     | 0.5 mg/L      | 102          | 85.0     | 115        |  |
| Anions and Nutrients (QCLot: 651630)    |  |       |          | _             |              |          | 1          |  |
| chloride 168                            | 887-00-6 E235.CI-L                     | 0.1   | mg/L     | 100 mg/L      | 101          | 90.0     | 110        |  |
| Anions and Nutrients (QCLot: 651631)    |  |       |          |               |              |          |            |  |
| nitrate (as N) 147                      | 797-55-8 E235.NO3-L                    | 0.005 | mg/L     | 2.5 mg/L      | 102          | 90.0     | 110        |  |
| Anions and Nutrients (QCLot: 651632)    |  |       |          |               |              |          |            |  |
| nitrite (as N) 147                      | 797-65-0 E235.NO2-L                    | 0.001 | mg/L     | 0.5 mg/L      | 99.7         | 90.0     | 110        |  |
| Anions and Nutrients (QCLot: 651633)    |  |       |          |               |              |          |            |  |
| sulfate (as SO4) 148                    | 808-79-8 E235.SO4                      | 0.3   | mg/L     | 100 mg/L      | 104          | 90.0     | 110        |  |
| Anions and Nutrients (QCLot: 651930)    |  |       |          |               |              |          |            |  |
| phosphate, ortho-, dissolved (as P) 142 | 265-44-2 E378-U                        | 0.001 | mg/L     | 0.03 mg/L     | 93.0         | 80.0     | 120        |  |
| Anions and Nutrients (QCLot: 652134)    |  |       |          |               |              |          |            |  |
|   |  |       |          |               |              |          |            | The second secon |
| Kjeldahl nitrogen, total [TKN]          | E318                                   | 0.05  | mg/L     | 4 mg/L        | 95.2         | 75.0     | 125        |  |

Page : 12 of 18 : CG2212647 Work Order Client

: Teck Coal Limited





| Sub-Matrix: Water                      | Laboratory Control Sample (LCS) Report |          |      |               |              |          |            |   |
|--|--|----------|------|---------------|--------------|----------|------------|---|
|  |  |          |      | Spike         | Recovery (%) | Recovery | Limits (%) |   |
| Analyte                                | CAS Number Method                      | LOR      | Unit | Concentration | LCS          | Low      | Low High   |   |
| Anions and Nutrients (QCLot: 652189)   | - continued                            |          |      |               |              |          |            |   |
| ammonia, total (as N)                  | 7664-41-7 E298                         | 0.005    | mg/L | 0.2 mg/L      | 102          | 85.0     | 115        |   |
| Anions and Nutrients (QCLot: 657682)   |  |          |      |               |              |          |            |   |
| phosphorus, total                      | 7723-14-0 E372-U                       | 0.002    | mg/L | 0.03 mg/L     | 98.2         | 80.0     | 120        |   |
|  |  |          |      |               |              |          |            |   |
| Organic / Inorganic Carbon (QCLot: 652 | 2465)                                  |          |      |               |              |          |            | ' |
| carbon, dissolved organic [DOC]        | E358-L                                 | 0.5      | mg/L | 8.57 mg/L     | 118          | 80.0     | 120        |   |
| Organic / Inorganic Carbon (QCLot: 652 | 2469)                                  |          |      |               |              |          |            | ' |
| carbon, total organic [TOC]            | E355-L                                 | 0.5      | mg/L | 8.57 mg/L     | 110          | 80.0     | 120        |   |
|  |  |          |      |               |              |          |            |   |
| Total Metals (QCLot: 660261)           |  |          |      |               |              |          |            |   |
| chromium, total                        | 7440-47-3 E420.Cr-L                    | 0.0001   | mg/L | 0.25 mg/L     | 94.1         | 80.0     | 120        |   |
| Total Metals (QCLot: 660262)           |  |          |      |               |              |          |            |   |
| aluminum, total                        | 7429-90-5 E420                         | 0.003    | mg/L | 2 mg/L        | 96.2         | 80.0     | 120        |   |
| antimony, total                        | 7440-36-0 E420                         | 0.0001   | mg/L | 1 mg/L        | 104          | 80.0     | 120        |   |
| arsenic, total                         | 7440-38-2 E420                         | 0.0001   | mg/L | 1 mg/L        | 94.3         | 80.0     | 120        |   |
| barium, total                          | 7440-39-3 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 96.0         | 80.0     | 120        |   |
| beryllium, total                       | 7440-41-7 E420                         | 0.00002  | mg/L | 0.1 mg/L      | 90.9         | 80.0     | 120        |   |
| bismuth, total                         | 7440-69-9 E420                         | 0.00005  | mg/L | 1 mg/L        | 96.4         | 80.0     | 120        |   |
| boron, total                           | 7440-42-8 E420                         | 0.01     | mg/L | 1 mg/L        | 84.8         | 80.0     | 120        |   |
| cadmium, total                         | 7440-43-9 E420                         | 0.000005 | mg/L | 0.1 mg/L      | 94.0         | 80.0     | 120        |   |
| calcium, total                         | 7440-70-2 E420                         | 0.05     | mg/L | 50 mg/L       | 89.6         | 80.0     | 120        |   |
| cobalt, total                          | 7440-48-4 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 94.7         | 80.0     | 120        |   |
| copper, total                          | 7440-50-8 E420                         | 0.0005   | mg/L | 0.25 mg/L     | 93.0         | 80.0     | 120        |   |
| iron, total                            | 7439-89-6 E420                         | 0.01     | mg/L | 1 mg/L        | 106          | 80.0     | 120        |   |
| lead, total                            | 7439-92-1 E420                         | 0.00005  | mg/L | 0.5 mg/L      | 96.1         | 80.0     | 120        |   |
| lithium, total                         | 7439-93-2 E420                         | 0.001    | mg/L | 0.25 mg/L     | 96.4         | 80.0     | 120        |   |
| magnesium, total                       | 7439-95-4 E420                         | 0.005    | mg/L | 50 mg/L       | 89.6         | 80.0     | 120        |   |
| manganese, total                       | 7439-96-5 E420                         | 0.0001   | mg/L | 0.25 mg/L     | 95.7         | 80.0     | 120        |   |
| molybdenum, total                      | 7439-98-7 E420                         | 0.00005  | mg/L | 0.25 mg/L     | 99.9         | 80.0     | 120        |   |
| nickel, total                          | 7440-02-0 E420                         | 0.0005   | mg/L | 0.5 mg/L      | 93.8         | 80.0     | 120        |   |
| potassium, total                       | 7440-09-7 E420                         | 0.05     | mg/L | 50 mg/L       | 95.1         | 80.0     | 120        |   |
| selenium, total                        | 7782-49-2 E420                         | 0.00005  | mg/L | 1 mg/L        | 88.2         | 80.0     | 120        |   |
| silicon, total                         | 7440-21-3 E420                         | 0.1      | mg/L | 10 mg/L       | 95.9         | 60.0     | 140        |   |
| silver, total                          | 7440-22-4 E420                         | 0.00001  | mg/L | 0.1 mg/L      | 88.7         | 80.0     | 120        |   |
| sodium, total                          | 7440-23-5 E420                         | 0.05     | mg/L | 50 mg/L       | 94.9         | 80.0     | 120        |   |
| strontium, total                       | 7440-24-6 E420                         | 0.0002   | mg/L | 0.25 mg/L     | 97.7         | 80.0     | 120        |   |
| sulfur, total                          | 7704-34-9 E420                         | 0.5      | mg/L | 50 mg/L       | 89.0         | 80.0     | 120        |   |

 Page
 : 13 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



| p-Matrix: Water                          |            |           |          |      |               | Laboratory Cor | trol Sample (LCS) | Report     |           |
|--|------------|-----------|----------|------|---------------|----------------|-------------------|------------|-----------|
|  |            |           |          |      | Spike         | Recovery (%)   | Recovery          | Limits (%) |           |
| Analyte                                  | CAS Number | Method    | LOR      | Unit | Concentration | LCS            | Low               | High       | Qualifier |
| Total Metals (QCLot: 660262) - continued |            |           |          |      |               |                |                   |            |           |
| thallium, total                          | 7440-28-0  | E420      | 0.00001  | mg/L | 1 mg/L        | 96.4           | 80.0              | 120        |           |
| tin, total                               | 7440-31-5  | E420      | 0.0001   | mg/L | 0.5 mg/L      | 99.1           | 80.0              | 120        |           |
| titanium, total                          | 7440-32-6  | E420      | 0.0003   | mg/L | 0.25 mg/L     | 94.2           | 80.0              | 120        |           |
| uranium, total                           | 7440-61-1  | E420      | 0.00001  | mg/L | 0.005 mg/L    | 92.5           | 80.0              | 120        |           |
| vanadium, total                          | 7440-62-2  | E420      | 0.0005   | mg/L | 0.5 mg/L      | 97.1           | 80.0              | 120        |           |
| zinc, total                              | 7440-66-6  | E420      | 0.003    | mg/L | 0.5 mg/L      | 88.0           | 80.0              | 120        |           |
| Total Metals (QCLot: 661783)             |            |           |          |      |               |                |                   |            |           |
| mercury, total                           | 7439-97-6  | E508      | 0.000005 | mg/L | 0.0001 mg/L   | 101            | 80.0              | 120        |           |
| Dissolved Metals (QCLot: 659978)         |            |           |          |      |               |                |                   |            |           |
| chromium, dissolved                      | 7440-47-3  | E421.Cr-L | 0.0001   | mg/L | 0.25 mg/L     | 95.6           | 80.0              | 120        |           |
| Dissolved Metals (QCLot: 659979)         |            |           |          |      |               |                |                   |            | I         |
| aluminum, dissolved                      | 7429-90-5  | E421      | 0.001    | mg/L | 2 mg/L        | 101            | 80.0              | 120        |           |
| antimony, dissolved                      | 7440-36-0  | E421      | 0.0001   | mg/L | 1 mg/L        | 97.2           | 80.0              | 120        |           |
| arsenic, dissolved                       | 7440-38-2  | E421      | 0.0001   | mg/L | 1 mg/L        | 95.4           | 80.0              | 120        |           |
| barium, dissolved                        | 7440-39-3  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 97.9           | 80.0              | 120        |           |
| beryllium, dissolved                     | 7440-41-7  | E421      | 0.00002  | mg/L | 0.1 mg/L      | 99.3           | 80.0              | 120        |           |
| bismuth, dissolved                       | 7440-69-9  | E421      | 0.00005  | mg/L | 1 mg/L        | 93.6           | 80.0              | 120        |           |
| boron, dissolved                         | 7440-42-8  | E421      | 0.01     | mg/L | 1 mg/L        | 101            | 80.0              | 120        |           |
| cadmium, dissolved                       | 7440-43-9  | E421      | 0.000005 | mg/L | 0.1 mg/L      | 93.5           | 80.0              | 120        |           |
| calcium, dissolved                       | 7440-70-2  | E421      | 0.05     | mg/L | 50 mg/L       | 97.1           | 80.0              | 120        |           |
| cobalt, dissolved                        | 7440-48-4  | E421      | 0.0001   | mg/L | 0.25 mg/L     | 94.3           | 80.0              | 120        |           |
| copper, dissolved                        | 7440-50-8  | E421      | 0.0002   | mg/L | 0.25 mg/L     | 93.8           | 80.0              | 120        |           |
| iron, dissolved                          | 7439-89-6  | E421      | 0.01     | mg/L | 1 mg/L        | 97.9           | 80.0              | 120        |           |
| lead, dissolved                          | 7439-92-1  | E421      | 0.00005  | mg/L | 0.5 mg/L      | 99.2           | 80.0              | 120        |           |
| lithium, dissolved                       | 7439-93-2  |           | 0.001    | mg/L | 0.25 mg/L     | 102            | 80.0              | 120        |           |
| magnesium, dissolved                     | 7439-95-4  | E421      | 0.005    | mg/L | 50 mg/L       | 105            | 80.0              | 120        |           |
| manganese, dissolved                     | 7439-96-5  |           | 0.0001   | mg/L | 0.25 mg/L     | 94.0           | 80.0              | 120        |           |
| molybdenum, dissolved                    | 7439-98-7  |           | 0.00005  | mg/L | 0.25 mg/L     | 98.5           | 80.0              | 120        |           |
| nickel, dissolved                        | 7440-02-0  | E421      | 0.0005   | mg/L | 0.5 mg/L      | 93.6           | 80.0              | 120        |           |
| potassium, dissolved                     | 7440-09-7  | E421      | 0.05     | mg/L | 50 mg/L       | 99.6           | 80.0              | 120        |           |
| selenium, dissolved                      | 7782-49-2  | E421      | 0.00005  | mg/L | 1 mg/L        | 95.0           | 80.0              | 120        |           |
| silicon, dissolved                       | 7440-21-3  |           | 0.05     | mg/L | 10 mg/L       | 103            | 60.0              | 140        |           |
| silver, dissolved                        | 7440-22-4  |           | 0.00001  | mg/L | 0.1 mg/L      | 84.0           | 80.0              | 120        |           |
| sodium, dissolved                        | 7440-23-5  |           | 0.05     | mg/L | 50 mg/L       | 102            | 80.0              | 120        |           |
| strontium, dissolved                     | 7440-24-6  |           | 0.0002   | mg/L | 0.25 mg/L     | 95.4           | 80.0              | 120        |           |
| sulfur, dissolved                        | 7704-34-9  |           | 0.5      | mg/L | 50 mg/L       | 92.4           | 80.0              | 120        |           |

 Page
 : 14 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



| Sub-Matrix: Water                            | Matrix: Water |        |          |      |               |              | Laboratory Control Sample (LCS) Report |            |           |  |  |  |
|--|---------------|--------|----------|------|---------------|--------------|--|------------|-----------|--|--|--|
|  |               |        |          |      | Spike         | Recovery (%) | Recovery                               | Limits (%) |           |  |  |  |
| Analyte                                      | CAS Number    | Method | LOR      | Unit | Concentration | LCS          | Low                                    | High       | Qualifier |  |  |  |
| Dissolved Metals (QCLot: 659979) - continued |               |        |          |      |               |              |  |            |           |  |  |  |
| thallium, dissolved                          | 7440-28-0     | E421   | 0.00001  | mg/L | 1 mg/L        | 97.8         | 80.0                                   | 120        |           |  |  |  |
| tin, dissolved                               | 7440-31-5     | E421   | 0.0001   | mg/L | 0.5 mg/L      | 97.7         | 80.0                                   | 120        |           |  |  |  |
| titanium, dissolved                          | 7440-32-6     | E421   | 0.0003   | mg/L | 0.25 mg/L     | 96.2         | 80.0                                   | 120        |           |  |  |  |
| uranium, dissolved                           | 7440-61-1     | E421   | 0.00001  | mg/L | 0.005 mg/L    | 89.0         | 80.0                                   | 120        |           |  |  |  |
| vanadium, dissolved                          | 7440-62-2     | E421   | 0.0005   | mg/L | 0.5 mg/L      | 97.2         | 80.0                                   | 120        |           |  |  |  |
| zinc, dissolved                              | 7440-66-6     | E421   | 0.001    | mg/L | 0.5 mg/L      | 92.6         | 80.0                                   | 120        |           |  |  |  |
| mercury, dissolved                           | 7439-97-6     | E509   | 0.000005 | mg/L | 0.0001 mg/L   | 103          | 80.0                                   | 120        |           |  |  |  |
|  |               |        |          |      |               |              |  |            |           |  |  |  |

Page : 15 of 18 Work Order : CG2212647 Client

: Teck Coal Limited

: LINE CREEK OPERATIONS Project



## Matrix Spike (MS) Report

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

| Sub-Matrix: Water       | -Matrix: Water                     |                                     |            |            |               |           | Matrix Spike (MS) Report |          |            |           |  |  |
|-------------------------|------------------------------------|-------------------------------------|------------|------------|---------------|-----------|--------------------------|----------|------------|-----------|--|--|
|                         |                                    |                                     |            |            | Spi           | ike       | Recovery (%)             | Recovery | Limits (%) |           |  |  |
| Laboratory sample<br>ID | Client sample ID                   | Analyte                             | CAS Number | Method     | Concentration | Target    | MS                       | Low      | High       | Qualifier |  |  |
|                         | ients (QCLot: 651628)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | fluoride                            | 16984-48-8 | E235.F     | 1.02 mg/L     | 1 mg/L    | 102                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651629)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | bromide                             | 24959-67-9 | E235.Br-L  | 0.510 mg/L    | 0.5 mg/L  | 102                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651630)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | chloride                            | 16887-00-6 | E235.CI-L  | 100 mg/L      | 100 mg/L  | 100                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651631)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 2.53 mg/L     | 2.5 mg/L  | 101                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651632)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.515 mg/L    | 0.5 mg/L  | 103                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651633)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-09_N  | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 102 mg/L      | 100 mg/L  | 102                      | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 651930)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-001           | LC_GRCK_WS_LAEMP_D<br>RY_2022-09_N | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0497 mg/L   | 0.05 mg/L | 99.4                     | 70.0     | 130        |           |  |  |
| Anions and Nutr         | ients (QCLot: 652134)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-001           | LC_GRCK_WS_LAEMP_D<br>RY_2022-09_N | Kjeldahl nitrogen, total [TKN]      |            | E318       | 2.47 mg/L     | 2.5 mg/L  | 98.8                     | 70.0     | 130        |           |  |  |
| Anions and Nutr         | ients (QCLot: 652189)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212631-008           | Anonymous                          | ammonia, total (as N)               | 7664-41-7  | E298       | ND mg/L       | 0.1 mg/L  | ND                       | 75.0     | 125        |           |  |  |
| Anions and Nutr         | ients (QCLot: 657682)              |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212633-006           | Anonymous                          | phosphorus, total                   | 7723-14-0  | E372-U     | 0.0455 mg/L   | 0.05 mg/L | 91.1                     | 70.0     | 130        |           |  |  |
| Organic / Inorga        | nic Carbon (QCLot: 6524            | 465)                                |            |            |               |           |                          |          |            |           |  |  |
| CG2212626-001           | Anonymous                          | carbon, dissolved organic [DOC]     |            | E358-L     | 5.84 mg/L     | 5 mg/L    | 117                      | 70.0     | 130        |           |  |  |
| Organic / Inorgai       | nic Carbon  (QCLot: 6524           | 469)                                |            |            |               |           |                          |          |            |           |  |  |
| CG2212626-001           | Anonymous                          | carbon, total organic [TOC]         |            | E355-L     | 5.91 mg/L     | 5 mg/L    | 118                      | 70.0     | 130        |           |  |  |
| Total Metals (QC        | Lot: 660261)                       |                                     |            |            |               |           |                          |          |            |           |  |  |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>2022-09 N   | chromium, total                     | 7440-47-3  | E420.Cr-L  | 0.480 mg/L    | 0.4 mg/L  | 120                      | 70.0     | 130        |           |  |  |

Page : 16 of 18 : CG2212647 Work Order Client

: Teck Coal Limited



| Sub-Matrix: Water       |                                  |                     |            |           |                |             | Matrix Spik  | re (MS) Report |            |           |
|-------------------------|----------------------------------|---------------------|------------|-----------|----------------|-------------|--------------|----------------|------------|-----------|
|                         |                                  |                     |            |           | Spi            | ke          | Recovery (%) | Recovery       | Limits (%) |           |
| Laboratory sample<br>ID | Client sample ID                 | Analyte             | CAS Number | Method    | Concentration  | Target      | MS           | Low            | High       | Qualifier |
| Fotal Metals (QC        | Lot: 660262)                     |                     |            |           |                |             |              |                |            |           |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY              | aluminum, total     | 7429-90-5  | E420      | 2.37 mg/L      | 2 mg/L      | 118          | 70.0           | 130        |           |
|                         | _2022-09_N                       | antimony, total     | 7440-36-0  | E420      | 0.228 mg/L     | 0.2 mg/L    | 114          | 70.0           | 130        |           |
|                         |                                  | arsenic, total      | 7440-38-2  | E420      | 0.230 mg/L     | 0.2 mg/L    | 115          | 70.0           | 130        |           |
|                         |                                  | barium, total       | 7440-39-3  | E420      | 0.234 mg/L     | 0.2 mg/L    | 117          | 70.0           | 130        |           |
|                         |                                  | beryllium, total    | 7440-41-7  | E420      | 0.482 mg/L     | 0.4 mg/L    | 120          | 70.0           | 130        |           |
|                         |                                  | bismuth, total      | 7440-69-9  | E420      | 0.115 mg/L     | 0.1 mg/L    | 115          | 70.0           | 130        |           |
|                         |                                  | boron, total        | 7440-42-8  | E420      | 1.09 mg/L      | 1 mg/L      | 109          | 70.0           | 130        |           |
|                         |                                  | cadmium, total      | 7440-43-9  | E420      | 0.0485 mg/L    | 0.04 mg/L   | 121          | 70.0           | 130        |           |
|                         |                                  | calcium, total      | 7440-70-2  | E420      | 46.8 mg/L      | 40 mg/L     | 117          | 70.0           | 130        |           |
|                         |                                  | cobalt, total       | 7440-48-4  | E420      | 0.242 mg/L     | 0.2 mg/L    | 121          | 70.0           | 130        |           |
|                         |                                  | copper, total       | 7440-50-8  | E420      | 0.245 mg/L     | 0.2 mg/L    | 122          | 70.0           | 130        |           |
|                         |                                  | iron, total         | 7439-89-6  | E420      | 23.8 mg/L      | 20 mg/L     | 119          | 70.0           | 130        |           |
|                         |                                  | lead, total         | 7439-92-1  | E420      | 0.240 mg/L     | 0.2 mg/L    | 120          | 70.0           | 130        |           |
|                         |                                  | lithium, total      | 7439-93-2  | E420      | 1.21 mg/L      | 1 mg/L      | 121          | 70.0           | 130        |           |
|                         |                                  | magnesium, total    | 7439-95-4  | E420      | 11.3 mg/L      | 10 mg/L     | 113          | 70.0           | 130        |           |
|                         |                                  | manganese, total    | 7439-96-5  | E420      | 0.240 mg/L     | 0.2 mg/L    | 120          | 70.0           | 130        |           |
|                         |                                  | molybdenum, total   | 7439-98-7  | E420      | 0.226 mg/L     | 0.2 mg/L    | 113          | 70.0           | 130        |           |
|                         |                                  | nickel, total       | 7440-02-0  | E420      | 0.484 mg/L     | 0.4 mg/L    | 121          | 70.0           | 130        |           |
|                         |                                  | potassium, total    | 7440-09-7  | E420      | 46.4 mg/L      | 40 mg/L     | 116          | 70.0           | 130        |           |
|                         |                                  | selenium, total     | 7782-49-2  | E420      | 0.468 mg/L     | 0.4 mg/L    | 117          | 70.0           | 130        |           |
|                         |                                  | silicon, total      | 7440-21-3  | E420      | 89.6 mg/L      | 100 mg/L    | 89.6         | 70.0           | 130        |           |
|                         |                                  | silver, total       | 7440-22-4  | E420      | 0.0495 mg/L    | 0.04 mg/L   | 124          | 70.0           | 130        |           |
|                         |                                  | sodium, total       | 7440-23-5  | E420      | 24.1 mg/L      | 20 mg/L     | 120          | 70.0           | 130        |           |
|                         |                                  | strontium, total    | 7440-24-6  | E420      | 0.239 mg/L     | 0.2 mg/L    | 119          | 70.0           | 130        |           |
|                         |                                  | sulfur, total       | 7704-34-9  | E420      | 216 mg/L       | 200 mg/L    | 108          | 70.0           | 130        |           |
|                         |                                  | thallium, total     | 7440-28-0  | E420      | 0.0454 mg/L    | 0.04 mg/L   | 114          | 70.0           | 130        |           |
|                         |                                  | tin, total          | 7440-31-5  | E420      | 0.228 mg/L     | 0.2 mg/L    | 114          | 70.0           | 130        |           |
|                         |                                  | titanium, total     | 7440-32-6  | E420      | 0.440 mg/L     | 0.4 mg/L    | 110          | 70.0           | 130        |           |
|                         |                                  | uranium, total      | 7440-61-1  | E420      | 0.0468 mg/L    | 0.04 mg/L   | 117          | 70.0           | 130        |           |
|                         |                                  | vanadium, total     | 7440-62-2  | E420      | 1.20 mg/L      | 1 mg/L      | 120          | 70.0           | 130        |           |
|                         |                                  | zinc, total         | 7440-66-6  | E420      | 4.62 mg/L      | 4 mg/L      | 116          | 70.0           | 130        |           |
| otal Metals (QC         | Lot: 661783)                     |                     |            |           |                |             |              |                |            |           |
| G2212615-008            | Anonymous                        | mercury, total      | 7439-97-6  | E508      | 0.0001000 mg/L | 0.0001 mg/L | 100.0        | 70.0           | 130        |           |
| issolved Metals         | (QCLot: 659978)                  |                     |            |           |                |             |              |                |            |           |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY<br>2022-09 N | chromium, dissolved | 7440-47-3  | E421.Cr-L | 0.378 mg/L     | 0.4 mg/L    | 94.4         | 70.0           | 130        |           |

 Page
 : 17 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



| Sub-Matrix: Water       |                     |                       |            |        |                |             | Matrix Spik  | e (MS) Report |            |           |
|-------------------------|---------------------|-----------------------|------------|--------|----------------|-------------|--------------|---------------|------------|-----------|
|                         |                     |                       |            |        | Spi            | ke          | Recovery (%) | Recovery      | Limits (%) |           |
| Laboratory sample<br>ID | Client sample ID    | Analyte               | CAS Number | Method | Concentration  | Target      | MS           | Low           | High       | Qualifier |
|                         | (QCLot: 659979)     |                       |            |        |                |             |              |               |            |           |
| CG2212647-002           | LC_MT1_WS_LAEMP_DRY | aluminum, dissolved   | 7429-90-5  | E421   | 1.92 mg/L      | 2 mg/L      | 96.3         | 70.0          | 130        |           |
|                         | _2022-09_N          | antimony, dissolved   | 7440-36-0  | E421   | 0.179 mg/L     | 0.2 mg/L    | 89.4         | 70.0          | 130        |           |
|                         |                     | arsenic, dissolved    | 7440-38-2  | E421   | 0.188 mg/L     | 0.2 mg/L    | 94.2         | 70.0          | 130        |           |
|                         |                     | barium, dissolved     | 7440-39-3  | E421   | 0.192 mg/L     | 0.2 mg/L    | 95.8         | 70.0          | 130        |           |
|                         |                     | beryllium, dissolved  | 7440-41-7  | E421   | 0.388 mg/L     | 0.4 mg/L    | 97.0         | 70.0          | 130        |           |
|                         |                     | bismuth, dissolved    | 7440-69-9  | E421   | 0.0936 mg/L    | 0.1 mg/L    | 93.6         | 70.0          | 130        |           |
|                         |                     | boron, dissolved      | 7440-42-8  | E421   | 0.986 mg/L     | 1 mg/L      | 98.6         | 70.0          | 130        |           |
|                         |                     | cadmium, dissolved    | 7440-43-9  | E421   | 0.0390 mg/L    | 0.04 mg/L   | 97.4         | 70.0          | 130        |           |
|                         |                     | calcium, dissolved    | 7440-70-2  | E421   | 39.6 mg/L      | 40 mg/L     | 99.1         | 70.0          | 130        |           |
|                         |                     | cobalt, dissolved     | 7440-48-4  | E421   | 0.190 mg/L     | 0.2 mg/L    | 94.8         | 70.0          | 130        |           |
|                         |                     | copper, dissolved     | 7440-50-8  | E421   | 0.190 mg/L     | 0.2 mg/L    | 94.9         | 70.0          | 130        |           |
|                         |                     | iron, dissolved       | 7439-89-6  | E421   | 19.0 mg/L      | 20 mg/L     | 95.0         | 70.0          | 130        |           |
|                         |                     | lead, dissolved       | 7439-92-1  | E421   | 0.198 mg/L     | 0.2 mg/L    | 99.1         | 70.0          | 130        |           |
|                         |                     | lithium, dissolved    | 7439-93-2  | E421   | 0.973 mg/L     | 1 mg/L      | 97.3         | 70.0          | 130        |           |
|                         |                     | magnesium, dissolved  | 7439-95-4  | E421   | 9.66 mg/L      | 10 mg/L     | 96.6         | 70.0          | 130        |           |
|                         |                     | manganese, dissolved  | 7439-96-5  | E421   | 0.188 mg/L     | 0.2 mg/L    | 94.0         | 70.0          | 130        |           |
|                         |                     | molybdenum, dissolved | 7439-98-7  | E421   | 0.192 mg/L     | 0.2 mg/L    | 96.2         | 70.0          | 130        |           |
|                         |                     | nickel, dissolved     | 7440-02-0  | E421   | 0.380 mg/L     | 0.4 mg/L    | 94.9         | 70.0          | 130        |           |
|                         |                     | potassium, dissolved  | 7440-09-7  | E421   | 38.5 mg/L      | 40 mg/L     | 96.3         | 70.0          | 130        |           |
|                         |                     | selenium, dissolved   | 7782-49-2  | E421   | 0.387 mg/L     | 0.4 mg/L    | 96.7         | 70.0          | 130        |           |
|                         |                     | silicon, dissolved    | 7440-21-3  | E421   | 101 mg/L       | 100 mg/L    | 101          | 70.0          | 130        |           |
|                         |                     | silver, dissolved     | 7440-22-4  | E421   | 0.0377 mg/L    | 0.04 mg/L   | 94.3         | 70.0          | 130        |           |
|                         |                     | sodium, dissolved     | 7440-23-5  | E421   | 20.0 mg/L      | 20 mg/L     | 99.9         | 70.0          | 130        |           |
|                         |                     | strontium, dissolved  | 7440-24-6  | E421   | 0.193 mg/L     | 0.2 mg/L    | 96.7         | 70.0          | 130        |           |
|                         |                     | sulfur, dissolved     | 7704-34-9  | E421   | 178 mg/L       | 200 mg/L    | 89.2         | 70.0          | 130        |           |
|                         |                     | thallium, dissolved   | 7440-28-0  | E421   | 0.0349 mg/L    | 0.04 mg/L   | 87.4         | 70.0          | 130        |           |
|                         |                     | tin, dissolved        | 7440-31-5  | E421   | 0.176 mg/L     | 0.2 mg/L    | 88.1         | 70.0          | 130        |           |
|                         |                     | titanium, dissolved   | 7440-32-6  | E421   | 0.368 mg/L     | 0.4 mg/L    | 92.1         | 70.0          | 130        |           |
|                         |                     | uranium, dissolved    | 7440-61-1  | E421   | 0.0352 mg/L    | 0.04 mg/L   | 88.0         | 70.0          | 130        |           |
|                         |                     | vanadium, dissolved   | 7440-62-2  | E421   | 0.946 mg/L     | 1 mg/L      | 94.6         | 70.0          | 130        |           |
|                         |                     | zinc, dissolved       | 7440-66-6  | E421   | 3.80 mg/L      | 4 mg/L      | 94.9         | 70.0          | 130        |           |
| issolved Metals         | (QCLot: 661779)     |                       |            |        |                |             |              |               |            |           |
| CG2212615-009           | Anonymous           | mercury, dissolved    | 7439-97-6  | E509   | 0.0000877 mg/L | 0.0001 mg/L | 87.7         | 70.0          | 130        |           |

 Page
 : 18 of 18

 Work Order
 : CG2212647

 Client
 : Teck Coal Limited



LC\_GRCK\_WS\_LAEMP\_DRY\_2022-09\_N LC\_MTI\_WS\_LAEMP\_DRY\_2022-09\_N LC\_CC1\_WS\_LAEMP\_DRY\_2022-09\_N Calgary
Work Order Reference
CG2212647 **Environmental Division** Telaphone: +1 403 407 1600 ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS SERVICE REQUEST (rush - subject to availability) Emergency (1 Business Day) - 100% surcharge For Emergency <1 Day, ASAP or Weekend - Contact ALS Facility Name / Job# Line Creek Operations Project Manager Nicole Zathey Phone Number 1-250-865-3048 Postal Code Regular (default)
Priority (2-3 business days) - 50% surcharge X Address 421 Pine Avenune Email Nicole Zathey@Teck.com PROJECT/CLIENT INFO CITY Sample Location SAMPLE DETAILS COC ID: (sys loc code) LC\_MT1 LC\_GRCK TC\_CC1 Sparwood V0B 2G1 LCO\_LAEMIP\_DKY\_2022-Matrix Field WS W/S WS S IV OU Hazardous Material (Yes/No) Sampler's Signature RELINQUISHED BY/AFFILIATION Sampler's Name Country Province 2022/09/14 2022/09/14 2022/09/14 Jennifer Ings/Minnow Canada BC (24hr)13:30 13:30 13:30 Time C=Com G=Grab TURNAROUND TIME: Phone Number |403 407 1794 ଦ <del>د</del> q Postal Code T1Y 7B5 Lab Contact Lyudmyla Shvets Page Lab Name ALS Calgary Address 2559 29 Street NE Cont #Of Email Lyudmyla Shyets@ALSGlobal.com 7 7 City Calgary <u>۔</u> ع Jennifer Ings ANALYSIS PRESERV Filt. DATE/IIME LABORATORY HZSO4 DOC \* 15-Sep HCL -Mercury\_Dissolved ANALYSIS REQUESTED Country Province Mercury\_Total ACCEPTED BY/AFFILIATION 2-3 Business Days Canada ΑB TECKCOAL\_METNH NO3 Date/Time Mobile # TECKCOAL\_METNH NO3 PO number Email 5: Email 5: Email 4: Email 3: Email 2: Email 1:  $G_T$ Report Format / Distribution TECKCOAL\_ROUTIN H2S04 Teck Lab Results@tect Jessica.Ritz@Teck.com teckcoal@equisonline.com obin. Valleau@minnow.ca sa.Bowron@minnow.ca TOC\_TKN\_PT RUSH Priority September 15, 2022 OTHER INFO Hered - F: Field, L: Lab, FL: Field & Lab, N: None 5195003444 VPO00816101 DATE/TIME Excel PDF **Environmental Division** 

Environmental Division
Calgary
Work Order Reference
CG2212647

# **WATER CHEMISTRY**

ALS Laboratory Report CG2216696 (Finalized 01-Dec-22)

#### **ALS Canada Ltd.**



#### **CERTIFICATE OF ANALYSIS**

**Work Order** : CG2216696 Page : 1 of 10

Client : Teck Coal Limited Laboratory : Calgary - Environmental **Account Manager** Contact : Nicole Zathey : Lyudmyla Shvets Address : 421 Pine Avenue Address : 2559 29th Street NE

> Sparwood BC Canada V0B 2G1 Calgary AB Canada T1Y 7B5

> > **Date Analysis Commenced**

Telephone Telephone : +1 403 407 1800

**Project** : LINE CREEK OPERATION Date Samples Received : 01-Dec-2022 09:00 PO : VPO00816101

: 01-Dec-2022 C-O-C number : LAEMP\_DRY\_2022-11\_ALS Issue Date : 07-Dec-2022 17:54

Sampler :, Robin Valleau

Site ----

Quote number : Teck Coal Master Quote

No. of samples received : 7 No. of samples analysed : 7

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

#### **Signatories**

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

| Signatories      | Position                 | Laboratory Department        |
|------------------|--------------------------|------------------------------|
| Anthony Calero   | Supervisor - Inorganic   | Inorganics, Calgary, Alberta |
| Elke Tabora      |                          | Inorganics, Calgary, Alberta |
| Harpreet Chawla  | Team Leader - Inorganics | Inorganics, Calgary, Alberta |
| Harpreet Chawla  | Team Leader - Inorganics | Metals, Calgary, Alberta     |
| Kevin Baxter     | Team Leader - Inorganics | Inorganics, Calgary, Alberta |
| Kevin Baxter     | Team Leader - Inorganics | Metals, Calgary, Alberta     |
| Parker Sgarbossa | Laboratory Analyst       | Metals, Calgary, Alberta     |
| Ruifang Zheng    | Analyst                  | Inorganics, Calgary, Alberta |
| Shirley Li       | Team Leader - Inorganics | Inorganics, Calgary, Alberta |
| Shirley Li       | Team Leader - Inorganics | Metals, Calgary, Alberta     |
| Sonthuong Bui    | Laboratory Analyst       | Metals, Calgary, Alberta     |

Page : 2 of 10
Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



#### **General Comments**

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

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

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

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

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

| Unit     | Description                   |
|----------|-------------------------------|
| -        | no units                      |
| %        | percent                       |
| μg/L     | micrograms per litre          |
| μS/cm    | microsiemens per centimetre   |
| meq/L    | milliequivalents per litre    |
| mg/L     | milligrams per litre          |
| mV       | millivolts                    |
| NTU      | nephelometric turbidity units |
| pH units | pH units                      |

<: less than.

>: greater than.

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

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

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

#### **Qualifiers**

| Qualifier | Description  |
|-----------|--|
| DLM       | Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, |
|           | colour, turbidity).  |
| RRV       | Reported result verified by repeat analysis.                                       |
| TKNI      | TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.  |

 Page
 :
 3 of 10

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Li

Client : Teck Coal Limited
Project : LINE CREEK OPERATION



| AEMP_DRY_20  | Analytical Results                  |            |            |             |                   |               |               |               |               |               |
|--|-------------------------------------|------------|------------|-------------|-------------------|---------------|---------------|---------------|---------------|---------------|
| Client sampling date / time   30-Mav-2022    | Sub-Matrix: Water                   |            |            | CI          | ient sample ID    | LC_RD1_WS_L   | LC_MT1_WS_L   | LC_CC1_WS_L   | LC_FRB_WS_L   | LC_GRCK_WS_   |
| Client sampling date / Bine   30-Nov-2022   20-Nov-2022    | (Matrix: Water)                     |            |            |             |                   |               |               |               |               | LAEMP_DRY_2   |
| Analyte   CAS Number   Method   LOR   Unit   CG2216698-012   CG2216698-003   CG2216698-004   CG22   Result      |                                     |            |            |             |                   | 22-11_NP      | 22-11_NP      | 22-11_NP      | 22-11_N       | 022-11_N      |
| Analyte   CAS Number   Method   LOR   Unit   CG2216698-012   CG2216698-003   CG2216698-004   CG22   Result      |                                     |            |            | Client samp | oling date / time | 30-Nov-2022   | 30-Nov-2022   | 30-Nov-2022   | 30-Nov-2022   | 30-Nov-2022   |
| Physical Tests   |                                     |            |            | γ.          | 3                 |               |               |               |               | 10:30         |
| Physical Tests   acidity (as CaCO3)     E283   2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   mg/L   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0   <2.0         | Analyte                             | CAS Number | Method     | LOR         | Unit              | CG2216696-001 | CG2216696-002 | CG2216696-003 | CG2216696-004 | CG2216696-005 |
| Scidity (as CaCO3)   |                                     |            |            |             |                   | Result        | Result        | Result        | Result        | Result        |
| Scidity (as CaCO3)   | Physical Tests                      |            |            |             |                   |               |               |               |               |               |
| alkalinity, bicarbonate (as HCO3) 71-52-3 E290 1.0 mg/L 4-1.0 4-1.0 12.2 16.4 alkalinity, carbonate (as CaCO3) 3812-32-6 E290 1.0 mg/L 4-1.0 4-1.0 7.3 9.8 alkalinity, tydroxide (as CaCO3) 3812-32-6 E290 1.0 mg/L 4-1.0 4-1  |                                     |            | E283       | 2.0         | mg/L              | <2.0 RRV      | <2.0 RRV      | <2.0          | <2.0          | <2.0          |
| alkalinity, carbonate (as CaCO3)  3812-32-6  E290  1.0  mg/L  -1.0 | alkalinity, bicarbonate (as CaCO3)  |            | E290       | 1.0         | mg/L              | <1.0          | 2.2           | 199           | 195           | 159           |
| alkalinity, carbonate (as CO3)  3812-32-6  E290  1.0  mg/L  41.0   | alkalinity, bicarbonate (as HCO3)   | 71-52-3    | E290       | 1.0         | mg/L              | <1.0          | 2.7           | 243           | 238           | 194           |
| alkalinity, hydroxide (as CaCO3)   | alkalinity, carbonate (as CaCO3)    |            | E290       | 1.0         | mg/L              | <1.0          | <1.0          | 12.2          | 16.4          | 13.0          |
| alkalinity, hydroxide (as OH)  alkalinity, hydroxide (as OH)  14280-30-9  E290  1.0  mg/L  1.0  1.0  1.0  1.0  1.0  1.0  1.0  1.   | alkalinity, carbonate (as CO3)      | 3812-32-6  | E290       | 1.0         | mg/L              | <1.0          | <1.0          | 7.3           | 9.8           | 7.8           |
| alkalinity, total (as CaCO3)   | alkalinity, hydroxide (as CaCO3)    |            | E290       | 1.0         | mg/L              | <1.0          | <1.0          | <1.0          | <1.0          | <1.0          |
| conductivity          E100         2.0         μS/cm         <2.0  | alkalinity, hydroxide (as OH)       | 14280-30-9 | E290       | 1.0         | mg/L              | <1.0          | <1.0          | <1.0          | <1.0          | <1.0          |
| hardness (as CaCO3), dissolved   | alkalinity, total (as CaCO3)        |            | E290       | 1.0         | mg/L              | <1.0          | 2.2           | 211           | 211           | 172           |
| oxidation-reduction potential [ORP]  | conductivity                        |            | E100       | 2.0         | μS/cm             | <2.0          | 3.4           | 856           | 862           | 377           |
| pH          E108         0.10         pH units         5.59         6.27         8.38         8.40           solids, total dissolved [TDS]          E162         10         mg/L         <10   | hardness (as CaCO3), dissolved      |            | EC100      | 0.50        | mg/L              | <0.50         | <0.50         | 545           | 541           | 225           |
| Solids, total dissolved [TDS]  | oxidation-reduction potential [ORP] |            | E125       | 0.10        | mV                | 535           | 543           | 352           | 374           | 403           |
| Solids, total suspended [TSS]  | pH                                  |            | E108       | 0.10        | pH units          | 5.59          | 6.27          | 8.38          | 8.40          | 8.44          |
| turbidity          E121         0.10         NTU         <0.10   | solids, total dissolved [TDS]       |            | E162       | 10          | mg/L              | <10           | <10           | 597           | 596           | 223           |
| Anions and Nutrients ammonia, total (as N) 7664-41-7 E298 0.0050 mg/L <0.0050 <0.0050 0.0062 <0.0050 <0.0050   bromide 24959-67-9 E235.Br-L 0.050 mg/L <0.050 <0.050 <0.050 <0.050 <0.050 <0.050   chloride 16887-00-6 E235.Cl-L 0.10 mg/L <0.10 <0.10 5.22 5.40   fluoride 16984-48-8 E235.F 0.020 mg/L <0.020 <0.020 0.162 0.168   Kjeldahl nitrogen, total [TKN]  | solids, total suspended [TSS]       |            | E160-L     | 1.0         | mg/L              | <1.0          | <1.0          | <1.0          | <1.0          | 2.9           |
| ammonia, total (as N)         7664-41-7         E298         0.0050         mg/L         <0.0050   | turbidity                           |            | E121       | 0.10        | NTU               | <0.10         | <0.10         | 0.36          | 0.34          | 0.28          |
| bromide         24959-67-9         E235.Br-L         0.050         mg/L         <0.050   | Anions and Nutrients                |            |            |             |                   |               |               |               |               |               |
| chloride         16887-00-6         E235.Cl-L         0.10         mg/L         <0.10  | ammonia, total (as N)               | 7664-41-7  | E298       | 0.0050      | mg/L              | <0.0050       | <0.0050       | 0.0062        | <0.0050       | <0.0050       |
| fluoride   16984-48-8   E235.F   0.020   mg/L   <0.020   <0.020   0.162   0.168  | bromide                             | 24959-67-9 | E235.Br-L  | 0.050       | mg/L              | <0.050        | <0.050        | <0.050        | <0.050        | <0.050        |
| Kjeldahl nitrogen, total [TKN]         E318         0.050         mg/L         <0.050  | chloride                            | 16887-00-6 | E235.CI-L  | 0.10        | mg/L              | <0.10         | <0.10         | 5.22          | 5.40          | 0.17          |
| nitrate (as N)         14797-55-8         E235.NO3-L         0.0050         mg/L         <0.0050   | fluoride                            | 16984-48-8 | E235.F     | 0.020       | mg/L              | <0.020        | <0.020        | 0.162         | 0.168         | 0.139         |
| nitrite (as N) 14797-65-0 E235.NO2-L 0.0010 mg/L <0.0010 <0.0010 0.0033 0.0035 <   | Kjeldahl nitrogen, total [TKN]      |            | E318       | 0.050       | mg/L              | <0.050        | <0.050        | 0.987 TKNI    | 0.745 TKNI    | <0.500 DLM    |
|  | nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0050      | mg/L              | <0.0050       | <0.0050       | 14.4          | 14.3          | 0.0771        |
| phosphate, ortho-, dissolved (as P) 14265-44-2 E378-U 0.0010 mg/L <0.0010 <0.0010 <0.0010 <0.0010  | nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0010      | mg/L              | <0.0010       | <0.0010       | 0.0033        | 0.0035        | <0.0010       |
|  | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010      | mg/L              | <0.0010       | <0.0010       | <0.0010       | <0.0010       | 0.0019        |
| phosphorus, total 7723-14-0 E372-U 0.0020 mg/L <0.0020 <0.0020 <0.0020 <0.0020   | phosphorus, total                   | 7723-14-0  | E372-U     | 0.0020      | mg/L              | <0.0020       | <0.0020       | <0.0020       | <0.0020       | 0.0026        |
| sulfate (as \$04)         14808-79-8         E235.SO4         0.30         mg/L         <0.30  | sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 0.30        | mg/L              | <0.30         | <0.30         | 234           | 232           | 50.1          |
| Organic / Inorganic Carbon   | Organic / Inorganic Carbon          |            |            |             |                   |               |               |               |               |               |
| carbon, dissolved organic [DOC]          E358-L         0.50         mg/L          <0.50   |                                     |            | E358-L     | 0.50        | mg/L              |               | <0.50         | 0.68          | 0.64          | <0.50         |

Page : 4 of 10
Work Order : CG2216696
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ient sample ID   | LC_RD1_WS_L<br>AEMP_DRY_20<br>22-11_NP | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-11_NP | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-11_NP | LC_FRB_WS_L<br>AEMP_DRY_20<br>22-11_N | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-11_N |
|-----------------------------------|------------|-----------|-------------|------------------|--|--|--|---------------------------------------|--|
|                                   |            |           | Client samp | ling date / time | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                  | 30-Nov-2022<br>10:30                   |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2216696-001                          | CG2216696-002                          | CG2216696-003                          | CG2216696-004                         | CG2216696-005                          |
|                                   |            |           |             |                  | Result                                 | Result                                 | Result                                 | Result                                | Result                                 |
| Organic / Inorganic Carbon        |            |           |             |                  |  |  |  |                                       |  |
| carbon, total organic [TOC]       |            | E355-L    | 0.50        | mg/L             | <0.50                                  | <0.50                                  | 0.71                                   | <0.50                                 | <0.50                                  |
| Ion Balance                       |            |           |             |                  |  |  |  |                                       |  |
| anion sum                         |            | EC101     | 0.10        | meq/L            | <0.10                                  | <0.10                                  | 10.3                                   | 10.2                                  | 4.50                                   |
| cation sum                        |            | EC101     | 0.10        | meq/L            | <0.10                                  | <0.10                                  | 11.1                                   | 11.0                                  | 4.62                                   |
| ion balance (cations/anions)      |            | EC101     | 0.010       | %                | 100                                    | 100                                    | 108                                    | 108                                   | 103                                    |
| ion balance (APHA)                |            | EC101     | 0.01        | %                | <0.01                                  | <0.01                                  | 3.74                                   | 3.77                                  | 1.32                                   |
| Total Metals                      |            |           |             |                  |  |  |  |                                       |  |
| aluminum, total                   | 7429-90-5  | E420      | 0.0030      | mg/L             | <0.0030                                | <0.0030                                | 0.0037                                 | 0.0054                                | 0.0048                                 |
| antimony, total                   | 7440-36-0  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                               | <0.00010                               | <0.00010                              | <0.00010                               |
| arsenic, total                    | 7440-38-2  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                               | <0.00010                               | <0.00010                              | <0.00010                               |
| barium, total                     | 7440-39-3  | E420      | 0.00010     | mg/L             | <0.00010                               | 0.00090 RRV                            | 0.124                                  | 0.123                                 | 0.0607                                 |
| beryllium, total                  | 7440-41-7  | E420      | 0.020       | μg/L             | <0.020                                 | <0.020                                 | <0.020                                 | <0.020                                | <0.020                                 |
| bismuth, total                    | 7440-69-9  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                              | <0.000050                              | <0.000050                             | <0.000050                              |
| boron, total                      | 7440-42-8  | E420      | 0.010       | mg/L             | <0.010                                 | <0.010                                 | <0.010                                 | <0.010                                | 0.012                                  |
| cadmium, total                    | 7440-43-9  | E420      | 0.0050      | μg/L             | <0.0050                                | <0.0050                                | 0.0255                                 | 0.0200                                | <0.0050                                |
| calcium, total                    | 7440-70-2  | E420      | 0.050       | mg/L             | <0.050                                 | 0.106 RRV                              | 112                                    | 113                                   | 50.2                                   |
| chromium, total                   | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L             | <0.00010                               | <0.00010                               | 0.00016                                | 0.00014                               | 0.00014                                |
| cobalt, total                     | 7440-48-4  | E420      | 0.10        | μg/L             | <0.10                                  | <0.10                                  | <0.10                                  | <0.10                                 | <0.10                                  |
| copper, total                     | 7440-50-8  | E420      | 0.00050     | mg/L             | <0.00050                               | 0.00056 RRV                            | <0.00050                               | <0.00050                              | <0.00050                               |
| iron, total                       | 7439-89-6  | E420      | 0.010       | mg/L             | <0.010                                 | <0.010                                 | <0.010                                 | <0.010                                | 0.012                                  |
| lead, total                       | 7439-92-1  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                              | <0.000050                              | <0.000050                             | <0.000050                              |
| lithium, total                    | 7439-93-2  | E420      | 0.0010      | mg/L             | <0.0010                                | <0.0010                                | 0.0290                                 | 0.0289                                | 0.0064                                 |
| magnesium, total                  | 7439-95-4  | E420      | 0.0050      | mg/L             | <0.0050                                | 0.0067 RRV                             | 49.6                                   | 48.0                                  | 19.4                                   |
| manganese, total                  | 7439-96-5  | E420      | 0.00010     | mg/L             | <0.00010                               | 0.00015 RRV                            | 0.00151                                | 0.00164                               | 0.00185                                |
| mercury, total                    | 7439-97-6  | E508      | 0.0000050   | mg/L             | <0.0000050                             | <0.0000050                             | <0.000050                              | <0.0000050                            | <0.0000050                             |
| molybdenum, total                 | 7439-98-7  | E420      | 0.000050    | mg/L             | <0.000050                              | <0.000050                              | 0.000844                               | 0.000806                              | 0.00150                                |
| nickel, total                     | 7440-02-0  | E420      | 0.00050     | mg/L             | <0.00050                               | <0.00050                               | 0.00066                                | <0.00050                              | <0.00050                               |
| potassium, total                  | 7440-09-7  | E420      | 0.050       | mg/L             | <0.050                                 | <0.050                                 | 1.51                                   | 1.40                                  | 0.666                                  |
| selenium, total                   | 7782-49-2  | E420      | 0.050       | μg/L             | <0.050                                 | <0.050                                 | 55.8                                   | 55.8                                  | 2.54                                   |

Page : 5 of 10
Work Order : CG2216696
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ent sample ID    | LC_RD1_WS_L<br>AEMP_DRY_20<br>22-11 NP | LC_MT1_WS_L<br>AEMP_DRY_20<br>22-11 NP | LC_CC1_WS_L<br>AEMP_DRY_20<br>22-11 NP | LC_FRB_WS_L<br>AEMP_DRY_20<br>22-11 N | LC_GRCK_WS_<br>LAEMP_DRY_2<br>022-11 N |
|-----------------------------------|------------|-----------|-------------|------------------|--|--|--|---------------------------------------|--|
|                                   |            |           | Client samp | ling date / time | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                   | 30-Nov-2022<br>10:30                  | 30-Nov-2022<br>10:30                   |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2216696-001                          | CG2216696-002                          | CG2216696-003                          | CG2216696-004                         | CG2216696-005                          |
|                                   |            |           |             |                  | Result                                 | Result                                 | Result                                 | Result                                | Result                                 |
| Total Metals                      |            |           |             |                  |  |  |  |                                       |  |
| silicon, total                    | 7440-21-3  | E420      | 0.10        | mg/L             | <0.10                                  | 0.35 RRV                               | 2.62                                   | 2.67                                  | 2.96                                   |
| silver, total                     | 7440-22-4  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                              | <0.000010                              | <0.000010                             | <0.000010                              |
| sodium, total                     | 7440-23-5  | E420      | 0.050       | mg/L             | <0.050                                 | 0.511 RRV                              | 3.47                                   | 3.40                                  | 2.49                                   |
| strontium, total                  | 7440-24-6  | E420      | 0.00020     | mg/L             | <0.00020                               | 0.00062 RRV                            | 0.158                                  | 0.161                                 | 0.180                                  |
| sulfur, total                     | 7704-34-9  | E420      | 0.50        | mg/L             | <0.50                                  | <0.50                                  | 85.9                                   | 86.2                                  | 20.2                                   |
| thallium, total                   | 7440-28-0  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                              | <0.000010                              | <0.000010                             | <0.000010                              |
| tin, total                        | 7440-31-5  | E420      | 0.00010     | mg/L             | <0.00010                               | <0.00010                               | <0.00010                               | <0.00010                              | <0.00010                               |
| titanium, total                   | 7440-32-6  | E420      | 0.00030     | mg/L             | <0.00030                               | <0.00030                               | <0.00030                               | <0.00030                              | <0.00030                               |
| uranium, total                    | 7440-61-1  | E420      | 0.000010    | mg/L             | <0.000010                              | <0.000010                              | 0.00260                                | 0.00255                               | 0.00117                                |
| vanadium, total                   | 7440-62-2  | E420      | 0.00050     | mg/L             | <0.00050                               | <0.00050                               | <0.00050                               | <0.00050                              | <0.00050                               |
| zinc, total                       | 7440-66-6  | E420      | 0.0030      | mg/L             | <0.0030                                | <0.0030                                | <0.0030                                | <0.0030                               | <0.0030                                |
| Dissolved Metals                  |            |           |             |                  |  |  |  |                                       |  |
| aluminum, dissolved               | 7429-90-5  | E421      | 0.0010      | mg/L             |  | <0.0010                                | <0.0010                                | <0.0010                               | <0.0010                                |
| antimony, dissolved               | 7440-36-0  | E421      | 0.00010     | mg/L             |  | <0.00010                               | 0.00011                                | <0.00010                              | <0.00010                               |
| arsenic, dissolved                | 7440-38-2  | E421      | 0.00010     | mg/L             |  | <0.00010                               | <0.00010                               | <0.00010                              | <0.00010                               |
| barium, dissolved                 | 7440-39-3  | E421      | 0.00010     | mg/L             |  | 0.00038 RRV                            | 0.128                                  | 0.124                                 | 0.0596                                 |
| beryllium, dissolved              | 7440-41-7  | E421      | 0.020       | μg/L             |  | <0.020                                 | <0.020                                 | <0.020                                | <0.020                                 |
| bismuth, dissolved                | 7440-69-9  | E421      | 0.000050    | mg/L             |  | <0.000050                              | <0.000050                              | <0.000050                             | <0.000050                              |
| boron, dissolved                  | 7440-42-8  | E421      | 0.010       | mg/L             |  | <0.010                                 | <0.010                                 | <0.010                                | 0.012                                  |
| cadmium, dissolved                | 7440-43-9  | E421      | 0.0050      | μg/L             |  | <0.0050                                | 0.0291                                 | 0.0186                                | 0.0053                                 |
| calcium, dissolved                | 7440-70-2  | E421      | 0.050       | mg/L             | <0.050                                 | <0.050                                 | 131                                    | 127                                   | 55.6                                   |
| chromium, dissolved               | 7440-47-3  | E421.Cr-L | 0.00010     | mg/L             |  | <0.00010                               | 0.00017                                | 0.00017                               | 0.00017                                |
| cobalt, dissolved                 | 7440-48-4  | E421      | 0.10        | μg/L             |  | <0.10                                  | <0.10                                  | <0.10                                 | <0.10                                  |
| copper, dissolved                 | 7440-50-8  | E421      | 0.00020     | mg/L             |  | 0.00051 RRV                            | 0.00038                                | 0.00025                               | <0.00020                               |
| iron, dissolved                   | 7439-89-6  | E421      | 0.010       | mg/L             |  | <0.010                                 | <0.010                                 | <0.010                                | <0.010                                 |
| lead, dissolved                   | 7439-92-1  | E421      | 0.000050    | mg/L             |  | <0.000050                              | <0.000050                              | <0.000050                             | <0.000050                              |
| lithium, dissolved                | 7439-93-2  | E421      | 0.0010      | mg/L             |  | <0.0010                                | 0.0312                                 | 0.0307                                | 0.0061                                 |
| magnesium, dissolved              | 7439-95-4  | E421      | 0.0050      | mg/L             | <0.0050                                | 0.0079 RRV                             | 52.9                                   | 54.4                                  | 20.9                                   |
| manganese, dissolved              | 7439-96-5  | E421      | 0.00010     | mg/L             |  | 0.00015 RRV                            | 0.00127                                | 0.00129                               | 0.00056                                |
| 1 3,                              | 7 100 00-0 |           | 1           | J. –             |  |  | 1                                      | l                                     |  |

 Page
 :
 6 of 10

 Work Order
 :
 CG2216696

 Client
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 Teck Coal Li

Client : Teck Coal Limited
Project : LINE CREEK OPERATION



# Analytical Results

| Sub-Matrix: Water                     |            |        | Cli         | ent sample ID    | LC_RD1_WS_L             | LC_MT1_WS_L             | LC_CC1_WS_L             | LC_FRB_WS_L            | LC_GRCK_WS_             |
|---------------------------------------|------------|--------|-------------|------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|
| (Matrix: Water)                       |            |        |             |                  | AEMP_DRY_20<br>22-11 NP | AEMP_DRY_20<br>22-11 NP | AEMP_DRY_20<br>22-11 NP | AEMP_DRY_20<br>22-11 N | LAEMP_DRY_2<br>022-11 N |
|                                       |            |        |             |                  | 22-11_NF                | 22-11_NF                | 22-11_NP                | 22-11_14               | 022-11_N                |
|                                       |            |        | Client samp | ling date / time | 30-Nov-2022             | 30-Nov-2022             | 30-Nov-2022             | 30-Nov-2022            | 30-Nov-2022             |
|                                       |            |        |             |                  | 10:30                   | 10:30                   | 10:30                   | 10:30                  | 10:30                   |
| Analyte                               | CAS Number | Method | LOR         | Unit             | CG2216696-001           | CG2216696-002           | CG2216696-003           | CG2216696-004          | CG2216696-005           |
|                                       |            |        |             |                  | Result                  | Result                  | Result                  | Result                 | Result                  |
| Dissolved Metals                      |            |        |             |                  |                         |                         |                         |                        |                         |
| mercury, dissolved                    | 7439-97-6  | E509   | 0.0000050   | mg/L             |                         | <0.0000050              | <0.0000050              | <0.0000050             | <0.0000050              |
| molybdenum, dissolved                 | 7439-98-7  | E421   | 0.000050    | mg/L             |                         | <0.000050               | 0.000887                | 0.000890               | 0.00156                 |
| nickel, dissolved                     | 7440-02-0  | E421   | 0.00050     | mg/L             |                         | <0.00050                | <0.00050                | <0.00050               | <0.00050                |
| potassium, dissolved                  | 7440-09-7  | E421   | 0.050       | mg/L             | <0.050                  | <0.050                  | 1.45                    | 1.48                   | 0.616                   |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050       | μg/L             |                         | <0.050                  | 59.6                    | 60.9                   | 2.84                    |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050       | mg/L             |                         | <0.050                  | 2.40                    | 2.42                   | 2.63                    |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010    | mg/L             |                         | <0.000010               | <0.000010               | <0.000010              | <0.000010               |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050       | mg/L             | <0.050                  | 0.284 RRV               | 3.35                    | 3.52                   | 2.48                    |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020     | mg/L             |                         | <0.00020                | 0.172                   | 0.176                  | 0.193                   |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50        | mg/L             |                         | <0.50                   | 85.4                    | 87.4                   | 19.2                    |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010    | mg/L             |                         | <0.000010               | <0.000010               | <0.000010              | <0.000010               |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010     | mg/L             |                         | 0.00025 RRV             | <0.00010                | <0.00010               | <0.00010                |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030     | mg/L             |                         | <0.00030                | <0.00030                | <0.00030               | <0.00030                |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010    | mg/L             |                         | <0.000010               | 0.00256                 | 0.00256                | 0.00117                 |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050     | mg/L             |                         | <0.00050                | <0.00050                | <0.00050               | <0.00050                |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010      | mg/L             |                         | <0.0010                 | 0.0013                  | 0.0013                 | <0.0010                 |
| dissolved mercury filtration location |            | EP509  | -           | -                |                         | Field                   | Field                   | Field                  | Field                   |
| dissolved metals filtration location  |            | EP421  | -           | -                | Laboratory              | Field                   | Field                   | Field                  | Field                   |

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

Page : 7 of 10
Work Order : CG2216696
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water                   |            |            | CI          | ient sample ID   | LC_FRUS_WS_          | LC_DCEF_WS_          | <br> |   |
|-------------------------------------|------------|------------|-------------|------------------|----------------------|----------------------|------|---|
| (Matrix: Water)                     |            |            |             | •                | LAEMP_DRY_2          | LAEMP_DRY_2          |      |   |
|                                     |            |            |             |                  | 022-11_N             | 022-11_N             |      |   |
|                                     |            |            | Client same | ling date / time | 20 N 2022            | 00 N 0000            | <br> |   |
|                                     |            |            | Cherit Samp | iing date / time | 29-Nov-2022<br>10:30 | 29-Nov-2022<br>10:30 | <br> |   |
| Analyte                             | CAS Number | Method     | LOR         | Unit             | CG2216696-006        | CG2216696-007        | <br> |   |
|                                     |            |            |             |                  | Result               | Result               | <br> |   |
| Physical Tests                      |            |            |             |                  |                      |                      |      |   |
| acidity (as CaCO3)                  |            | E283       | 2.0         | mg/L             | <2.0                 | <2.0                 | <br> |   |
| alkalinity, bicarbonate (as CaCO3)  |            | E290       | 1.0         | mg/L             | 201                  | 147                  | <br> |   |
| alkalinity, bicarbonate (as HCO3)   | 71-52-3    | E290       | 1.0         | mg/L             | 245                  | 179                  | <br> |   |
| alkalinity, carbonate (as CaCO3)    |            | E290       | 1.0         | mg/L             | 16.6                 | 9.0                  | <br> |   |
| alkalinity, carbonate (as CO3)      | 3812-32-6  | E290       | 1.0         | mg/L             | 10.0                 | 5.4                  | <br> |   |
| alkalinity, hydroxide (as CaCO3)    |            | E290       | 1.0         | mg/L             | <1.0                 | <1.0                 | <br> |   |
| alkalinity, hydroxide (as OH)       | 14280-30-9 | E290       | 1.0         | mg/L             | <1.0                 | <1.0                 | <br> |   |
| alkalinity, total (as CaCO3)        |            | E290       | 1.0         | mg/L             | 218                  | 156                  | <br> |   |
| conductivity                        |            | E100       | 2.0         | μS/cm            | 792                  | 269                  | <br> |   |
| hardness (as CaCO3), dissolved      |            | EC100      | 0.50        | mg/L             | 485                  | 164                  | <br> |   |
| oxidation-reduction potential [ORP] |            | E125       | 0.10        | mV               | 413                  | 384                  | <br> |   |
| рН                                  |            | E108       | 0.10        | pH units         | 8.43                 | 8.39                 | <br> |   |
| solids, total dissolved [TDS]       |            | E162       | 10          | mg/L             | 576                  | 179                  | <br> |   |
| solids, total suspended [TSS]       |            | E160-L     | 1.0         | mg/L             | 1.1                  | <1.0                 | <br> |   |
| turbidity                           |            | E121       | 0.10        | NTU              | 0.24                 | 0.12                 | <br> |   |
| Anions and Nutrients                |            |            |             |                  |                      |                      |      |   |
| ammonia, total (as N)               | 7664-41-7  | E298       | 0.0050      | mg/L             | <0.0050              | <0.0050              | <br> |   |
| bromide                             | 24959-67-9 | E235.Br-L  | 0.050       | mg/L             | <0.050               | <0.050               | <br> |   |
| chloride                            | 16887-00-6 | E235.CI-L  | 0.10        | mg/L             | 4.15                 | 0.30                 | <br> |   |
| fluoride                            | 16984-48-8 | E235.F     | 0.020       | mg/L             | 0.162                | 0.110                | <br> |   |
| Kjeldahl nitrogen, total [TKN]      |            | E318       | 0.050       | mg/L             | 0.876 TKNI           | <0.500 DLM           | <br> |   |
| nitrate (as N)                      | 14797-55-8 | E235.NO3-L | 0.0050      | mg/L             | 11.8                 | 0.130                | <br> |   |
| nitrite (as N)                      | 14797-65-0 | E235.NO2-L | 0.0010      | mg/L             | 0.0025               | <0.0010              | <br> |   |
| phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U     | 0.0010      | mg/L             | <0.0010              | 0.0135               | <br> |   |
| phosphorus, total                   | 7723-14-0  | E372-U     | 0.0020      | mg/L             | <0.0020              | 0.0132 DLM           | <br> |   |
| sulfate (as SO4)                    | 14808-79-8 | E235.SO4   | 0.30        | mg/L             | 204                  | 6.93                 | <br> |   |
| Organic / Inorganic Carbon          |            |            |             |                  |                      |                      |      |   |
| carbon, dissolved organic [DOC]     |            | E358-L     | 0.50        | mg/L             | <0.50                | 0.77                 | <br> |   |
| carbon, total organic [TOC]         |            | E355-L     | 0.50        | mg/L             | <0.50                | 0.90                 | <br> |   |
| 1                                   | '          |            | 1           |                  |                      | '                    |      | ' |

Page : 8 of 10
Work Order : CG2216696
Client : Teck Coal Limited

Project : LINE CREEK OPERATION



| Sub-Matrix: Water (Matrix: Water) |            |           | Cli         | ent sample ID    | LC_FRUS_WS_<br>LAEMP_DRY_2 | LC_DCEF_WS_<br>LAEMP_DRY_2 | <br> |  |
|-----------------------------------|------------|-----------|-------------|------------------|----------------------------|----------------------------|------|--|
|                                   |            |           |             |                  | 022-11_N                   | 022-11_N                   |      |  |
|                                   |            |           | Client samp | ling date / time | 29-Nov-2022<br>10:30       | 29-Nov-2022<br>10:30       | <br> |  |
| Analyte                           | CAS Number | Method    | LOR         | Unit             | CG2216696-006              | CG2216696-007              | <br> |  |
|                                   |            |           |             |                  | Result                     | Result                     | <br> |  |
| Ion Balance                       |            |           |             |                  |                            |                            |      |  |
| anion sum                         |            | EC101     | 0.10        | meq/L            | 9.57                       | 3.28                       | <br> |  |
| cation sum                        |            | EC101     | 0.10        | meq/L            | 9.84                       | 3.41                       | <br> |  |
| ion balance (cations/anions)      |            | EC101     | 0.010       | %                | 103                        | 104                        | <br> |  |
| ion balance (APHA)                |            | EC101     | 0.01        | %                | 1.39                       | 1.94                       | <br> |  |
| Total Metals                      |            |           |             |                  |                            |                            |      |  |
| aluminum, total                   | 7429-90-5  | E420      | 0.0030      | mg/L             | 0.0060                     | 0.0035                     | <br> |  |
| antimony, total                   | 7440-36-0  | E420      | 0.00010     | mg/L             | <0.00010                   | 0.00015                    | <br> |  |
| arsenic, total                    | 7440-38-2  | E420      | 0.00010     | mg/L             | <0.00010                   | 0.00018                    | <br> |  |
| barium, total                     | 7440-39-3  | E420      | 0.00010     | mg/L             | 0.106                      | 0.249                      | <br> |  |
| beryllium, total                  | 7440-41-7  | E420      | 0.020       | μg/L             | <0.020                     | <0.020                     | <br> |  |
| bismuth, total                    | 7440-69-9  | E420      | 0.000050    | mg/L             | <0.000050                  | <0.000050                  | <br> |  |
| boron, total                      | 7440-42-8  | E420      | 0.010       | mg/L             | <0.010                     | 0.011                      | <br> |  |
| cadmium, total                    | 7440-43-9  | E420      | 0.0050      | μg/L             | 0.0238                     | 0.0347                     | <br> |  |
| calcium, total                    | 7440-70-2  | E420      | 0.050       | mg/L             | 102                        | 35.2                       | <br> |  |
| chromium, total                   | 7440-47-3  | E420.Cr-L | 0.00010     | mg/L             | 0.00013                    | 0.00013                    | <br> |  |
| cobalt, total                     | 7440-48-4  | E420      | 0.10        | μg/L             | <0.10                      | <0.10                      | <br> |  |
| copper, total                     | 7440-50-8  | E420      | 0.00050     | mg/L             | <0.00050                   | <0.00050                   | <br> |  |
| iron, total                       | 7439-89-6  | E420      | 0.010       | mg/L             | 0.013                      | <0.010                     | <br> |  |
| lead, total                       | 7439-92-1  | E420      | 0.000050    | mg/L             | <0.000050                  | <0.000050                  | <br> |  |
| lithium, total                    | 7439-93-2  | E420      | 0.0010      | mg/L             | 0.0252                     | 0.0189                     | <br> |  |
| magnesium, total                  | 7439-95-4  | E420      | 0.0050      | mg/L             | 43.5                       | 14.5                       | <br> |  |
| manganese, total                  | 7439-96-5  | E420      | 0.00010     | mg/L             | 0.00187                    | <0.00010                   | <br> |  |
| mercury, total                    | 7439-97-6  | E508      | 0.0000050   | mg/L             | <0.0000050                 | <0.0000050                 | <br> |  |
| molybdenum, total                 | 7439-98-7  | E420      | 0.000050    | mg/L             | 0.000788                   | 0.00114                    | <br> |  |
| nickel, total                     | 7440-02-0  | E420      | 0.00050     | mg/L             | <0.00050                   | <0.00050                   | <br> |  |
| potassium, total                  | 7440-09-7  | E420      | 0.050       | mg/L             | 1.19                       | 1.09                       | <br> |  |
| selenium, total                   | 7782-49-2  | E420      | 0.050       | μg/L             | 50.9                       | 1.51                       | <br> |  |
| silicon, total                    | 7440-21-3  | E420      | 0.10        | mg/L             | 2.71                       | 3.32                       | <br> |  |
| silver, total                     | 7440-22-4  | E420      | 0.000010    | mg/L             | <0.000010                  | <0.000010                  | <br> |  |

 Page
 :
 9 of 10

 Work Order
 :
 CG2216696

 Client
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Client : Teck Coal Limited
Project : LINE CREEK OPERATION

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| Sub-Matrix: Water     |            |           | Cl          | ient sample ID      | LC_FRUS_WS_          | LC_DCEF_WS_          |   | <br> |
|-----------------------|------------|-----------|-------------|---------------------|----------------------|----------------------|---|------|
| (Matrix: Water)       |            |           |             |                     | LAEMP_DRY_2          | LAEMP_DRY_2          |   |      |
| · · · · ·             |            |           |             |                     | 022-11_N             | 022-11_N             |   |      |
|                       |            |           | Client samn | ling date / time    | 29-Nov-2022          | 29-Nov-2022          |   | <br> |
|                       |            |           | Cherit samp | iiiig date / tiiiie | 29-NOV-2022<br>10:30 | 29-N6V-2022<br>10:30 |   | <br> |
| Analyte               | CAS Number | Method    | LOR         | Unit                | CG2216696-006        | CG2216696-007        |   | <br> |
| ,                     |            |           |             |                     | Result               | Result               |   | <br> |
| Total Metals          |            |           |             |                     |                      |                      |   |      |
| sodium, total         | 7440-23-5  | E420      | 0.050       | mg/L                | 3.07                 | 2.59                 |   | <br> |
| strontium, total      | 7440-24-6  | E420      | 0.00020     | mg/L                | 0.153                | 0.0506               |   | <br> |
| sulfur, total         | 7704-34-9  | E420      | 0.50        | mg/L                | 86.2                 | 3.63                 |   | <br> |
| thallium, total       | 7440-28-0  | E420      | 0.000010    | mg/L                | <0.000010            | <0.000010            |   | <br> |
| tin, total            | 7440-31-5  | E420      | 0.00010     | mg/L                | <0.00010             | <0.00010             |   | <br> |
| titanium, total       | 7440-32-6  | E420      | 0.00030     | mg/L                | <0.00030             | <0.00030             |   | <br> |
| uranium, total        | 7440-61-1  | E420      | 0.000010    | mg/L                | 0.00230              | 0.000424             |   | <br> |
| vanadium, total       | 7440-62-2  | E420      | 0.00050     | mg/L                | <0.00050             | 0.00054              |   | <br> |
| zinc, total           | 7440-66-6  | E420      | 0.0030      | mg/L                | <0.0030              | <0.0030              |   | <br> |
| Dissolved Metals      |            |           |             |                     |                      |                      |   |      |
| aluminum, dissolved   | 7429-90-5  | E421      | 0.0010      | mg/L                | <0.0010              | <0.0010              |   | <br> |
| antimony, dissolved   | 7440-36-0  | E421      | 0.00010     | mg/L                | <0.00010             | 0.00014              |   | <br> |
| arsenic, dissolved    | 7440-38-2  | E421      | 0.00010     | mg/L                | <0.00010             | 0.00018              |   | <br> |
| barium, dissolved     | 7440-39-3  | E421      | 0.00010     | mg/L                | 0.104                | 0.261                |   | <br> |
| beryllium, dissolved  | 7440-41-7  | E421      | 0.020       | μg/L                | <0.020               | <0.020               |   | <br> |
| bismuth, dissolved    | 7440-69-9  | E421      | 0.000050    | mg/L                | <0.000050            | <0.000050            |   | <br> |
| boron, dissolved      | 7440-42-8  | E421      | 0.010       | mg/L                | <0.010               | 0.010                |   | <br> |
| cadmium, dissolved    | 7440-43-9  | E421      | 0.0050      | μg/L                | 0.0196               | 0.0373               |   | <br> |
| calcium, dissolved    | 7440-70-2  | E421      | 0.050       | mg/L                | 117                  | 41.3                 |   | <br> |
| chromium, dissolved   | 7440-47-3  | E421.Cr-L | 0.00010     | mg/L                | 0.00016              | 0.00011              |   | <br> |
| cobalt, dissolved     | 7440-48-4  | E421      | 0.10        | μg/L                | <0.10                | <0.10                |   | <br> |
| copper, dissolved     | 7440-50-8  | E421      | 0.00020     | mg/L                | <0.00020             | <0.00020             |   | <br> |
| iron, dissolved       | 7439-89-6  | E421      | 0.010       | mg/L                | <0.010               | <0.010               |   | <br> |
| lead, dissolved       | 7439-92-1  | E421      | 0.000050    | mg/L                | <0.000050            | <0.000050            |   | <br> |
| lithium, dissolved    | 7439-93-2  | E421      | 0.0010      | mg/L                | 0.0280               | 0.0199               |   | <br> |
| magnesium, dissolved  | 7439-95-4  | E421      | 0.0050      | mg/L                | 46.8                 | 14.8                 |   | <br> |
| manganese, dissolved  | 7439-96-5  | E421      | 0.00010     | mg/L                | 0.00165              | <0.00010             |   | <br> |
| mercury, dissolved    | 7439-97-6  | E509      | 0.0000050   | mg/L                | <0.0000050           | <0.0000050           |   | <br> |
| molybdenum, dissolved | 7439-98-7  | E421      | 0.000050    | mg/L                | 0.000856             | 0.00125              |   | <br> |
| 1                     |            |           | 1           | '                   |                      | '                    | ' | 1    |

Page : 10 of 10 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



## Analytical Results

| Sub-Matrix: Water (Matrix: Water)     |            |        | Cl          | ient sample ID   | LC_FRUS_WS_<br>LAEMP_DRY_2 | LC_DCEF_WS_<br>LAEMP_DRY_2 | <br> |  |
|---------------------------------------|------------|--------|-------------|------------------|----------------------------|----------------------------|------|--|
| (Matrix: Water)                       |            |        |             |                  | 022-11_N                   | 022-11_N                   |      |  |
|                                       |            |        | Client samp | ling date / time | 29-Nov-2022<br>10:30       | 29-Nov-2022<br>10:30       | <br> |  |
| Analyte                               | CAS Number | Method | LOR         | Unit             | CG2216696-006              | CG2216696-007              | <br> |  |
|                                       |            |        |             |                  | Result                     | Result                     | <br> |  |
| Dissolved Metals                      |            |        |             |                  |                            |                            |      |  |
| nickel, dissolved                     | 7440-02-0  | E421   | 0.00050     | mg/L             | <0.00050                   | <0.00050                   | <br> |  |
| potassium, dissolved                  | 7440-09-7  | E421   | 0.050       | mg/L             | 1.19                       | 1.00                       | <br> |  |
| selenium, dissolved                   | 7782-49-2  | E421   | 0.050       | μg/L             | 52.0                       | 1.70                       | <br> |  |
| silicon, dissolved                    | 7440-21-3  | E421   | 0.050       | mg/L             | 2.35                       | 2.86                       | <br> |  |
| silver, dissolved                     | 7440-22-4  | E421   | 0.000010    | mg/L             | <0.000010                  | <0.000010                  | <br> |  |
| sodium, dissolved                     | 7440-23-5  | E421   | 0.050       | mg/L             | 2.84                       | 2.36                       | <br> |  |
| strontium, dissolved                  | 7440-24-6  | E421   | 0.00020     | mg/L             | 0.165                      | 0.0557                     | <br> |  |
| sulfur, dissolved                     | 7704-34-9  | E421   | 0.50        | mg/L             | 78.6                       | 2.65                       | <br> |  |
| thallium, dissolved                   | 7440-28-0  | E421   | 0.000010    | mg/L             | <0.000010                  | <0.000010                  | <br> |  |
| tin, dissolved                        | 7440-31-5  | E421   | 0.00010     | mg/L             | <0.00010                   | <0.00010                   | <br> |  |
| titanium, dissolved                   | 7440-32-6  | E421   | 0.00030     | mg/L             | <0.00030                   | <0.00030                   | <br> |  |
| uranium, dissolved                    | 7440-61-1  | E421   | 0.000010    | mg/L             | 0.00236                    | 0.000425                   | <br> |  |
| vanadium, dissolved                   | 7440-62-2  | E421   | 0.00050     | mg/L             | <0.00050                   | <0.00050                   | <br> |  |
| zinc, dissolved                       | 7440-66-6  | E421   | 0.0010      | mg/L             | <0.0010                    | <0.0010                    | <br> |  |
| dissolved mercury filtration location |            | EP509  | -           | -                | Field                      | Field                      | <br> |  |
| dissolved metals filtration location  |            | EP421  | -           | -                | Field                      | Field                      | <br> |  |

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



#### **QUALITY CONTROL INTERPRETIVE REPORT**

**Work Order** : **CG2216696** Page : 1 of 30

Client : Teck Coal Limited Laboratory : Calgary - Environmental
Contact : Nicole Zathev Account Manager : Lyudmyla Shyets

Contact : Nicole Zathey Account Manager : Lyudmyla Shvets
Address : 421 Pine Avenue Address : 2559 29th Street NE

Sparwood BC Canada V0B 2G1 Calgary, Alberta Canada T1Y 7B5

Telephone :--- Telephone :+1 403 407 1800

 Project
 : LINE CREEK OPERATION
 Date Samples Received
 : 01-Dec-2022 09:00

 PO
 : VPO00816101
 Issue Date
 : 07-Dec-2022 17:55

C-O-C number : LAEMP DRY 2022-11 ALS

Sampler :, Robin Valleau

Site : ----

Quote number : Teck Coal Master Quote

No. of samples received :7
No. of samples analysed :7

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

#### Key

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

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

**DQO: Data Quality Objective.** 

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

#### **Workorder Comments**

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

# **Summary of Outliers Outliers : Quality Control Samples**

#### • No Method Blank value outliers occur.

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

#### Outliers: Reference Material (RM) Samples

No Reference Material (RM) Sample outliers occur.

# Outliers: Analysis Holding Time Compliance (Breaches) ● Analysis Holding Time Outliers exist - please see following pages for full details.

## **Outliers : Frequency of Quality Control Samples**

• No Quality Control Sample Frequency Outliers occur.

Page : 3 of 30 Work Order : CG2216696

Matrix: Water

Analyte Group

Container / Client Sample ID(s)

Anions and Nutrients : Ammonia by Fluorescence

Anions and Nutrients: Ammonia by Fluorescence

LC DCEF WS LAEMP DRY 2022-11 N

LC FRUS WS LAEMP DRY 2022-11 N

Amber glass total (sulfuric acid)

Amber glass total (sulfuric acid)

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Eval

Evaluation: **x** = Holding time exceedance; ✓ = Within Holding Time

Analysis Date

01-Dec-2022

01-Dec-2022

28 days

28 days 2 days

2 days

Analysis

Rec

Holding Times

Actual

#### **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.

Sampling Date

Extraction / Preparation

Rec

Preparation

Date

01-Dec-2022

01-Dec-2022

**Holding Times** 

Actual

Eval

Method

E298

E298

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

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

| Anions and Nutrients : Ammonia by Fluorescence                    |      |             |             |      |             |         |        |   |
|---|------|-------------|-------------|------|-------------|---------|--------|---|
| Amber glass total (sulfuric acid)  LC_CC1_WS_LAEMP_DRY_2022-11_NP | E298 | 30-Nov-2022 | 01-Dec-2022 | <br> | 01-Dec-2022 | 28 days | 1 days | ✓ |
| Anions and Nutrients : Ammonia by Fluorescence                    |      |             |             |      |             |         |        |   |
| Amber glass total (sulfuric acid)  LC_FRB_WS_LAEMP_DRY_2022-11_N  | E298 | 30-Nov-2022 | 01-Dec-2022 | <br> | 01-Dec-2022 | 28 days | 1 days | ✓ |
| Anions and Nutrients : Ammonia by Fluorescence                    |      |             |             |      |             |         |        |   |
| Amber glass total (sulfuric acid)  LC_GRCK_WS_LAEMP_DRY_2022-11_N | E298 | 30-Nov-2022 | 01-Dec-2022 | <br> | 01-Dec-2022 | 28 days | 1 days | ✓ |
| Anions and Nutrients : Ammonia by Fluorescence                    |      |             |             |      |             |         |        |   |
| Amber glass total (sulfuric acid) LC_MT1_WS_LAEMP_DRY_2022-11_NP  | E298 | 30-Nov-2022 | 01-Dec-2022 | <br> | 01-Dec-2022 | 28 days | 1 days | ✓ |
| Anions and Nutrients : Ammonia by Fluorescence                    |      |             |             |      |             |         |        |   |
| Amber glass total (sulfuric acid) LC_RD1_WS_LAEMP_DRY_2022-11_NP  | E298 | 30-Nov-2022 | 01-Dec-2022 | <br> | 01-Dec-2022 | 28 days | 1 days | ✓ |

29-Nov-2022

29-Nov-2022

✓

Page : 4 of 30 Work Order : CG2216696

Client : Teck Coal Limited
Project : LINE CREEK OPERATION



| Matrix: Water  |           |               |                     |                | Εν              | /aluation: ≭ = | Holding time exce | edance ; 🔻     | = Within          | Holding Tim |
|--|-----------|---------------|---------------------|----------------|-----------------|----------------|-------------------|----------------|-------------------|-------------|
| Analyte Group  | Method    | Sampling Date | Ext                 | raction / Pr   | eparation       |                |                   | Analys         | sis               |             |
| Container / Client Sample ID(s)                            |           |               | Preparation<br>Date | Holding<br>Rec | Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | 7 Times<br>Actual | Eval        |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP                        | E235.Br-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N                         | E235.Br-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                | 1                 |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N                        | E235.Br-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | 4           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP                        | E235.Br-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP                        | E235.Br-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N                        | E235.Br-L | 29-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 2 days            | ✓           |
| Anions and Nutrients : Bromide in Water by IC (Low Level)  |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N                        | E235.Br-L | 29-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 2 days            | ✓           |
| Anions and Nutrients : Chloride in Water by IC (Low Level) |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP                        | E235.CI-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |
| Anions and Nutrients : Chloride in Water by IC (Low Level) |           |               |                     |                |                 |                |                   |                |                   |             |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N                         | E235.CI-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days            | ✓           |

Page : 5 of 30 Work Order : 5 of 30 CG2216696

Client : Teck Coal Limited



| Matrix: Water   |           |               |             |              | Ev        | ⁄aluation: <b>≭</b> = l | Holding time exce | edance ; 🔻 | = Within | Holding Time |
|---|-----------|---------------|-------------|--------------|-----------|-------------------------|-------------------|------------|----------|--------------|
| Analyte Group   | Method    | Sampling Date | Ext         | raction / Pr | eparation |                         |                   | Analys     | is       |              |
| Container / Client Sample ID(s)   |           |               | Preparation | Holding      | g Times   | Eval                    | Analysis Date     | Holding    | Times    | Eval         |
|   |           |               | Date        | Rec          | Actual    |                         |                   | Rec        | Actual   |              |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |              |           |                         |                   |            |          |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N   | E235.CI-L | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 28 days    | 1 days   | ✓            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |              |           |                         |                   |            |          |              |
| HDPE  |           |               |             |              |           |                         |                   |            |          |              |
| LC_MT1_WS_LAEMP_DRY_2022-11_NP  | E235.CI-L | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 28 days    | 1 days   | ✓            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |              |           |                         |                   |            |          |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP   | E235.CI-L | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 28 days    | 1 days   | <b>√</b>     |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |              |           |                         |                   |            |          |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N   | E235.CI-L | 29-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 28 days    | 2 days   | ✓            |
| Anions and Nutrients : Chloride in Water by IC (Low Level)                      |           |               |             |              |           |                         |                   |            |          |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N   | E235.CI-L | 29-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 28 days    | 2 days   | ✓            |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001 |               |             |              |           |                         |                   |            |          |              |
| HDPE  |           |               |             |              |           |                         |                   |            |          |              |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP  | E378-U    | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 3 days     | 1 days   | ✓            |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001 |               |             |              |           |                         |                   |            |          |              |
| HDPE  |           |               |             |              |           |                         |                   |            |          |              |
| LC_FRB_WS_LAEMP_DRY_2022-11_N   | E378-U    | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 3 days     | 1 days   | ✓            |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Le | vel 0.001 |               |             |              |           |                         |                   |            |          |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N   | E378-U    | 30-Nov-2022   | 01-Dec-2022 |              |           |                         | 01-Dec-2022       | 3 days     | 1 days   | 4            |

Page : 6 of 30 Work Order : CG2216696

Client : Teck Coal Limited



|   |            |               |                   | · · · · · · · · · · · · · · · · · · · |              |      | Holding time excee |                |              |      |
|---|------------|---------------|-------------------|---------------------------------------|--------------|------|--------------------|----------------|--------------|------|
| Analyte Group  Container / Client Sample ID(s)                                  | Method     | Sampling Date | Preparation  Date | Holding<br>Rec                        | Times Actual | Eval | Analysis Date      | Holding<br>Rec | Times Actual | Eval |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Lo | evel 0.001 |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP   | E378-U     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 3 days         | 1 days       | ✓    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Lo | evel 0.001 |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP   | E378-U     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 3 days         | 1 days       | ✓    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Lo | evel 0.001 |               |                   |                                       |              |      |                    |                |              |      |
| HDPE  LC_DCEF_WS_LAEMP_DRY_2022-11_N  | E378-U     | 29-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 3 days         | 2 days       | ✓    |
| Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Lo | evel 0.001 |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N   | E378-U     | 29-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 3 days         | 2 days       | ✓    |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP   | E235.F     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 28 days        | 1 days       | ✓    |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N  | E235.F     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 28 days        | 1 days       | ✓    |
| Anions and Nutrients : Fluoride in Water by IC                                  |            |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N   | E235.F     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 28 days        | 1 days       | ✓    |
| nions and Nutrients : Fluoride in Water by IC                                   |            |               |                   |                                       |              |      |                    |                |              |      |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP   | E235.F     | 30-Nov-2022   | 01-Dec-2022       |                                       |              |      | 01-Dec-2022        | 28 days        | 1 days       | ✓    |

Page : 7 of 30 Work Order : CG2216696





| Matrix: Water  |             |               |  |               | E         | valuation: × = | Holding time exce | edance ; • | ✓ = Within | Holding Tin |
|--|-------------|---------------|--|---------------|-----------|----------------|-------------------|------------|------------|-------------|
| Analyte Group  | Method      | Sampling Date | Ex   | traction / Pr | eparation |                |                   | Analys     | sis        |             |
| Container / Client Sample ID(s)                                |             |               | Preparation  | Holding       | g Times   | Eval           | Analysis Date     | Holding    | g Times    | Eval        |
|  |             |               | Date   | Rec           | Actual    |                |                   | Rec        | Actual     |             |
| Anions and Nutrients : Fluoride in Water by IC                 |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC_RD1_WS_LAEMP_DRY_2022-11_NP                                 | E235.F      | 30-Nov-2022   | 01-Dec-2022  |               |           |                | 01-Dec-2022       | 28 days    | 1 days     | ✓           |
|  |             |               |  |               |           |                |                   |            |            |             |
| Anions and Nutrients : Fluoride in Water by IC                 |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N                                 | E235.F      | 29-Nov-2022   | 01-Dec-2022  |               |           |                | 01-Dec-2022       | 28 days    | 2 days     | ✓           |
|  |             |               |  |               |           |                |                   |            |            |             |
| Anions and Nutrients : Fluoride in Water by IC                 |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC_FRUS_WS_LAEMP_DRY_2022-11_N                                 | E235.F      | 29-Nov-2022   | 01-Dec-2022  |               |           |                | 01-Dec-2022       | 28 days    | 2 days     | ✓           |
|  |             |               |  |               |           |                |                   |            |            |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)      |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC CC1 WS LAEMP DRY 2022-11 NP                                 | E235.NO3-L  | 30-Nov-2022   | 01-Dec-2022  | 3 days        | 1 days    | ✓              | 01-Dec-2022       | 3 days     | 0 days     | ✓           |
|  |             |               |  |               |           |                |                   |            | -          |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)      |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC_FRB_WS_LAEMP_DRY_2022-11_N                                  | E235.NO3-L  | 30-Nov-2022   | 01-Dec-2022  | 3 days        | 1 days    | <b>✓</b>       | 01-Dec-2022       | 3 days     | 0 days     | ✓           |
|  |             |               |  | ,             |           |                |                   |            | ,          |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level)      |             |               |  |               |           |                |                   |            |            |             |
| HDPE   |             |               |  |               |           |                |                   |            |            |             |
| LC_GRCK_WS_LAEMP_DRY_2022-11_N                                 | E235.NO3-L  | 30-Nov-2022   | 01-Dec-2022  | 3 days        | 1 days    | 1              | 01-Dec-2022       | 3 days     | 0 days     | ✓           |
| 20_01.01C_1/0_21.221(1_2022_11_1)                              |             |               | 0. 200 2022  | o dayo        | . aayo    |                | 0.2002022         | l c days   | o aayo     |             |
| Anione and Netwignts - Nitrate in Water by IC / and avail      |             |               |  |               |           |                |                   |            |            |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level) HDPE |             |               |  |               |           |                | 1                 |            |            |             |
| LC MT1 WS LAEMP DRY 2022-11 NP                                 | E235.NO3-L  | 30-Nov-2022   | 01-Dec-2022  | 3 days        | 1 days    | <b>√</b>       | 01-Dec-2022       | 3 days     | 0 days     | <b>√</b>    |
| EO_WITT_WO_EAEWII_BIXT_2022-TT_WI                              | L200.1400-L | 00-1404-2022  | 01-00-2022   | o days        | 1 days    | ,              | 01-000-2022       | o days     | o days     | ·           |
| Anima and Nickinstan Mikasa in Massa in 10 (1)                 |             |               | and the second s |               |           |                |                   |            |            |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level) HDPE |             |               |  |               |           |                | I                 |            |            |             |
| LC_RD1_WS_LAEMP_DRY_2022-11_NP                                 | E235.NO3-L  | 30-Nov-2022   | 01-Dec-2022  | 3 days        | 1 days    | <b>✓</b>       | 01-Dec-2022       | 3 days     | 0 days     | <b>√</b>    |
| LO_ND1_WO_LALIVIF_DIX1_Z0ZZ-11_NF                              | L200.1400-L | 50-1404-2022  | 01-060-2022  | Juays         | , days    | •              | 01-060-2022       | Juays      | Juays      | •           |
|  |             |               |  |               |           |                |                   |            |            |             |
| Anions and Nutrients : Nitrate in Water by IC (Low Level) HDPE |             |               |  |               |           |                |                   |            |            |             |
|  | E235.NO3-L  | 29-Nov-2022   | 01-Dec-2022  | 3 days        | 2 days    | <b>√</b>       | 01-Dec-2022       | 3 days     | 0 days     | <b>√</b>    |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N                                 | LZ33.NO3-L  | 23-1100-2022  | 01-DeC-2022  | o uays        | ∠ uays    | *              | 01-086-2022       | 3 days     | o days     | *           |
|  |             |               |  |               |           |                |                   |            |            |             |

Page : 8 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water   |            |               |                     |                | Εν                | /aluation: 🗴 = | Holding time exce | edance ; •     | ✓ = Within        | Holding Tin |
|---|------------|---------------|---------------------|----------------|-------------------|----------------|-------------------|----------------|-------------------|-------------|
| Analyte Group   | Method     | Sampling Date | Ex                  | traction / Pr  | eparation         |                |                   | Analys         | sis               |             |
| Container / Client Sample ID(s)                           |            |               | Preparation<br>Date | Holding<br>Rec | g Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | g Times<br>Actual | Eval        |
| Anions and Nutrients : Nitrate in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N                       | E235.NO3-L | 29-Nov-2022   | 01-Dec-2022         | 3 days         | 2 days            | ✓              | 01-Dec-2022       | 3 days         | 0 days            | 4           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP                       | E235.NO2-L | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 1 days            | ✓           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE  LC_FRB_WS_LAEMP_DRY_2022-11_N                       | E235.NO2-L | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 1 days            | ✓           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N                       | E235.NO2-L | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 1 days            | 4           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP                       | E235.NO2-L | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 1 days            | ✓           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE  LC_RD1_WS_LAEMP_DRY_2022-11_NP                      | E235.NO2-L | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 1 days            | <b>√</b>    |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N                       | E235.NO2-L | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 2 days            | ✓           |
| Anions and Nutrients : Nitrite in Water by IC (Low Level) |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N                       | E235.NO2-L | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 3 days         | 2 days            | ✓           |
| Anions and Nutrients : Sulfate in Water by IC             |            |               |                     |                |                   |                |                   |                |                   |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP                       | E235.SO4   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days            | 4           |

Page : 9 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water  |          |               |             |               | Εν        | /aluation: 🗴 = | Holding time exce | edance ; 🔻 | = Within | Holding Tin |
|--|----------|---------------|-------------|---------------|-----------|----------------|-------------------|------------|----------|-------------|
| Analyte Group  | Method   | Sampling Date | Ext         | traction / Pr | eparation |                |                   | Analys     | is       |             |
| Container / Client Sample ID(s)  |          |               | Preparation |               | g Times   | Eval           | Analysis Date     |            | Times    | Eval        |
|  |          |               | Date        | Rec           | Actual    |                |                   | Rec        | Actual   |             |
| Anions and Nutrients : Sulfate in Water by IC  HDPE                        |          |               |             |               |           |                |                   |            |          |             |
| LC_FRB_WS_LAEMP_DRY_2022-11_N  | E235.SO4 | 30-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
| Anions and Nutrients : Sulfate in Water by IC                              |          |               |             |               |           |                |                   |            |          |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N  | E235.SO4 | 30-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
| Anions and Nutrients : Sulfate in Water by IC                              |          |               |             |               |           |                |                   |            |          |             |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP  | E235.SO4 | 30-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
| Anions and Nutrients : Sulfate in Water by IC                              |          |               |             |               |           |                |                   |            |          |             |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP  | E235.SO4 | 30-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
| Anions and Nutrients : Sulfate in Water by IC                              |          |               |             |               |           |                |                   |            |          |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N  | E235.SO4 | 29-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 2 days   | ✓           |
| Anions and Nutrients : Sulfate in Water by IC                              |          |               |             |               |           |                |                   |            |          |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N  | E235.SO4 | 29-Nov-2022   | 01-Dec-2022 |               |           |                | 01-Dec-2022       | 28 days    | 2 days   | ✓           |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |          |               |             |               |           |                |                   |            |          |             |
| Amber glass total (sulfuric acid)  LC_CC1_WS_LAEMP_DRY_2022-11_NP          | E318     | 30-Nov-2022   | 03-Dec-2022 |               |           |                | 03-Dec-2022       | 28 days    | 3 days   | ✓           |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |          |               |             |               |           |                |                   |            |          |             |
| Amber glass total (sulfuric acid)  LC_FRB_WS_LAEMP_DRY_2022-11_N           | E318     | 30-Nov-2022   | 03-Dec-2022 |               |           |                | 03-Dec-2022       | 28 days    | 3 days   | ✓           |
| Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level) |          |               |             |               |           |                |                   |            |          |             |
| Amber glass total (sulfuric acid)  LC_GRCK_WS_LAEMP_DRY_2022-11_N          | E318     | 30-Nov-2022   | 03-Dec-2022 |               |           |                | 03-Dec-2022       | 28 days    | 3 days   | ✓           |

Page : 10 of 30 Work Order : CG2216696

Client : Teck Coal Limited



|          |               |  |  |  |  |   |  |  | Holding Ti   |
|----------|---------------|--|--|--|--|---|--|--|--|
| Method   | Sampling Date | Ext  | traction / Pr  | eparation  |  |   | Analys   | is   |  |
|          |               | Preparation  | Holding  | g Times  | Eval                                       | Analysis Date   | Holding  | Times  | Eval   |
|          |               | Date   | Rec  | Actual   |  |   | Rec  | Actual   |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  |   |  |  |  |
| E318     | 30-Nov-2022   | 03-Dec-2022  |  |  |  | 03-Dec-2022   | 28 days  | 3 days   | ✓  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  |   |  |  |  |
| E318     | 30-Nov-2022   | 03-Dec-2022  |  |  |  | 03-Dec-2022   | 28 days  | 3 days   | ✓  |
|          |               |  |  |  |  |   |  | 1  |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  | <u> </u>   |  | <u> </u>  | <u> </u>   |  |  |
| E318     | 29-Nov-2022   | 03-Dec-2022  |  |  |  | 03-Dec-2022   | 28 davs  | 4 davs   | ✓  |
|          |               |  |  |  |  |   |  | , ,  |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  |   |  |  |  |
| E318     | 29-Nov-2022   | 03-Dec-2022  |  |  |  | 03-Dec-2022   | 28 days  | 4 days   | ✓  |
|          |               | 00 200 2022  |  |  |  | 00 200 2022   | 20 44,0  | . aayo   |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  | <u> </u>  |  |  |  |
| E372-U   | 30-Nov-2022   | 02-Dec-2022  |  |  |  | 07-Dec-2022   | 28 davs  | 7 davs   | ✓  |
|          |               |  |  |  |  | ** = = = = = =  |  | , -  |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  | <u> </u>  |  |  |  |
| F372-U   | 30-Nov-2022   | 02-Dec-2022  |  |  |  | 07-Dec-2022   | 28 days  | 7 days   | 1  |
| 20.2 0   | 00 1101 2022  | 02 000 2022  |  |  |  | 0, 500 2022   | 20 dayo  | , dayo   |  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  | <u> </u>   |  |   | <u> </u>   |  |  |
| F372-II  | 30-Nov-2022   | 02-Dec-2022  |  |  |  | 07-Dec-2022   | 28 days  | 7 days   | 1  |
| 2072-0   | 00-1404-2022  | 02-000-2022  |  |  |  | 07-200-2022   | 20 days  | r days   | •  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  | <u> </u>  |  |  |  |
| E372 I I | 30 Nov 2022   | 02 Dec 2022  |  |  |  | 07 Dec 2022   | 28 days  | 7 days   | <b>✓</b>   |
| L372-0   | 30-1107-2022  | 02-060-2022  |  |  |  | 07-060-2022   | 20 days  | 7 days   | •  |
|          |               |  |  |  |  |   |  |  |  |
|          |               |  |  |  |  |   |  |  |  |
| E372-I I | 30-Nov-2022   | 02-Dec 2022  |  |  |  | 07-Dec 2022   | 28 days  | 7 days   | 1  |
| 2372-0   | 30-140V-2022  | 02-060-2022  |  |  |  | 01-060-2022   | 20 days  | r uays   | •  |
|          | E318          | E318 30-Nov-2022  E318 29-Nov-2022  E318 29-Nov-2022  E372-U 30-Nov-2022  E372-U 30-Nov-2022  E372-U 30-Nov-2022 | E318 30-Nov-2022 03-Dec-2022  E318 29-Nov-2022 03-Dec-2022  E318 29-Nov-2022 03-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022 | E318 30-Nov-2022 03-Dec-2022  E318 29-Nov-2022 03-Dec-2022  E318 29-Nov-2022 03-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022  E372-U 30-Nov-2022 02-Dec-2022 | Barrel   Preparation   Date   Rec   Actual | E318   30-Nov-2022   03-Dec-2022         E318   29-Nov-2022   03-Dec-2022         E318   29-Nov-2022   03-Dec-2022         E318   29-Nov-2022   03-Dec-2022         E372-U   30-Nov-2022   02-Dec-2022         E372-U   30-Nov-2022   02-Dec-2022         E372-U   30-Nov-2022   02-Dec-2022         E372-U   30-Nov-2022   02-Dec-2022 | Preparation Date   Holding Times   Eval   Analysis Date   Rec   Actual | E318   30-Nov-2022   03-Dec-2022       03-Dec-2022   28 days | Preparation Date   Holding Times   Rec   Actual   Analysis Date   Holding Times   Rec   Actual |

Page : 11 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| latrix: Water  |           |               |                |               | Ev         | /aluation: 🗴 = | Holding time exce | edance ; 🔻  | / = Within | Holding T |
|--|-----------|---------------|----------------|---------------|------------|----------------|-------------------|-------------|------------|-----------|
| Analyte Group  | Method    | Sampling Date | Ext            | traction / Pi | reparation |                |                   | Analys      | sis        |           |
| Container / Client Sample ID(s)  |           |               | Preparation    | Holdin        | g Times    | Eval           | Analysis Date     | Holding     | g Times    | Eval      |
|  |           |               | Date           | Rec           | Actual     |                |                   | Rec         | Actual     |           |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)                                     |           |               |                |               |            |                |                   |             |            |           |
| Amber glass total (sulfuric acid)  |           |               |                |               |            |                |                   |             |            |           |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N   | E372-U    | 29-Nov-2022   | 02-Dec-2022    |               |            |                | 07-Dec-2022       | 28 days     | 8 days     | ✓         |
|  |           |               |                |               |            |                |                   |             |            |           |
| Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)                                     |           |               |                |               |            |                |                   |             |            |           |
| Amber glass total (sulfuric acid)  LC_FRUS_WS_LAEMP_DRY_2022-11_N  | E372-U    | 29-Nov-2022   | 02-Dec-2022    |               |            |                | 07-Dec-2022       | 28 days     | 8 davs     | 1         |
| 20_1100_110_212  |           | 20 1101 2022  | 02 200 2022    |               |            |                | 0. 200 2022       | 20 44,0     | o dayo     |           |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                                  |           |               |                |               |            |                |                   |             |            |           |
| HDPE - dissolved (lab preserved)   |           |               |                |               |            |                |                   |             |            |           |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP   | E421.Cr-L | 30-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180         | 5 days     | ✓         |
|  |           |               |                |               |            |                |                   | days        |            |           |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                                  |           |               |                |               |            |                |                   |             |            |           |
| HDPE - dissolved (lab preserved)  LC FRB WS LAEMP DRY 2022-11 N  | E421.Cr-L | 30-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180         | 5 days     | 1         |
| LC_FRB_W3_LAEMIF_DR1_2022-11_N   | L421.01-L | 30-1107-2022  | 03-Dec-2022    |               |            |                | 03-Dec-2022       | days        | Juays      | •         |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                                  |           |               |                |               |            |                |                   | days        |            |           |
| HDPE - dissolved (lab preserved)   |           |               |                |               |            |                |                   |             |            |           |
| LC_GRCK_WS_LAEMP_DRY_2022-11_N   | E421.Cr-L | 30-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180         | 5 days     | ✓         |
|  |           |               |                |               |            |                |                   | days        |            |           |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                                  |           |               |                |               |            |                |                   |             |            |           |
| HDPE - dissolved (lab preserved)   |           |               |                |               |            |                |                   |             |            |           |
| LC_MT1_WS_LAEMP_DRY_2022-11_NP   | E421.Cr-L | 30-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180         | 5 days     | ✓         |
|  |           |               |                |               |            |                |                   | days        |            |           |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level)                                  |           |               |                |               |            |                |                   |             |            |           |
| HDPE - dissolved (lab preserved)   | E421.Cr-L | 29-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 400         | 6 days     | 1         |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N   | E421.CI-L | 29-INOV-2022  | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180<br>days | o days     | •         |
| Discalled Metals a Discalled Chromium in Weter by CDC (CDMC (1 and 1 and 1)                              |           |               | and the second |               |            |                |                   | uays        |            |           |
| Dissolved Metals : Dissolved Chromium in Water by CRC ICPMS (Low Level) HDPE - dissolved (lab preserved) |           |               |                |               |            |                |                   |             |            |           |
| LC_FRUS_WS_LAEMP_DRY_2022-11_N   | E421.Cr-L | 29-Nov-2022   | 05-Dec-2022    |               |            |                | 05-Dec-2022       | 180         | 6 days     | ✓         |
|  |           |               |                |               |            |                |                   | days        |            |           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS   |           |               |                |               |            |                |                   |             |            |           |
| Glass vial dissolved (hydrochloric acid)   |           |               |                |               |            |                |                   |             |            |           |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP   | E509      | 30-Nov-2022   | 01-Dec-2022    |               |            |                | 01-Dec-2022       | 28 days     | 1 days     | ✓         |
|  |           |               |                |               |            |                |                   |             |            |           |

Page : 12 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water   |        |               |                     |                | E                 | valuation: × = | Holding time exce | edance ; •     | = Within        | Holding Tim |
|---|--------|---------------|---------------------|----------------|-------------------|----------------|-------------------|----------------|-----------------|-------------|
| Analyte Group   | Method | Sampling Date | Ex                  | traction / Pr  | eparation         |                |                   | Analys         | is              |             |
| Container / Client Sample ID(s)   |        |               | Preparation<br>Date | Holding<br>Rec | g Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | Times<br>Actual | Eval        |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                  |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial dissolved (hydrochloric acid) LC_FRB_WS_LAEMP_DRY_2022-11_N  | E509   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                  |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial dissolved (hydrochloric acid) LC_GRCK_WS_LAEMP_DRY_2022-11_N | E509   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                  |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial dissolved (hydrochloric acid) LC_MT1_WS_LAEMP_DRY_2022-11_NP | E509   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                  |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial dissolved (hydrochloric acid) LC_DCEF_WS_LAEMP_DRY_2022-11_N | E509   | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 2 days          | 1           |
| Dissolved Metals : Dissolved Mercury in Water by CVAAS                  |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial dissolved (hydrochloric acid) LC_FRUS_WS_LAEMP_DRY_2022-11_N | E509   | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 2 days          | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS               |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_CC1_WS_LAEMP_DRY_2022-11_NP        | E421   | 30-Nov-2022   | 05-Dec-2022         |                |                   |                | 05-Dec-2022       | 180<br>days    | 5 days          | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS               |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_FRB_WS_LAEMP_DRY_2022-11_N         | E421   | 30-Nov-2022   | 05-Dec-2022         |                |                   |                | 05-Dec-2022       | 180<br>days    | 5 days          | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS               |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_GRCK_WS_LAEMP_DRY_2022-11_N        | E421   | 30-Nov-2022   | 05-Dec-2022         |                |                   |                | 05-Dec-2022       | 180<br>days    | 5 days          | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS               |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_MT1_WS_LAEMP_DRY_2022-11_NP        | E421   | 30-Nov-2022   | 05-Dec-2022         |                |                   |                | 05-Dec-2022       | 180<br>days    | 5 days          | ✓           |

Page : 13 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water  |        |               |                     |                | E۱              | /aluation: ≭ = | Holding time exce | edance ; 🔻     | = Within        | Holding Tim |
|--|--------|---------------|---------------------|----------------|-----------------|----------------|-------------------|----------------|-----------------|-------------|
| Analyte Group  | Method | Sampling Date | Ext                 | traction / Pr  | eparation       |                |                   | Analys         | is              |             |
| Container / Client Sample ID(s)  |        |               | Preparation<br>Date | Holding<br>Rec | Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | Times<br>Actual | Eval        |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |        |               |                     |                |                 |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_RD1_WS_LAEMP_DRY_2022-11_NP               | E421   | 30-Nov-2022   | 05-Dec-2022         |                |                 |                | 05-Dec-2022       | 180<br>days    | 5 days          | <b>√</b>    |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |        |               |                     |                |                 |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_DCEF_WS_LAEMP_DRY_2022-11_N               | E421   | 29-Nov-2022   | 05-Dec-2022         |                |                 |                | 05-Dec-2022       | 180<br>days    | 6 days          | ✓           |
| Dissolved Metals : Dissolved Metals in Water by CRC ICPMS                      |        |               |                     |                |                 |                |                   |                |                 |             |
| HDPE - dissolved (lab preserved)  LC_FRUS_WS_LAEMP_DRY_2022-11_N               | E421   | 29-Nov-2022   | 05-Dec-2022         |                |                 |                | 05-Dec-2022       | 180<br>days    | 6 days          | ✓           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level | )      |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid)  LC_CC1_WS_LAEMP_DRY_2022-11_NP          | E358-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days          | 4           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level | )      |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid)  LC_FRB_WS_LAEMP_DRY_2022-11_N           | E358-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level |        |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid)  LC_GRCK_WS_LAEMP_DRY_2022-11_N          | E358-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level |        |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid)  LC_MT1_WS_LAEMP_DRY_2022-11_NP          | E358-L | 30-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level |        |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid) LC_DCEF_WS_LAEMP_DRY_2022-11_N           | E358-L | 29-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 2 days          | ✓           |
| Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level | )      |               |                     |                |                 |                |                   |                |                 |             |
| Amber glass dissolved (sulfuric acid)  LC_FRUS_WS_LAEMP_DRY_2022-11_N          | E358-L | 29-Nov-2022   | 01-Dec-2022         |                |                 |                | 01-Dec-2022       | 28 days        | 2 days          | ✓           |

Page : 14 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| latrix: Water   |                |               |             |               | E          | valuation: 🗴 = | Holding time exce | edance ; 🔹 | = Within | Holding Tir |
|---|----------------|---------------|-------------|---------------|------------|----------------|-------------------|------------|----------|-------------|
| Analyte Group   | Method         | Sampling Date | Ext         | traction / Pi | reparation |                | Analysis          |            |          |             |
| Container / Client Sample ID(s)   |                |               | Preparation | Holdin        | g Times    | Eval           | Analysis Date     | Holding    | g Times  | Eval        |
|   |                |               | Date        | Rec           | Actual     |                |                   | Rec        | Actual   |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP  | E355-L         | 30-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_FRB_WS_LAEMP_DRY_2022-11_N   | E355-L         | 30-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_GRCK_WS_LAEMP_DRY_2022-11_N  | E355-L         | 30-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_MT1_WS_LAEMP_DRY_2022-11_NP  | E355-L         | 30-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_RD1_WS_LAEMP_DRY_2022-11_NP  | E355-L         | 30-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 1 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                |                   |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N  | E355-L         | 29-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 2 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Organic / Inorganic Carbon : Total Organic Carbon (Non-Purgeable) by Combusti | on (Low Level) |               |             |               |            |                | •                 |            |          |             |
| Amber glass total (sulfuric acid)   |                |               |             |               |            |                |                   |            |          |             |
| LC_FRUS_WS_LAEMP_DRY_2022-11_N  | E355-L         | 29-Nov-2022   | 01-Dec-2022 |               |            |                | 01-Dec-2022       | 28 days    | 2 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Physical Tests : Acidity by Titration   |                |               |             |               |            |                |                   |            |          |             |
| HDPE  |                |               |             |               |            |                |                   |            |          |             |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP  | E283           | 30-Nov-2022   | 02-Dec-2022 |               |            |                | 02-Dec-2022       | 14 days    | 2 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |
| Physical Tests : Acidity by Titration   |                |               |             |               |            |                |                   |            |          |             |
| HDPE  |                |               |             |               |            |                |                   |            |          |             |
| LC_FRB_WS_LAEMP_DRY_2022-11_N   | E283           | 30-Nov-2022   | 02-Dec-2022 |               |            |                | 02-Dec-2022       | 14 days    | 2 days   | ✓           |
|   |                |               |             |               |            |                |                   |            |          |             |

Page : 15 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                                    |        |               |             |              | Ev        | /aluation: 🗴 = | Holding time exce | edance ; 🔻 | / = Within | Holding Tin |
|--|--------|---------------|-------------|--------------|-----------|----------------|-------------------|------------|------------|-------------|
| Analyte Group                                    | Method | Sampling Date | Ext         | raction / Pr | eparation | Ana            |                   |            | sis        |             |
| Container / Client Sample ID(s)                  |        |               | Preparation |              | g Times   | Eval           | Analysis Date     |            | Times      | Eval        |
|  |        |               | Date        | Rec          | Actual    |                |                   | Rec        | Actual     |             |
| Physical Tests : Acidity by Titration            |        |               |             | I            |           |                |                   |            |            |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N              | E283   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Acidity by Titration            |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP              | E283   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Acidity by Titration            |        |               |             |              |           |                |                   |            | 1          |             |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP              | E283   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Acidity by Titration            |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N              | E283   | 29-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 3 days     | ✓           |
| Physical Tests : Acidity by Titration            |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N              | E283   | 29-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 3 days     | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP              | E290   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N               | E290   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N              | E290   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |            |             |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP              | E290   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days     | ✓           |

Page : 16 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                                    |        |               |             |              | E۱        | /aluation: 🗴 = | Holding time exce | edance ; 🔻 | = Within | Holding Tin |
|--|--------|---------------|-------------|--------------|-----------|----------------|-------------------|------------|----------|-------------|
| Analyte Group                                    | Method | Sampling Date | Ext         | raction / Pr | eparation |                |                   | Analys     | Analysis |             |
| Container / Client Sample ID(s)                  |        |               | Preparation |              | g Times   | Eval           | Analysis Date     | Holding    |          | Eval        |
|  |        |               | Date        | Rec          | Actual    |                |                   | Rec        | Actual   |             |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   | T          |          |             |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP              | E290   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 2 days   | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N              | E290   | 29-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 3 days   | ✓           |
| Physical Tests : Alkalinity Species by Titration |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N              | E290   | 29-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 14 days    | 3 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP              | E100   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 2 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N               | E100   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 2 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N              | E100   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 2 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE<br>LC_MT1_WS_LAEMP_DRY_2022-11_NP           | E100   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 2 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP              | E100   | 30-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 2 days   | ✓           |
| Physical Tests : Conductivity in Water           |        |               |             |              |           |                |                   |            |          |             |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N              | E100   | 29-Nov-2022   | 02-Dec-2022 |              |           |                | 02-Dec-2022       | 28 days    | 3 days   | ✓           |

Page : 17 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                          |        |               |             |              |        | /aluation: × = | Holding time exce |             |             | Holding Tim         |
|--|--------|---------------|-------------|--------------|--------|----------------|-------------------|-------------|-------------|---------------------|
| Analyte Group                          | Method | Sampling Date | Ext         | raction / Pr |        |                |                   | Analysis    |             |                     |
| Container / Client Sample ID(s)        |        |               | Preparation |              | Times  | Eval           | Analysis Date     |             | g Times     | Eval                |
|  |        |               | Date        | Rec          | Actual |                |                   | Rec         | Actual      |                     |
| Physical Tests : Conductivity in Water |        |               |             | ı            |        |                |                   |             |             |                     |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N    | E100   | 29-Nov-2022   | 02-Dec-2022 |              |        |                | 02-Dec-2022       | 28 days     | 3 days      | ✓                   |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N    | E125   | 29-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 100 hrs     | *<br>EHTR-FM        |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N    | E125   | 29-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 100 hrs     | <b>*</b><br>EHTR-FM |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP    | E125   | 30-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 76 hrs      | #<br>EHTR-FM        |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N     | E125   | 30-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 76 hrs      | *<br>EHTR-FM        |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N    | E125   | 30-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 76 hrs      | *<br>EHTR-FM        |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP    | E125   | 30-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 76 hrs      | #<br>EHTR-FM        |
| Physical Tests : ORP by Electrode      |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP    | E125   | 30-Nov-2022   |             |              |        |                | 03-Dec-2022       | 0.25<br>hrs | 76 hrs      | #<br>EHTR-FM        |
| Physical Tests : pH by Meter           |        |               |             |              |        |                |                   |             |             |                     |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP    | E108   | 30-Nov-2022   | 02-Dec-2022 |              |        |                | 02-Dec-2022       | 0.25<br>hrs | 0.26<br>hrs | *<br>EHTR-FM        |

Page : 18 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                      |        |               |             |              | Ev        | /aluation: <b>×</b> = | Holding time excee | edance ; •  | = Within    | Holding Time |
|------------------------------------|--------|---------------|-------------|--------------|-----------|-----------------------|--------------------|-------------|-------------|--------------|
| Analyte Group                      | Method | Sampling Date | Ext         | raction / Pr | eparation |                       |                    | Analysis    |             |              |
| Container / Client Sample ID(s)    |        |               | Preparation | Holding      | g Times   | Eval                  | Analysis Date      | Holding     | g Times     | Eval         |
|                                    |        |               | Date        | Rec          | Actual    |                       |                    | Rec         | Actual      |              |
| Physical Tests : pH by Meter       |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               |        |               |             |              |           |                       |                    |             |             |              |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N     | E108   | 29-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25        | 0.26        | <b>x</b>     |
|                                    |        |               |             |              |           |                       |                    | hrs         | hrs         | EHTR-FM      |
| Physical Tests : pH by Meter       |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               |        |               |             |              |           |                       |                    |             |             |              |
| LC_FRB_WS_LAEMP_DRY_2022-11_N      | E108   | 30-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25        | 0.26        | #            |
|                                    |        |               |             |              |           |                       |                    | hrs         | hrs         | EHTR-FM      |
| Physical Tests : pH by Meter       |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               | E108   | 29-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.05        | 0.00        | *            |
| LC_FRUS_WS_LAEMP_DRY_2022-11_N     | L100   | 29-1100-2022  | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25<br>hrs | 0.26<br>hrs | EHTR-FM      |
|                                    |        |               |             |              |           |                       |                    | 1115        | 1115        | LITTIX-I IVI |
| Physical Tests : pH by Meter HDPE  |        |               |             |              |           |                       |                    | 1           |             |              |
| LC GRCK WS LAEMP DRY 2022-11 N     | E108   | 30-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25        | 0.26        | ×            |
|                                    |        |               | 02 200 2022 |              |           |                       | 02 200 2022        | hrs         | hrs         | EHTR-FM      |
| Physical Tests : pH by Meter       |        |               |             |              |           |                       |                    | 10          |             |              |
| HDPE                               |        |               |             |              | <u> </u>  |                       |                    |             |             |              |
| LC_MT1_WS_LAEMP_DRY_2022-11_NP     | E108   | 30-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25        | 0.26        | 3c           |
|                                    |        |               |             |              |           |                       |                    | hrs         | hrs         | EHTR-FM      |
| Physical Tests : pH by Meter       |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               |        |               |             |              |           |                       |                    |             |             |              |
| LC_RD1_WS_LAEMP_DRY_2022-11_NP     | E108   | 30-Nov-2022   | 02-Dec-2022 |              |           |                       | 02-Dec-2022        | 0.25        | 0.26        | st.          |
|                                    |        |               |             |              |           |                       |                    | hrs         | hrs         | EHTR-FM      |
| Physical Tests : TDS by Gravimetry |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               |        |               |             |              |           |                       |                    |             |             |              |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP     | E162   | 30-Nov-2022   |             |              |           |                       | 03-Dec-2022        | 7 days      | 3 days      | ✓            |
|                                    |        |               |             |              |           |                       |                    |             |             |              |
| Physical Tests : TDS by Gravimetry |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               |        |               |             |              |           |                       |                    |             |             |              |
| LC_FRB_WS_LAEMP_DRY_2022-11_N      | E162   | 30-Nov-2022   |             |              |           |                       | 03-Dec-2022        | 7 days      | 3 days      | ✓            |
|                                    |        |               |             |              |           |                       |                    |             |             |              |
| Physical Tests : TDS by Gravimetry |        |               |             |              |           |                       |                    |             |             |              |
| HDPE                               | E400   | 00 N 0000     |             |              |           |                       | 00 0 0000          |             |             |              |
| LC_GRCK_WS_LAEMP_DRY_2022-11_N     | E162   | 30-Nov-2022   |             |              |           |                       | 03-Dec-2022        | 7 days      | 3 days      | ✓            |
|                                    |        |               |             |              |           |                       |                    |             |             |              |

Page : 19 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                                       |        |               |             |               | E          | /aluation: × = | Holding time exce | edance ; | ✓ = Within | Holding Ti |
|---|--------|---------------|-------------|---------------|------------|----------------|-------------------|----------|------------|------------|
| Analyte Group                                       | Method | Sampling Date | Ex          | traction / Pi | reparation | Analysis       |                   | sis      |            |            |
| Container / Client Sample ID(s)                     |        |               | Preparation | Holdin        | g Times    | Eval           | Analysis Date     | Holding  | g Times    | Eval       |
|   |        |               | Date        | Rec           | Actual     |                |                   | Rec      | Actual     |            |
| Physical Tests : TDS by Gravimetry                  |        |               |             |               |            |                |                   |          |            |            |
| HDPE  |        |               |             |               |            |                |                   |          |            |            |
| LC_MT1_WS_LAEMP_DRY_2022-11_NP                      | E162   | 30-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 3 days     | ✓          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TDS by Gravimetry                  |        |               |             |               |            |                |                   |          |            |            |
| HDPE  |        |               |             |               |            |                |                   |          |            |            |
| LC_RD1_WS_LAEMP_DRY_2022-11_NP                      | E162   | 30-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 3 days     | ✓          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TDS by Gravimetry                  |        |               |             |               |            |                |                   | 1        |            |            |
| HDPE  |        |               |             |               |            |                |                   |          |            |            |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N                      | E162   | 29-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 4 days     | ✓          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TDS by Gravimetry                  |        |               |             |               |            |                |                   |          |            |            |
| HDPE  |        |               |             |               |            |                |                   |          |            |            |
| LC_FRUS_WS_LAEMP_DRY_2022-11_N                      | E162   | 29-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 4 days     | ✓          |
|   |        |               |             |               |            |                |                   |          | ,          |            |
| Physical Tests : TSS by Gravimetry (Low Level)      |        |               |             |               |            |                |                   |          |            |            |
| HDPE  |        |               |             |               |            |                | <u> </u>          |          |            |            |
| LC_DCEF_WS_LAEMP_DRY_2022-11_N                      | E160-L | 29-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 4 days     | 1          |
| 20_5021 _W0_5/LIW _5/W_2022 W_W                     | 2.002  | 20 1101 2022  |             |               |            |                | 00 200 2022       | ,        | · aayo     |            |
| Plactic IT of a TOO by One to do do a locally       |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TSS by Gravimetry (Low Level) HDPE |        |               |             |               |            |                |                   |          |            |            |
| LC FRUS WS LAEMP DRY 2022-11 N                      | E160-L | 29-Nov-2022   |             |               |            |                | 03-Dec-2022       | 7 days   | 4 days     | 1          |
| LC_TNOS_WS_LALIWIF_DIXT_2022-TT_IX                  | E100-E | 20-1101-2022  |             |               |            |                | 03-Dec-2022       | 1 days   | 4 days     | Ť          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TSS by Gravimetry (Low Level)      |        |               |             |               |            |                |                   | 1        |            |            |
| HDPE  | E160-L | 30-Nov-2022   |             |               |            |                | 06-Dec-2022       | 7 days   | 6 days     | <b>√</b>   |
| LC_CC1_WS_LAEMP_DRY_2022-11_NP                      | E100-L | 30-INOV-2022  |             |               |            |                | 06-Dec-2022       | 7 days   | 6 days     | •          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TSS by Gravimetry (Low Level)      |        | 1             |             |               |            |                |                   |          |            |            |
| HDPE  | E400 ! | 20 Nov. 2022  |             |               |            |                | 00 D 0000         | 7 -1-10  | 0 4-11     |            |
| LC_FRB_WS_LAEMP_DRY_2022-11_N                       | E160-L | 30-Nov-2022   |             |               |            |                | 06-Dec-2022       | 7 days   | 6 days     | ✓          |
|   |        |               |             |               |            |                |                   |          |            |            |
| Physical Tests : TSS by Gravimetry (Low Level)      |        |               |             |               |            |                |                   |          |            |            |
| HDPE  |        |               |             |               |            |                |                   |          |            |            |
| LC_GRCK_WS_LAEMP_DRY_2022-11_N                      | E160-L | 30-Nov-2022   |             |               |            |                | 06-Dec-2022       | 7 days   | 6 days     | ✓          |
|   |        |               |             |               |            |                |                   |          |            |            |

Page : 20 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water                                  |        |               |             |              | Ev        | valuation: × = | Holding time excee | edance ; 🛚 | / = Within | Holding Time |
|--|--------|---------------|-------------|--------------|-----------|----------------|--------------------|------------|------------|--------------|
| Analyte Group                                  | Method | Sampling Date | Ext         | raction / Pr | eparation |                | Analysis           |            |            |              |
| Container / Client Sample ID(s)                |        |               | Preparation |              | Times     | Eval           | Analysis Date      |            | Times      | Eval         |
|  |        |               | Date        | Rec          | Actual    |                |                    | Rec        | Actual     |              |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |              |           | ı              |                    |            |            |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP            | E160-L | 30-Nov-2022   |             |              |           |                | 06-Dec-2022        | 7 days     | 6 days     | ✓            |
| Physical Tests : TSS by Gravimetry (Low Level) |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP            | E160-L | 30-Nov-2022   |             |              |           |                | 06-Dec-2022        | 7 days     | 6 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_CC1_WS_LAEMP_DRY_2022-11_NP            | E121   | 30-Nov-2022   |             |              |           |                | 02-Dec-2022        | 3 days     | 2 days     | 4            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_DCEF_WS_LAEMP_DRY_2022-11_N            | E121   | 29-Nov-2022   |             |              |           |                | 01-Dec-2022        | 3 days     | 2 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_FRB_WS_LAEMP_DRY_2022-11_N             | E121   | 30-Nov-2022   |             |              |           |                | 02-Dec-2022        | 3 days     | 2 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_FRUS_WS_LAEMP_DRY_2022-11_N            | E121   | 29-Nov-2022   |             |              |           |                | 01-Dec-2022        | 3 days     | 2 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_GRCK_WS_LAEMP_DRY_2022-11_N            | E121   | 30-Nov-2022   |             |              |           |                | 02-Dec-2022        | 3 days     | 2 days     | ✓            |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_MT1_WS_LAEMP_DRY_2022-11_NP            | E121   | 30-Nov-2022   |             |              |           |                | 02-Dec-2022        | 3 days     | 2 days     | <b>√</b>     |
| Physical Tests : Turbidity by Nephelometry     |        |               |             |              |           |                |                    |            |            |              |
| HDPE LC_RD1_WS_LAEMP_DRY_2022-11_NP            | E121   | 30-Nov-2022   |             |              |           |                | 02-Dec-2022        | 3 days     | 2 days     | ✓            |

Page : 21 of 30 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



Matrix: Water Evaluation: x = Holding time exceedance; ✓ = Within Holding Time Extraction / Preparation Analyte Group Method Sampling Date Analysis Container / Client Sample ID(s) **Holding Times** Eval Analysis Date Holding Times Eval Preparation Rec Actual Rec Actual Date Total Metals: Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) E420.Cr-L 30-Nov-2022 ✓ LC CC1 WS LAEMP DRY 2022-11 NP 04-Dec-2022 04-Dec-2022 180 4 days days Total Metals: Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) LC\_FRB\_WS\_LAEMP\_DRY\_2022-11\_N E420.Cr-L 30-Nov-2022 04-Dec-2022 04-Dec-2022 4 days ✓ 180 days Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) E420.Cr-L 30-Nov-2022 04-Dec-2022 04-Dec-2022 ✓ LC GRCK WS LAEMP DRY 2022-11 N 4 days 180 days Total Metals: Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) LC\_MT1\_WS\_LAEMP\_DRY\_2022-11\_NP E420.Cr-L 30-Nov-2022 04-Dec-2022 04-Dec-2022 4 days 180 days Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) HDPE total (nitric acid) E420.Cr-L 30-Nov-2022 04-Dec-2022 04-Dec-2022 ✓ LC RD1 WS LAEMP DRY 2022-11 NP 180 4 days days Total Metals: Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) E420.Cr-L 29-Nov-2022 ✓ LC DCEF WS LAEMP DRY 2022-11 N 04-Dec-2022 04-Dec-2022 180 5 days ---days Total Metals : Total Chromium in Water by CRC ICPMS (Low Level) HDPE - total (lab preserved) LC FRUS WS LAEMP DRY 2022-11 N E420.Cr-L 04-Dec-2022 04-Dec-2022 ✓ 29-Nov-2022 5 days 180 days **Total Metals: Total Mercury in Water by CVAAS** Glass vial total (hydrochloric acid) LC\_CC1\_WS\_LAEMP\_DRY\_2022-11\_NP E508 30-Nov-2022 01-Dec-2022 01-Dec-2022 28 days 1 days ✓ **Total Metals: Total Mercury in Water by CVAAS** Glass vial total (hydrochloric acid) 01-Dec-2022 E508 30-Nov-2022 28 days | 1 days ✓ LC\_FRB\_WS\_LAEMP\_DRY\_2022-11\_N 01-Dec-2022

Page : 22 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water  |        |               |                     |                | Ev                | /aluation: 🗴 = | Holding time exce | edance ; 🔻     | = Within        | Holding Tin |
|--|--------|---------------|---------------------|----------------|-------------------|----------------|-------------------|----------------|-----------------|-------------|
| Analyte Group  | Method | Sampling Date | Ext                 | traction / Pr  | eparation         |                | Analysis          |                |                 |             |
| Container / Client Sample ID(s)                                      |        |               | Preparation<br>Date | Holding<br>Rec | 7 Times<br>Actual | Eval           | Analysis Date     | Holding<br>Rec | Times<br>Actual | Eval        |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial total (hydrochloric acid) LC_GRCK_WS_LAEMP_DRY_2022-11_N  | E508   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial total (hydrochloric acid) LC_MT1_WS_LAEMP_DRY_2022-11_NP  | E508   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial total (hydrochloric acid) LC_RD1_WS_LAEMP_DRY_2022-11_NP  | E508   | 30-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 1 days          | ✓           |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial total (hydrochloric acid)  LC_DCEF_WS_LAEMP_DRY_2022-11_N | E508   | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 2 days          | ✓           |
| Total Metals : Total Mercury in Water by CVAAS                       |        |               |                     |                |                   |                |                   |                |                 |             |
| Glass vial total (hydrochloric acid) LC_FRUS_WS_LAEMP_DRY_2022-11_N  | E508   | 29-Nov-2022   | 01-Dec-2022         |                |                   |                | 01-Dec-2022       | 28 days        | 2 days          | ✓           |
| Total Metals : Total metals in Water by CRC ICPMS                    |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - total (lab preserved) LC_CC1_WS_LAEMP_DRY_2022-11_NP          | E420   | 30-Nov-2022   | 04-Dec-2022         |                |                   |                | 04-Dec-2022       | 180<br>days    | 4 days          | ✓           |
| Total Metals : Total metals in Water by CRC ICPMS                    |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - total (lab preserved)  LC_FRB_WS_LAEMP_DRY_2022-11_N          | E420   | 30-Nov-2022   | 04-Dec-2022         |                |                   |                | 04-Dec-2022       | 180<br>days    | 4 days          | ✓           |
| Total Metals : Total metals in Water by CRC ICPMS                    |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - total (lab preserved)  LC_GRCK_WS_LAEMP_DRY_2022-11_N         | E420   | 30-Nov-2022   | 04-Dec-2022         |                |                   |                | 04-Dec-2022       | 180<br>days    | 4 days          | ✓           |
| Total Metals : Total metals in Water by CRC ICPMS                    |        |               |                     |                |                   |                |                   |                |                 |             |
| HDPE - total (lab preserved)  LC_MT1_WS_LAEMP_DRY_2022-11_NP         | E420   | 30-Nov-2022   | 04-Dec-2022         |                |                   |                | 04-Dec-2022       | 180<br>days    | 4 days          | ✓           |

Page : 23 of 30 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



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

|   |        |               |             |              |           | raidatioiii | Troising time onco | , ,         | ********** | rieiunig iiii |
|---|--------|---------------|-------------|--------------|-----------|-------------|--------------------|-------------|------------|---------------|
| Analyte Group   | Method | Sampling Date | Ext         | raction / Pr | eparation |             | Analysis           |             |            |               |
| Container / Client Sample ID(s)                             |        |               | Preparation | Holding      | g Times   | Eval        | Analysis Date      | Holding     | g Times    | Eval          |
|   |        |               | Date        | Rec          | Actual    |             |                    | Rec         | Actual     |               |
| Total Metals : Total metals in Water by CRC ICPMS           |        |               |             |              |           |             |                    |             |            |               |
| HDPE total (nitric acid) LC_RD1_WS_LAEMP_DRY_2022-11_NP     | E420   | 30-Nov-2022   | 04-Dec-2022 |              |           |             | 04-Dec-2022        | 180<br>days | 4 days     | ✓             |
| Total Metals : Total metals in Water by CRC ICPMS           |        |               |             |              |           |             |                    |             |            |               |
| HDPE - total (lab preserved) LC_DCEF_WS_LAEMP_DRY_2022-11_N | E420   | 29-Nov-2022   | 04-Dec-2022 |              |           |             | 04-Dec-2022        | 180<br>days | 5 days     | <b>√</b>      |
| Total Metals : Total metals in Water by CRC ICPMS           |        |               |             |              |           |             |                    |             |            |               |
| HDPE - total (lab preserved) LC_FRUS_WS_LAEMP_DRY_2022-11_N | E420   | 29-Nov-2022   | 04-Dec-2022 |              |           |             | 04-Dec-2022        | 180<br>days | 5 days     | ✓             |

#### Legend & Qualifier Definitions

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

Page : 24 of 30 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



## **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.

| Quality Control Sample Type   |            |          | Co | ount    |        | )        |            |
|---|------------|----------|----|---------|--------|----------|------------|
| Analytical Methods  | Method     | QC Lot # | QC | Regular | Actual | Expected | Evaluation |
| aboratory Duplicates (DUP)  |            |          |    |         |        |          |            |
| Acidity by Titration  | E283       | 765406   | 2  | 37      | 5.4    | 5.0      | 1          |
| Alkalinity Species by Titration   | E290       | 765590   | 1  | 20      | 5.0    | 5.0      | 1          |
| Ammonia by Fluorescence   | E298       | 764773   | 1  | 20      | 5.0    | 5.0      | 1          |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 764810   | 1  | 9       | 11.1   | 5.0      | 1          |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 764811   | 1  | 9       | 11.1   | 5.0      | <b>√</b>   |
| Conductivity in Water   | E100       | 765588   | 1  | 20      | 5.0    | 5.0      | 1          |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 767115   | 1  | 19      | 5.2    | 5.0      | <b>√</b>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 764834   | 1  | 6       | 16.6   | 5.0      | <b>√</b>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 767114   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 764778   | 1  | 19      | 5.2    | 5.0      | <b>√</b>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 764740   | 1  | 18      | 5.5    | 5.0      | <b>√</b>   |
| Fluoride in Water by IC   | E235.F     | 764809   | 1  | 9       | 11.1   | 5.0      | 1          |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 764812   | 1  | 9       | 11.1   | 5.0      | <u>√</u>   |
| litrite in Water by IC (Low Level)                                      | E235.NO2-L | 764813   | 1  | 9       | 11.1   | 5.0      | 1          |
| DRP by Electrode  | E125       | 764762   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| H by Meter  | E108       | 765589   | 1  | 20      | 5.0    | 5.0      | 1          |
| Sulfate in Water by IC  | E235.SO4   | 764814   | 1  | 9       | 11.1   | 5.0      | 1          |
| TDS by Gravimetry   | E162       | 765146   | 2  | 39      | 5.1    | 5.0      | <u>√</u>   |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 766892   | 1  | 17      | 5.8    | 5.0      | 1          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 765499   | 1  | 16      | 6.2    | 5.0      | ✓          |
| Total Mercury in Water by CVAAS   | E508       | 764833   | 1  | 7       | 14.2   | 5.0      | 1          |
| otal metals in Water by CRC ICPMS                                       | E420       | 766893   | 1  | 20      | 5.0    | 5.0      | 1          |
| otal Organic Carbon (Non-Purgeable) by Combustion (Low Level)           | E355-L     | 764779   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 765467   | 2  | 40      | 5.0    | 5.0      | 1          |
| Turbidity by Nephelometry   | E121       | 764765   | 3  | 41      | 7.3    | 5.0      | 1          |
| aboratory Control Samples (LCS)   |            |          |    |         |        |          |            |
| Acidity by Titration  | E283       | 765406   | 2  | 37      | 5.4    | 5.0      | 1          |
| Alkalinity Species by Titration   | E290       | 765590   | 1  | 20      | 5.0    | 5.0      | ✓          |
| Ammonia by Fluorescence   | E298       | 764773   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 764810   | 1  | 9       | 11.1   | 5.0      | <b>√</b>   |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 764811   | 1  | 9       | 11.1   | 5.0      | 1          |
| Conductivity in Water   | E100       | 765588   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 767115   | 1  | 19      | 5.2    | 5.0      | <b>√</b>   |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 764834   | 1  | 6       | 16.6   | 5.0      | <b>√</b>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 767114   | 1  | 20      | 5.0    | 5.0      | <b>√</b>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 764778   | 1  | 19      | 5.2    | 5.0      | <b>✓</b>   |

Page : 25 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water Quality Control Sample Type                               |                          | Lvaluati         | on: × = QC frequ | ount     |        | <u> </u>               |            |
|---|--------------------------|------------------|------------------|----------|--------|------------------------|------------|
|   | Method                   | QC Lot #         | QC               | Regular  | Actual | Frequency (%) Expected | Evaluation |
| Analytical Methods  | Wethou                   | QO LOI #         | 40               | rtogulai | Actual | Lxpected               | Evaluation |
| Laboratory Control Samples (LCS) - Continued                            |                          | 704740           | 4                | 40       | 5.5    | 5.0                    |            |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U                   | 764740           | 1                | 18       | 5.5    | 5.0                    | <u>√</u>   |
| Fluoride in Water by IC   | E235.F                   | 764809           | 1                | 9        | 11.1   | 5.0                    | <b>√</b>   |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L               | 764812           | 1                | 9        | 11.1   | 5.0                    | ✓          |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L               | 764813           | 1                | 9        | 11.1   | 5.0                    | ✓          |
| ORP by Electrode  | E125                     | 764762           | 1                | 20       | 5.0    | 5.0                    | ✓          |
| pH by Meter   | E108                     | 765589           | 1                | 20       | 5.0    | 5.0                    | ✓          |
| Sulfate in Water by IC  | E235.SO4                 | 764814           | 1                | 9        | 11.1   | 5.0                    | ✓          |
| TDS by Gravimetry   | E162                     | 765146           | 2                | 39       | 5.1    | 5.0                    | ✓          |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L                | 766892           | 1                | 17       | 5.8    | 5.0                    | ✓          |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318                     | 765499           | 1                | 16       | 6.2    | 5.0                    | ✓          |
| Total Mercury in Water by CVAAS   | E508                     | 764833           | 1                | 7        | 14.2   | 5.0                    | ✓          |
| Total metals in Water by CRC ICPMS                                      | E420                     | 766893           | 1                | 20       | 5.0    | 5.0                    | ✓          |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L                   | 764779           | 1                | 20       | 5.0    | 5.0                    | ✓          |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U                   | 765467           | 2                | 40       | 5.0    | 5.0                    | ✓          |
| TSS by Gravimetry (Low Level)   | E160-L                   | 765142           | 2                | 36       | 5.5    | 5.0                    | ✓          |
| Turbidity by Nephelometry   | E121                     | 764765           | 3                | 41       | 7.3    | 5.0                    | ✓          |
| Method Blanks (MB)  |                          |                  |                  |          |        |                        |            |
| Acidity by Titration  | E283                     | 765406           | 2                | 37       | 5.4    | 5.0                    | 1          |
| Alkalinity Species by Titration   | E290                     | 765590           | 1                | 20       | 5.0    | 5.0                    |            |
| Ammonia by Fluorescence   | E298                     | 764773           | 1                | 20       | 5.0    | 5.0                    | <u> </u>   |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L                | 764810           | 1                | 9        | 11.1   | 5.0                    |            |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L                | 764811           | 1                | 9        | 11.1   | 5.0                    | <u> </u>   |
| Conductivity in Water   | E100                     | 765588           | 1                | 20       | 5.0    | 5.0                    | <u> </u>   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L                | 767115           | 1                | 19       | 5.2    | 5.0                    | <u> </u>   |
| Dissolved Mercury in Water by CVAAS                                     | E509                     | 764834           | 1                | 6        | 16.6   | 5.0                    | <u> </u>   |
| Dissolved Metals in Water by CRC ICPMS                                  | E421                     | 767114           | 1                | 20       | 5.0    | 5.0                    | <u> </u>   |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L                   | 764778           | 1                | 19       | 5.2    | 5.0                    | <u> </u>   |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U                   | 764740           | 1                | 18       | 5.5    | 5.0                    | <u> </u>   |
| Fluoride in Water by IC   | E235.F                   | 764809           | 1                | 9        | 11.1   | 5.0                    | <u>√</u>   |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L               | 764812           | 1                | 9        | 11.1   | 5.0                    | <u>√</u>   |
| Nitrite in Water by IC (Low Level)                                      | E235.NO3-L<br>E235.NO2-L | 764813           | 1                | 9        | 11.1   | 5.0                    | <u> </u>   |
| Sulfate in Water by IC  |                          | 764814           | 1                | 9        | 11.1   | 5.0                    | <u> </u>   |
| •   | E235.SO4                 | 765146           | 2                | 39       | 5.1    | 5.0                    | <b>√</b>   |
| TDS by Gravimetry Total Chromium in Water by CRC ICPMS (Low Level)      | E162                     | 765146           | 1                | 17       | 5.1    | 5.0                    | <b>√</b>   |
| <u> </u>  | E420.Cr-L                | 766892<br>765499 |                  |          | 6.2    | 5.0                    | <b>√</b>   |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318                     |                  | 1                | 16       |        |                        | <u>√</u>   |
| Total Mercury in Water by CVAAS   | E508                     | 764833           | 1                | 7        | 14.2   | 5.0                    | <u>√</u>   |
| Total metals in Water by CRC ICPMS                                      | E420                     | 766893           | 1                | 20       | 5.0    | 5.0                    | <u>√</u>   |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L                   | 764779           | 1                | 20       | 5.0    | 5.0                    | <u>√</u>   |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U                   | 765467           | 2                | 40       | 5.0    | 5.0                    | ✓          |

Page : 26 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Matrix: Water   |            | Evaluatio | n: × = QC freque | ency outside spe | ecification; ✓ = 0 | QC frequency wit | hin specificatio |
|---|------------|-----------|------------------|------------------|--------------------|------------------|------------------|
| Quality Control Sample Type   |            |           | Co               | ount             |                    | Frequency (%)    |                  |
| Analytical Methods  | Method     | QC Lot #  | QC               | Regular          | Actual             | Expected         | Evaluation       |
| Method Blanks (MB) - Continued  |            |           |                  |                  |                    |                  |                  |
| TSS by Gravimetry (Low Level)   | E160-L     | 765142    | 2                | 36               | 5.5                | 5.0              | ✓                |
| Turbidity by Nephelometry   | E121       | 764765    | 3                | 41               | 7.3                | 5.0              | <b>√</b>         |
| Matrix Spikes (MS)  |            |           |                  |                  |                    |                  |                  |
| Ammonia by Fluorescence   | E298       | 764773    | 1                | 20               | 5.0                | 5.0              | ✓                |
| Bromide in Water by IC (Low Level)                                      | E235.Br-L  | 764810    | 1                | 9                | 11.1               | 5.0              | <b>√</b>         |
| Chloride in Water by IC (Low Level)                                     | E235.CI-L  | 764811    | 1                | 9                | 11.1               | 5.0              | <b>√</b>         |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)                    | E421.Cr-L  | 767115    | 1                | 19               | 5.2                | 5.0              | <b>√</b>         |
| Dissolved Mercury in Water by CVAAS                                     | E509       | 764834    | 1                | 6                | 16.6               | 5.0              | <b>√</b>         |
| Dissolved Metals in Water by CRC ICPMS                                  | E421       | 767114    | 1                | 20               | 5.0                | 5.0              | <b>√</b>         |
| Dissolved Organic Carbon by Combustion (Low Level)                      | E358-L     | 764778    | 1                | 19               | 5.2                | 5.0              | <b>√</b>         |
| Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L) | E378-U     | 764740    | 1                | 18               | 5.5                | 5.0              | ✓                |
| Fluoride in Water by IC   | E235.F     | 764809    | 1                | 9                | 11.1               | 5.0              | <b>√</b>         |
| Nitrate in Water by IC (Low Level)                                      | E235.NO3-L | 764812    | 1                | 9                | 11.1               | 5.0              | ✓                |
| Nitrite in Water by IC (Low Level)                                      | E235.NO2-L | 764813    | 1                | 9                | 11.1               | 5.0              | <b>√</b>         |
| Sulfate in Water by IC  | E235.SO4   | 764814    | 1                | 9                | 11.1               | 5.0              | <b>√</b>         |
| Total Chromium in Water by CRC ICPMS (Low Level)                        | E420.Cr-L  | 766892    | 1                | 17               | 5.8                | 5.0              | ✓                |
| Total Kjeldahl Nitrogen by Fluorescence (Low Level)                     | E318       | 765499    | 1                | 16               | 6.2                | 5.0              | ✓                |
| Total Mercury in Water by CVAAS   | E508       | 764833    | 1                | 7                | 14.2               | 5.0              | ✓                |
| Total metals in Water by CRC ICPMS                                      | E420       | 766893    | 1                | 20               | 5.0                | 5.0              | ✓                |
| Total Organic Carbon (Non-Purgeable) by Combustion (Low Level)          | E355-L     | 764779    | 1                | 20               | 5.0                | 5.0              | ✓                |
| Total Phosphorus by Colourimetry (0.002 mg/L)                           | E372-U     | 765467    | 2                | 40               | 5.0                | 5.0              | <b>√</b>         |

Page : 27 of 30 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



## **Methodology References and Summaries**

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

| Analytical Methods                  | Method / Lab                       | Matrix | Method Reference  | Method Descriptions  |
|-------------------------------------|------------------------------------|--------|-------------------|--|
| Conductivity in Water               | E100  Calgary - Environmental      | Water  | APHA 2510 (mod)   | Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water  |
| pH by Meter                         | E108                               | Water  | APHA 4500-H (mod) | sample. Conductivity measurements are temperature-compensated to 25°C.  pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results,  |
|                                     | Calgary - Environmental            |        |                   | pH should be measured in the field within the recommended 15 minute hold time.   |
| Turbidity by Nephelometry           | E121                               | Water  | APHA 2130 B (mod) | Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.   |
|                                     | Calgary - Environmental            |        |                   |  |
| ORP by Electrode                    | E125                               | Water  | ASTM D1498 (mod)  | Oxidation redution potential is reported as the oxidation-reduction potential of the platinum metal-reference electrode employed, measured in mV. For high accuracy test   |
|                                     | Calgary - Environmental            |        |                   | results, it is recommended that this analysis be conducted in the field.   |
| TSS by Gravimetry (Low Level)       | E160-L Calgary - Environmental     | Water  | APHA 2540 D (mod) | Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples. |
| TDS by Gravimetry                   | E162 Calgary - Environmental       | Water  | APHA 2540 C (mod) | Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.   |
| Bromide in Water by IC (Low Level)  | E235.Br-L Calgary - Environmental  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Chloride in Water by IC (Low Level) | E235.CI-L Calgary - Environmental  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Fluoride in Water by IC             | E235.F  Calgary - Environmental    | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |
| Nitrite in Water by IC (Low Level)  | E235.NO2-L Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.   |
| Nitrate in Water by IC (Low Level)  | E235.NO3-L Calgary - Environmental | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.   |
| Sulfate in Water by IC              | E235.SO4  Calgary - Environmental  | Water  | EPA 300.1 (mod)   | Inorganic anions are analyzed by Ion Chromatography with conductivity and /or UV detection.  |

Page : 28 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Analytical Methods                           | Method / Lab            | Matrix | Method Reference         | Method Descriptions  |
|--|-------------------------|--------|--------------------------|--|
| Acidity by Titration                         | E283                    | Water  | APHA 2310 B (mod)        | Acidity is determined by potentiometric titration to pH endpoint of 8.3  |
|  | Calgary - Environmental |        |                          |  |
| Alkalinity Species by Titration              | E290                    | Water  | APHA 2320 B (mod)        | Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate,  |
| , main, opone 2, main.                       | L230                    |        | 7.1.1.1.2020 2 (11104)   | carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total  |
|  | Calgary - Environmental |        |                          | alkalinity values.   |
| Ammonia by Fluorescence                      | E298                    | Water  | Method Fialab 100,       | Ammonia in water is determined by automated continuous flow analysis with membrane   |
|  | Calgary - Environmental |        | 2018                     | diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde).  |
| Total Kjeldahl Nitrogen by Fluorescence (Low | E318                    | Water  | Method Fialab 100.       | This method is approved under US EPA 40 CFR Part 136 (May 2021)  TKN in water is determined by automated continuous flow analysis with membrane  |
| Level)                                       | E316                    | Water  | 2018                     | diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde).  |
| 20.0.7                                       | Calgary - Environmental |        | 20.0                     | This method is approved under US EPA 40 CFR Part 136 (May 2021).   |
| Total Organic Carbon (Non-Purgeable) by      | E355-L                  | Water  | APHA 5310 B (mod)        | Total Organic Carbon (Non-Purgeable), also known as NPOC (total), is a direct  |
| Combustion (Low Level)                       |                         |        |                          | measurement of TOC after an acidified sample has been purged to remove inorganic   |
|  | Calgary - Environmental |        |                          | carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2.  |
|  |                         |        |                          | NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of total carbon (TC) is comprised of IC (which is common),  |
|  |                         |        |                          | this method is more accurate and more reliable than the TOC by subtraction method (i.e.  |
|  |                         |        |                          | TC minus TIC).   |
| Dissolved Organic Carbon by Combustion       | E358-L                  | Water  | APHA 5310 B (mod)        | Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a   |
| (Low Level)                                  | Calgary - Environmental |        |                          | direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and   |
|  | Calgary - Environmental |        |                          | purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are   |
|  |                         |        |                          | purged off with IC. For samples where the majority of DC (dissolved carbon) is   |
|  |                         |        |                          | comprised of IC (which is common), this method is more accurate and more reliable than   |
|  |                         |        |                          | the DOC by subtraction method (i.e. DC minus DIC).   |
| Total Phosphorus by Colourimetry (0.002      | E372-U                  | Water  | APHA 4500-P E (mod).     | Total Phosphorus is determined colourimetrically using a discrete analyzer after heated  |
| mg/L)  | Calgary - Environmental |        |                          | persulfate digestion of the sample.  |
| Dissolved Orthophosphate by Colourimetry     | E378-U                  | Water  | APHA 4500-P F (mod)      | Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab   |
| (Ultra Trace Level 0.001 mg/L)               | 2070 0                  |        | ,                        | or field filtered through a 0.45 micron membrane filter.   |
|  | Calgary - Environmental |        |                          | ·  |
|  |                         |        |                          | Field filtration is recommended to ensure test results represent conditions at time of   |
| Total metals in Water by CRC ICPMS           | F400                    | Water  | EDA 000 0/0000           | sampling.  |
| Total filetals III Water by CRC ICPIVIS      | E420                    | vvalei | EPA 200.2/6020B<br>(mod) | Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS.  |
|  | Calgary - Environmental |        | (mod)                    | Complete the control will be a |
|  |                         |        |                          | Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered   |
|  |                         |        |                          | by this method.  |
| Total Chromium in Water by CRC ICPMS (Low    | E420.Cr-L               | Water  | EPA 200.2/6020B          | Water samples are digested with nitric and hydrochloric acids, and analyzed by   |
| Level)                                       | Calgary - Environmental |        | (mod)                    | Collision/Reaction Cell ICPMS.   |
|  | Gaigary - Environmental |        |                          |  |

Page : 29 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Analytical Methods                                      | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
|---|-----------------------------------|--------|--------------------------------|--|
| Dissolved Metals in Water by CRC ICPMS                  | E421 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>6020B (mod)  | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS.  Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.   |
| Dissolved Chromium in Water by CRC ICPMS (Low Level)    | E421.Cr-L Calgary - Environmental | Water  | APHA 3030 B/EPA<br>6020B (mod) | Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS  |
| Total Mercury in Water by CVAAS                         | E508  Calgary - Environmental     | Water  | EPA 1631E (mod)                | Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS   |
| Dissolved Mercury in Water by CVAAS                     | E509 Calgary - Environmental      | Water  | APHA 3030B/EPA<br>1631E (mod)  | Water samples are filtered (0.45 um), preserved with HCl, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.   |
| Dissolved Hardness (Calculated)                         | EC100 Calgary - Environmental     | Water  | АРНА 2340В                     | "Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations. |
| Ion Balance using Dissolved Metals                      | EC101  Calgary - Environmental    | Water  | APHA 1030E                     | Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).   |
| Preparation Methods                                     | Method / Lab                      | Matrix | Method Reference               | Method Descriptions  |
| Preparation for Ammonia                                 | EP298  Calgary - Environmental    | Water  |                                | Sample preparation for Preserved Nutrients Water Quality Analysis.   |
| Digestion for TKN in water                              | EP318  Calgary - Environmental    | Water  | APHA 4500-Norg D<br>(mod)      | Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.                                  |
| Preparation for Total Organic Carbon by Combustion      | EP355 Calgary - Environmental     | Water  |                                | Preparation for Total Organic Carbon by Combustion   |
| Preparation for Dissolved Organic Carbon for Combustion | EP358  Calgary - Environmental    | Water  | APHA 5310 B (mod)              | Preparation for Dissolved Organic Carbon   |
| Digestion for Total Phosphorus in water                 | EP372                             | Water  | APHA 4500-P E (mod).           | Samples are heated with a persulfate digestion reagent.  |
|   | Calgary - Environmental           |        |                                |  |

Page : 30 of 30 Work Order : CG2216696

Client : Teck Coal Limited



| Preparation Methods                | Method / Lab            | Matrix | Method Reference | Method Descriptions  |
|------------------------------------|-------------------------|--------|------------------|--|
| Dissolved Metals Water Filtration  | EP421                   | Water  | APHA 3030B       | Water samples are filtered (0.45 um), and preserved with HNO3. |
|                                    | Calgary - Environmental |        |                  |  |
| Dissolved Mercury Water Filtration | EP509                   | Water  | APHA 3030B       | Water samples are filtered (0.45 um), and preserved with HCl.  |
|                                    | Calgary - Environmental |        |                  |  |

### **ALS Canada Ltd.**



## **QUALITY CONTROL REPORT**

Work Order : CG2216696 Page : 1 of 18

 Client
 : Teck Coal Limited
 Laboratory
 : Calgary - Environmental

 Contact
 : Nicole Zathey
 Account Manager
 : Lyudmyla Shvets

:421 Pine Avenue Address :2559 29th Street NE

Sparwood BC Canada V0B 2G1 Calgary, Alberta Canada T1Y 7B5

Telephone : Telephone :+1 403 407 1800

Project :LINE CREEK OPERATION Date Samples Received :01-Dec-2022 09:00

Project : LINE CREEK OPERATION Date Samples Received : 01-Dec-2022 09:00
PO : VPO00816101 Date Analysis Commenced : 01-Dec-2022

C-O-C number : LAEMP DRY 2022-11 ALS Issue Date : 07-Dec-2022 17:54

Sampler :, Robin Valleau\_

Site :----

Quote number : Teck Coal Master Quote

No. of samples analysed : 7

No. of samples analysed : 7

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

Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives

- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

#### Signatories

Address

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

| Signatories      | Position                 | Laboratory Department                |  |
|------------------|--------------------------|--------------------------------------|--|
| Anthony Calero   | Supervisor - Inorganic   | Calgary Inorganics, Calgary, Alberta |  |
| Elke Tabora      |                          | Calgary Inorganics, Calgary, Alberta |  |
| Harpreet Chawla  | Team Leader - Inorganics | Calgary Inorganics, Calgary, Alberta |  |
| Harpreet Chawla  | Team Leader - Inorganics | Calgary Metals, Calgary, Alberta     |  |
| Kevin Baxter     | Team Leader - Inorganics | Calgary Inorganics, Calgary, Alberta |  |
| Kevin Baxter     | Team Leader - Inorganics | Calgary Metals, Calgary, Alberta     |  |
| Parker Sgarbossa | Laboratory Analyst       | Calgary Metals, Calgary, Alberta     |  |
| Ruifang Zheng    | Analyst                  | Calgary Inorganics, Calgary, Alberta |  |
| Shirley Li       | Team Leader - Inorganics | Calgary Inorganics, Calgary, Alberta |  |
| Shirley Li       | Team Leader - Inorganics | Calgary Metals, Calgary, Alberta     |  |
| Sonthuong Bui    | Laboratory Analyst       | Calgary Metals, Calgary, Alberta     |  |

Page : 2 of 18 Work Order : CG2216696

Client : Teck Coal Limited

Project : LINE CREEK OPERATION



#### **General Comments**

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

Key:

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

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

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

#### **Workorder Comments**

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

 Page
 :
 3 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



#### Laboratory Duplicate (DUP) Report

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

| Sub-Matrix: Water    |                                    |                                     |            |        |        |          | Labora             | ntory Duplicate (D  | UP) Report              |                     |           |
|----------------------|------------------------------------|-------------------------------------|------------|--------|--------|----------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID | Client sample ID                   | Analyte                             | CAS Number | Method | LOR    | Unit     | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| Physical Tests (QC   | Lot: 764762)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216691-003        | Anonymous                          | oxidation-reduction potential [ORP] |            | E125   | 0.10   | mV       | 297                | 306                 | 2.92%                   | 15%                 |           |
| Physical Tests (QC   | Lot: 764765)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216657-001        | Anonymous                          | turbidity                           |            | E121   | 0.10   | NTU      | <0.10              | <0.10               | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 765146)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216669-002        | Anonymous                          | solids, total dissolved [TDS]       |            | E162   | 20     | mg/L     | 244                | 244                 | 0.00%                   | 20%                 |           |
| Physical Tests (QC   | Lot: 765401)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216663-001        | Anonymous                          | turbidity                           |            | E121   | 0.10   | NTU      | 1.82               | 1.85                | 1.74%                   | 15%                 |           |
| Physical Tests (QC   | Lot: 765402)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216696-002        | LC_MT1_WS_LAEMP_DR<br>Y_2022-11_NP | turbidity                           |            | E121   | 0.10   | NTU      | <0.10              | <0.10               | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 765406)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216683-001        | Anonymous                          | acidity (as CaCO3)                  |            | E283   | 2.0    | mg/L     | <2.0               | <2.0                | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   | Lot: 765407)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216696-007        | LC_DCEF_WS_LAEMP_D<br>RY_2022-11_N | acidity (as CaCO3)                  |            | E283   | 2.0    | mg/L     | <2.0               | <2.0                | 0                       | Diff <2x LOR        |           |
| Physical Tests (QC   |                                    |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216681-002        | Anonymous                          | conductivity                        |            | E100   | 2.0    | μS/cm    | 1550               | 1580                | 1.60%                   | 10%                 |           |
| Physical Tests (QC   | Lot: 765589)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216681-002        | Anonymous                          | рН                                  |            | E108   | 0.10   | pH units | 7.76               | 7.74                | 0.258%                  | 4%                  |           |
| Physical Tests (QC   | Lot: 765590)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216681-002        | Anonymous                          | alkalinity, bicarbonate (as CaCO3)  |            | E290   | 1.0    | mg/L     | 446                | 460                 | 3.13%                   | 20%                 |           |
|                      |                                    | alkalinity, carbonate (as CaCO3)    |            | E290   | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |           |
|                      |                                    | alkalinity, hydroxide (as CaCO3)    |            | E290   | 1.0    | mg/L     | <1.0               | <1.0                | 0                       | Diff <2x LOR        |           |
|                      |                                    | alkalinity, total (as CaCO3)        |            | E290   | 1.0    | mg/L     | 446                | 460                 | 3.13%                   | 20%                 |           |
| Physical Tests (QC   | Lot: 766414)                       |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216688-001        | Anonymous                          | solids, total dissolved [TDS]       |            | E162   | 40     | mg/L     | 2420               | 2520                | 4.17%                   | 20%                 |           |
| Anions and Nutrien   | ts (QC Lot: 764740)                |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216696-001        | LC_RD1_WS_LAEMP_DR<br>Y_2022-11_NP | phosphate, ortho-, dissolved (as P) | 14265-44-2 | E378-U | 0.0010 | mg/L     | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrien   | ts (QC Lot: 764773)                |                                     |            |        |        |          |                    |                     |                         |                     |           |
| CG2216689-001        | Anonymous                          | ammonia, total (as N)               | 7664-41-7  | E298   | 0.0050 | mg/L     | <0.0050            | <0.0050             | 0                       | Diff <2x LOR        |           |

ALS

 Page
 :
 4 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

| Sub-Matrix: Water          |                                    |                                 |            |            |           |      | Labora             | tory Duplicate (Dl  | JP) Report              |                     |           |
|----------------------------|------------------------------------|---------------------------------|------------|------------|-----------|------|--------------------|---------------------|-------------------------|---------------------|-----------|
| Laboratory sample ID       | Client sample ID                   | Analyte                         | CAS Number | Method     | LOR       | Unit | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |
| <b>Anions and Nutrient</b> | s (QC Lot: 764809)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | fluoride                        | 16984-48-8 | E235.F     | 0.020     | mg/L | 0.401              | 0.396               | 1.38%                   | 20%                 |           |
| Anions and Nutrient        | s (QC Lot: 764810)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | bromide                         | 24959-67-9 | E235.Br-L  | 0.050     | mg/L | <0.050             | <0.050              | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient        | s (QC Lot: 764811)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | chloride                        | 16887-00-6 | E235.CI-L  | 0.10      | mg/L | 0.35               | 0.34                | 0.004                   | Diff <2x LOR        |           |
| Anions and Nutrient        | s (QC Lot: 764812)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | nitrate (as N)                  | 14797-55-8 | E235.NO3-L | 0.0050    | mg/L | 0.251              | 0.252               | 0.159%                  | 20%                 |           |
| Anions and Nutrient        | s (QC Lot: 764813)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | nitrite (as N)                  | 14797-65-0 | E235.NO2-L | 0.0010    | mg/L | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient        | s (QC Lot: 764814)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | sulfate (as SO4)                | 14808-79-8 | E235.SO4   | 0.30      | mg/L | 85.3               | 84.8                | 0.593%                  | 20%                 |           |
| Anions and Nutrient        | s (QC Lot: 765467)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216679-004              | Anonymous                          | phosphorus, total               | 7723-14-0  | E372-U     | 0.0020    | mg/L | <0.0020            | <0.0020             | 0                       | Diff <2x LOR        |           |
| Anions and Nutrient        | s (QC Lot: 765468)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216696-004              | LC_FRB_WS_LAEMP_DR<br>Y_2022-11_N  | phosphorus, total               | 7723-14-0  | E372-U     | 0.0020    | mg/L | <0.0020            | 0.0028              | 0.0008                  | Diff <2x LOR        |           |
| Anions and Nutrient        | s (QC Lot: 765499)                 |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216695-002              | Anonymous                          | Kjeldahl nitrogen, total [TKN]  |            | E318       | 0.050     | mg/L | 1.42               | 1.45                | 1.43%                   | 20%                 |           |
| Organic / Inorganic        | Carbon (QC Lot: 764778             |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | carbon, dissolved organic [DOC] |            | E358-L     | 0.50      | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
| Organic / Inorganic        | Carbon (QC Lot: 764779             |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | carbon, total organic [TOC]     |            | E355-L     | 0.50      | mg/L | <0.50              | <0.50               | 0                       | Diff <2x LOR        |           |
| Total Metals (QC Lo        | ot: 764833)                        |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216696-001              | LC_RD1_WS_LAEMP_DR<br>Y_2022-11_NP | mercury, total                  | 7439-97-6  | E508       | 0.0000050 | mg/L | <0.0000050         | <0.0000050          | 0                       | Diff <2x LOR        |           |
| Total Metals (QC Lo        | ot: 766892)                        |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | chromium, total                 | 7440-47-3  | E420.Cr-L  | 0.00010   | mg/L | 0.00021            | 0.00029             | 0.00007                 | Diff <2x LOR        |           |
| Total Metals (QC Lo        | ot: 766893)                        |                                 |            |            |           |      |                    |                     |                         |                     |           |
| CG2216689-001              | Anonymous                          | aluminum, total                 | 7429-90-5  | E420       | 0.0030    | mg/L | 0.0033             | 0.0061              | 0.0028                  | Diff <2x LOR        |           |
|                            |                                    | antimony, total                 | 7440-36-0  | E420       | 0.00010   | mg/L | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |
|                            |                                    | arsenic, total                  | 7440-38-2  | E420       | 0.00010   | mg/L | 0.00021            | 0.00013             | 0.00007                 | Diff <2x LOR        |           |
|                            |                                    | barium, total                   | 7440-39-3  | E420       | 0.00010   | mg/L | 0.0470             | 0.0477              | 1.53%                   | 20%                 |           |
|                            |                                    | beryllium, total                | 7440-41-7  | E420       | 0.000020  | mg/L | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |           |
|                            |                                    | bismuth, total                  | 7440-69-9  | E420       | 0.000050  | mg/L | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |
|                            |                                    | boron, total                    | 7440-42-8  | E420       | 0.010     | mg/L | <0.010             | <0.010              | 0                       | Diff <2x LOR        |           |

 Page
 :
 5 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



| Sub-Matrix: Water    | o-Matrix: <b>Water</b>             |                      |            |          |           | Labora    | tory Duplicate (D  | UP) Report          |                         |                     |           |  |  |  |
|----------------------|------------------------------------|----------------------|------------|----------|-----------|-----------|--------------------|---------------------|-------------------------|---------------------|-----------|--|--|--|
| Laboratory sample ID | Client sample ID                   | Analyte              | CAS Number | Method   | LOR       | Unit      | Original<br>Result | Duplicate<br>Result | RPD(%) or<br>Difference | Duplicate<br>Limits | Qualifier |  |  |  |
| Total Metals (QC Lo  | ot: 766893) - continued            |                      |            |          |           |           |                    |                     |                         |                     |           |  |  |  |
| CG2216689-001        | Anonymous                          | cadmium, total       | 7440-43-9  | E420     | 0.0000050 | mg/L      | 0.0088 μg/L        | <0.0000050          | 0.0000038               | Diff <2x LOR        |           |  |  |  |
|                      |                                    | calcium, total       | 7440-70-2  | E420     | 0.050     | mg/L      | 51.0               | 53.1                | 4.00%                   | 20%                 |           |  |  |  |
|                      |                                    | cobalt, total        | 7440-48-4  | E420     | 0.00010   | mg/L      | <0.10 µg/L         | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | copper, total        | 7440-50-8  | E420     | 0.00050   | mg/L      | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | iron, total          | 7439-89-6  | E420     | 0.010     | mg/L      | <0.010             | <0.010              | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | lead, total          | 7439-92-1  | E420     | 0.000050  | mg/L      | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | lithium, total       | 7439-93-2  | E420     | 0.0010    | mg/L      | 0.0044             | 0.0041              | 0.0003                  | Diff <2x LOR        |           |  |  |  |
|                      |                                    | magnesium, total     | 7439-95-4  | E420     | 0.0050    | mg/L      | 14.9               | 15.6                | 4.47%                   | 20%                 |           |  |  |  |
|                      |                                    | manganese, total     | 7439-96-5  | E420     | 0.00010   | mg/L      | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | molybdenum, total    | 7439-98-7  | E420     | 0.000050  | mg/L      | 0.00108            | 0.00108             | 0.0389%                 | 20%                 |           |  |  |  |
|                      |                                    | nickel, total        | 7440-02-0  | E420     | 0.00050   | mg/L      | <0.00050           | 0.00051             | 0.00001                 | Diff <2x LOR        |           |  |  |  |
|                      |                                    | potassium, total     | 7440-09-7  | E420     | 0.050     | mg/L      | 0.311              | 0.307               | 0.004                   | Diff <2x LOR        |           |  |  |  |
|                      | selenium, total                    | 7782-49-2            | E420       | 0.000050 | mg/L      | 3.91 µg/L | 0.00379            | 2.99%               | 20%                     |                     |           |  |  |  |
|                      |                                    | silicon, total       | 7440-21-3  | E420     | 0.10      | mg/L      | 1.96               | 1.96                | 0.0285%                 | 20%                 |           |  |  |  |
|                      | silver, total                      | 7440-22-4            | E420       | 0.000010 | mg/L      | <0.000010 | <0.000010          | 0                   | Diff <2x LOR            |                     |           |  |  |  |
|                      |                                    | sodium, total        | 7440-23-5  | E420     | 0.050     | mg/L      | 1.42               | 1.48                | 3.96%                   | 20%                 |           |  |  |  |
|                      |                                    | strontium, total     | 7440-24-6  | E420     | 0.00020   | mg/L      | 0.199              | 0.203               | 1.84%                   | 20%                 |           |  |  |  |
|                      |                                    | sulfur, total        | 7704-34-9  | E420     | 0.50      | mg/L      | 31.8               | 31.5                | 1.11%                   | 20%                 |           |  |  |  |
|                      |                                    | thallium, total      | 7440-28-0  | E420     | 0.000010  | mg/L      | <0.000010          | <0.000010           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | tin, total           | 7440-31-5  | E420     | 0.00010   | mg/L      | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | titanium, total      | 7440-32-6  | E420     | 0.00030   | mg/L      | <0.00030           | <0.00030            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | uranium, total       | 7440-61-1  | E420     | 0.000010  | mg/L      | 0.00184            | 0.00189             | 2.44%                   | 20%                 |           |  |  |  |
|                      |                                    | vanadium, total      | 7440-62-2  | E420     | 0.00050   | mg/L      | <0.00050           | <0.00050            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | zinc, total          | 7440-66-6  | E420     | 0.0030    | mg/L      | <0.0030            | <0.0030             | 0                       | Diff <2x LOR        |           |  |  |  |
| Dissolved Metals (C  | QC Lot: 764834)                    |                      |            |          |           |           |                    |                     |                         |                     |           |  |  |  |
| CG2216696-002        | LC_MT1_WS_LAEMP_DR Y 2022-11 NP    | mercury, dissolved   | 7439-97-6  | E509     | 0.0000050 | mg/L      | <0.0000050         | <0.0000050          | 0                       | Diff <2x LOR        |           |  |  |  |
| Dissolved Metals (C  | QC Lot: 767114)                    |                      |            |          |           |           |                    |                     |                         |                     |           |  |  |  |
| CG2216696-002        | LC_MT1_WS_LAEMP_DR<br>Y_2022-11_NP | aluminum, dissolved  | 7429-90-5  | E421     | 0.0010    | mg/L      | <0.0010            | <0.0010             | 0                       | Diff <2x LOR        |           |  |  |  |
|                      | _ <b>_</b>                         | antimony, dissolved  | 7440-36-0  | E421     | 0.00010   | mg/L      | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | arsenic, dissolved   | 7440-38-2  | E421     | 0.00010   | mg/L      | <0.00010           | <0.00010            | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | barium, dissolved    | 7440-39-3  | E421     | 0.00010   | mg/L      | 0.00038            | 0.00040             | 0.00002                 | Diff <2x LOR        |           |  |  |  |
|                      |                                    | beryllium, dissolved | 7440-41-7  | E421     | 0.000020  | mg/L      | <0.020 µg/L        | <0.000020           | 0                       | Diff <2x LOR        |           |  |  |  |
|                      |                                    | bismuth, dissolved   | 7440-69-9  | E421     | 0.000050  | mg/L      | <0.000050          | <0.000050           | 0                       | Diff <2x LOR        |           |  |  |  |

 Page
 :
 6 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



Laboratory Duplicate (DUP) Report Sub-Matrix: Water Laboratory sample ID Client sample ID Analyte CAS Number Method LOR Unit Original **Duplicate** RPD(%) or **Duplicate** Qualifier Difference Limits Result Result Dissolved Metals (QC Lot: 767114) - continued CG2216696-002 LC MT1 WS LAEMP DR boron, dissolved 7440-42-8 E421 0.010 mg/L <0.010 <0.010 0 Diff <2x LOR Y 2022-11 NP 7440-43-9 E421 0.0000050 <0.0050 µg/L < 0.0000050 0 Diff <2x LOR cadmium, dissolved mg/L 7440-70-2 E421 0.050 < 0.050 < 0.050 0 Diff <2x LOR calcium, dissolved mg/L 7440-48-4 E421 0.00010 mg/L <0.10 µg/L < 0.00010 0 Diff <2x LOR cobalt, dissolved Diff <2x LOR 7440-50-8 E421 0.00020 0.00051 0.00051 0.000006 copper, dissolved mg/L iron, dissolved 7439-89-6 E421 0.010 mg/L < 0.010 < 0.010 0 Diff <2x LOR <0.000050 < 0.000050 Diff <2x LOR 7439-92-1 E421 0.000050 0 lead, dissolved mg/L lithium, dissolved 7439-93-2 E421 0.0010 mg/L < 0.0010 < 0.0010 0 Diff <2x LOR magnesium, dissolved 7439-95-4 E421 0.0050 mg/L 0.0079 0.0075 0.0004 Diff <2x LOR 0.00005 7439-96-5 E421 0.00010 mg/L 0.00015 < 0.00010 Diff <2x LOR manganese, dissolved 7439-98-7 E421 0.000050 < 0.000050 < 0.000050 0 Diff <2x LOR molybdenum, dissolved mg/L Diff <2x LOR 7440-02-0 E421 0.00050 mg/L <0.00050 < 0.00050 0 nickel, dissolved 7440-09-7 E421 0.050 mg/L < 0.050 < 0.050 0 Diff <2x LOR potassium, dissolved \_\_\_\_ 7782-49-2 E421 0.000050 <0.050 µg/L < 0.000050 Diff <2x LOR 0 selenium, dissolved mg/L silicon, dissolved 7440-21-3 E421 0.050 mg/L < 0.050 < 0.050 0 Diff <2x LOR E421 0.000010 < 0.000010 Diff <2x LOR 7440-22-4 < 0.000010 0 silver, dissolved mg/L E421 0.277 0.007 Diff <2x LOR 7440-23-5 0.050 0.284 sodium, dissolved mg/L strontium, dissolved 7440-24-6 E421 0.00020 mg/L <0.00020 < 0.00020 0 Diff <2x LOR 7704-34-9 E421 0.50 < 0.50 < 0.50 Diff <2x LOR sulfur, dissolved mg/L 0 thallium, dissolved 7440-28-0 E421 0.000010 < 0.000010 < 0.000010 0 Diff <2x LOR mg/L Diff <2x LOR tin, dissolved 7440-31-5 E421 0.00010 mg/L 0.00025 0.00025 0.000003 titanium, dissolved 7440-32-6 E421 0.00030 mg/L <0.00030 < 0.00030 0 Diff <2x LOR 7440-61-1 E421 0.000010 <0.000010 < 0.000010 0 Diff <2x LOR uranium, dissolved mg/L E421 0.00050 <0.00050 < 0.00050 Diff <2x LOR vanadium, dissolved 7440-62-2 mg/L 0 E421 Diff <2x LOR zinc, dissolved 7440-66-6 0.0010 mg/L < 0.0010 < 0.0010 0 ----Dissolved Metals (QC Lot: 767115) CG2216696-002 LC\_MT1\_WS\_LAEMP\_DR 7440-47-3 E421.Cr-L 0.00010 mg/L <0.00010 < 0.00010 0 Diff <2x LOR chromium, dissolved Y 2022-11 NP

 Page
 :
 7 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



#### 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.

| Analyte                              | CAS Number Method    | LOR   | Unit  | Result  | Qualifier |
|--------------------------------------|----------------------|-------|-------|---------|-----------|
| Physical Tests (QCLot: 764765)       |                      |       |       | riodari |           |
| turbidity                            | E121                 | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 765142)       |                      |       |       |         |           |
| solids, total suspended [TSS]        | E160-L               | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 765146)       |                      |       |       |         |           |
| solids, total dissolved [TDS]        | E162                 | 10    | mg/L  | <10     |           |
| Physical Tests (QCLot: 765401)       |                      |       |       |         |           |
| turbidity                            | E121                 | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 765402)       |                      |       |       |         |           |
| turbidity                            | E121                 | 0.1   | NTU   | <0.10   |           |
| Physical Tests (QCLot: 765406)       |                      |       |       |         |           |
| acidity (as CaCO3)                   | E283                 | 2     | mg/L  | 2.2     |           |
| Physical Tests (QCLot: 765407)       |                      |       |       | •       |           |
| acidity (as CaCO3)                   | E283                 | 2     | mg/L  | <2.0    |           |
| Physical Tests (QCLot: 765588)       |                      |       |       |         |           |
| conductivity                         | E100                 | 1     | μS/cm | <1.0    |           |
| Physical Tests (QCLot: 765590)       |                      |       |       |         |           |
| alkalinity, bicarbonate (as CaCO3)   | E290                 | 1     | mg/L  | <1.0    |           |
| alkalinity, carbonate (as CaCO3)     | E290                 | 1     | mg/L  | <1.0    |           |
| alkalinity, hydroxide (as CaCO3)     | E290                 | 1     | mg/L  | <1.0    |           |
| alkalinity, total (as CaCO3)         | E290                 | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 766409)       |                      |       |       |         |           |
| solids, total suspended [TSS]        | E160-L               | 1     | mg/L  | <1.0    |           |
| Physical Tests (QCLot: 766414)       |                      |       |       |         |           |
| solids, total dissolved [TDS]        | E162                 | 10    | mg/L  | <10     |           |
| Anions and Nutrients (QCLot: 764740) |                      |       |       |         |           |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U    | 0.001 | mg/L  | <0.0010 |           |
| Anions and Nutrients (QCLot: 764773) |                      |       |       |         |           |
| ammonia, total (as N)                | 7664-41-7 E298       | 0.005 | mg/L  | <0.0050 |           |
| Anions and Nutrients (QCLot: 764809) |                      |       |       |         |           |
| fluoride                             | 16984-48-8 E235.F    | 0.02  | mg/L  | <0.020  |           |
| Anions and Nutrients (QCLot: 764810) |                      |       |       |         |           |
| bromide                              | 24959-67-9 E235.Br-L | 0.05  | mg/L  | <0.050  |           |

 Page
 :
 8 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



| Analyte                               | CAS Number Met | hod     | LOR      | Unit | Result     | Qualifier |
|---------------------------------------|----------------|---------|----------|------|------------|-----------|
| Anions and Nutrients (QCLot: 764811)  |                |         |          |      |            |           |
| chloride                              | 16887-00-6 E23 | 5.CI-L  | 0.1      | mg/L | <0.10      |           |
| Anions and Nutrients (QCLot: 764812)  |                |         |          |      |            |           |
| nitrate (as N)                        | 14797-55-8 E23 | 5.NO3-L | 0.005    | mg/L | <0.0050    |           |
| Anions and Nutrients (QCLot: 764813)  |                |         |          |      |            |           |
| nitrite (as N)                        | 14797-65-0 E23 | 5.NO2-L | 0.001    | mg/L | <0.0010    |           |
| Anions and Nutrients (QCLot: 764814)  |                |         |          |      |            |           |
| sulfate (as SO4)                      | 14808-79-8 E23 | 5.SO4   | 0.3      | mg/L | <0.30      |           |
| Anions and Nutrients (QCLot: 765467)  |                |         |          |      |            |           |
| phosphorus, total                     | 7723-14-0 E37  | '2-U    | 0.002    | mg/L | <0.0020    |           |
| Anions and Nutrients (QCLot: 765468)  |                |         |          |      |            |           |
| phosphorus, total                     | 7723-14-0 E37  | 2-U     | 0.002    | mg/L | <0.0020    |           |
| Anions and Nutrients (QCLot: 765499)  |                |         |          |      |            |           |
| Kjeldahl nitrogen, total [TKN]        | E31            | 8       | 0.05     | mg/L | <0.050     |           |
| Organic / Inorganic Carbon (QCLot: 76 | 4778)          |         |          |      |            |           |
| carbon, dissolved organic [DOC]       | E35            | 8-L     | 0.5      | mg/L | <0.50      |           |
| Organic / Inorganic Carbon (QCLot: 76 | 4779)          |         |          |      |            |           |
| carbon, total organic [TOC]           | E35            | 5-L     | 0.5      | mg/L | <0.50      |           |
| Fotal Metals (QCLot: 764833)          |                |         |          |      |            |           |
| mercury, total                        | 7439-97-6 E50  | 8       | 0.000005 | mg/L | <0.0000050 |           |
| Fotal Metals (QCLot: 766892)          |                |         |          |      |            |           |
| chromium, total                       | 7440-47-3 E42  | 0.Cr-L  | 0.0001   | mg/L | <0.00010   |           |
| Fotal Metals (QCLot: 766893)          |                |         |          |      |            |           |
| aluminum, total                       | 7429-90-5 E42  | 0       | 0.003    | mg/L | <0.0030    |           |
| antimony, total                       | 7440-36-0 E42  | 0       | 0.0001   | mg/L | <0.00010   |           |
| arsenic, total                        | 7440-38-2 E42  | 0       | 0.0001   | mg/L | <0.00010   |           |
| barium, total                         | 7440-39-3 E42  | 0       | 0.0001   | mg/L | <0.00010   |           |
| beryllium, total                      | 7440-41-7 E42  | 0       | 0.00002  | mg/L | <0.000020  |           |
| bismuth, total                        | 7440-69-9 E42  | 0       | 0.00005  | mg/L | <0.000050  |           |
| boron, total                          | 7440-42-8 E42  | 0       | 0.01     | mg/L | <0.010     |           |
| cadmium, total                        | 7440-43-9 E42  | 0       | 0.000005 | mg/L | <0.000050  |           |
| calcium, total                        | 7440-70-2 E42  | 0       | 0.05     | mg/L | <0.050     |           |
| cobalt, total                         | 7440-48-4 E42  | 0       | 0.0001   | mg/L | <0.00010   |           |
| copper, total                         | 7440-50-8 E42  | 0       | 0.0005   | mg/L | <0.00050   |           |
| iron, total                           | 7439-89-6 E42  | 0       | 0.01     | mg/L | <0.010     |           |
| lead, total                           | 7439-92-1 E42  |         | 0.00005  | mg/L | <0.000050  |           |

 Page
 :
 9 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



| Analyte                          | CAS Number | Method | L   | LOR    | Unit | Result     | Qualifier |
|----------------------------------|------------|--------|-----|--------|------|------------|-----------|
| otal Metals (QCLot: 766893) - co | ntinued    |        |     |        |      |            |           |
| lithium, total                   | 7439-93-2  | E420   | 0   | 0.001  | mg/L | <0.0010    |           |
| magnesium, total                 | 7439-95-4  | E420   | 0   | 0.005  | mg/L | <0.0050    |           |
| manganese, total                 | 7439-96-5  | E420   | 0.  | .0001  | mg/L | <0.00010   |           |
| molybdenum, total                | 7439-98-7  | E420   | 0.0 | 00005  | mg/L | <0.000050  |           |
| nickel, total                    | 7440-02-0  | E420   | 0.  | .0005  | mg/L | <0.00050   |           |
| potassium, total                 | 7440-09-7  | E420   | (   | 0.05   | mg/L | <0.050     |           |
| selenium, total                  | 7782-49-2  | E420   | 0.0 | 00005  | mg/L | <0.000050  |           |
| silicon, total                   | 7440-21-3  | E420   |     | 0.1    | mg/L | <0.10      |           |
| silver, total                    | 7440-22-4  | E420   | 0.0 | 00001  | mg/L | <0.000010  |           |
| sodium, total                    | 7440-23-5  | E420   | (   | 0.05   | mg/L | <0.050     |           |
| strontium, total                 | 7440-24-6  | E420   | 0.  | .0002  | mg/L | <0.00020   |           |
| sulfur, total                    | 7704-34-9  | E420   |     | 0.5    | mg/L | <0.50      |           |
| thallium, total                  | 7440-28-0  | E420   | 0.0 | 00001  | mg/L | <0.000010  |           |
| tin, total                       | 7440-31-5  | E420   | 0.  | .0001  | mg/L | <0.00010   |           |
| titanium, total                  | 7440-32-6  | E420   | 0.  | .0003  | mg/L | <0.00030   |           |
| uranium, total                   | 7440-61-1  | E420   | 0.0 | 00001  | mg/L | <0.000010  |           |
| vanadium, total                  | 7440-62-2  | E420   | 0.  | .0005  | mg/L | <0.00050   |           |
| zinc, total                      | 7440-66-6  | E420   | 0   | 0.003  | mg/L | <0.0030    |           |
| issolved Metals (QCLot: 764834)  |            |        |     |        |      |            |           |
| mercury, dissolved               | 7439-97-6  | E509   | 0.0 | 000005 | mg/L | <0.0000050 |           |
| issolved Metals (QCLot: 767114)  |            |        |     |        |      |            |           |
| aluminum, dissolved              | 7429-90-5  | E421   | 0   | 0.001  | mg/L | <0.0010    |           |
| antimony, dissolved              | 7440-36-0  | E421   | 0.  | .0001  | mg/L | <0.00010   |           |
| arsenic, dissolved               | 7440-38-2  | E421   | 0.  | .0001  | mg/L | <0.00010   |           |
| barium, dissolved                | 7440-39-3  | E421   | 0.  | .0001  | mg/L | <0.00010   |           |
| beryllium, dissolved             | 7440-41-7  | E421   | 0.0 | 00002  | mg/L | <0.000020  |           |
| bismuth, dissolved               | 7440-69-9  | E421   | 0.0 | 00005  | mg/L | <0.000050  |           |
| boron, dissolved                 | 7440-42-8  | E421   | (   | 0.01   | mg/L | <0.010     |           |
| cadmium, dissolved               | 7440-43-9  | E421   | 0.0 | 000005 | mg/L | <0.0000050 |           |
| calcium, dissolved               | 7440-70-2  | E421   | (   | 0.05   | mg/L | <0.050     |           |
| cobalt, dissolved                | 7440-48-4  | E421   | 0.  | .0001  | mg/L | <0.00010   |           |
| copper, dissolved                | 7440-50-8  | E421   | 0.  | .0002  | mg/L | <0.00020   |           |
| iron, dissolved                  | 7439-89-6  | E421   | (   | 0.01   | mg/L | <0.010     |           |
| lead, dissolved                  | 7439-92-1  | E421   | 0.0 | 00005  | mg/L | <0.000050  |           |
| lithium, dissolved               | 7439-93-2  | E421   | 0   | 0.001  | mg/L | <0.0010    |           |

 Page
 :
 10 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION

ALS

| Analyte                         | CAS Number    | Method    | LOF   | R Unit  | Result    | Qualifier |
|---------------------------------|---------------|-----------|-------|---------|-----------|-----------|
| Dissolved Metals (QCLot: 767114 | ) - continued |           |       |         |           |           |
| magnesium, dissolved            | 7439-95-4     | E421      | 0.00  | 5 mg/L  | <0.0050   |           |
| manganese, dissolved            | 7439-96-5     | E421      | 0.000 | )1 mg/L | <0.00010  |           |
| molybdenum, dissolved           | 7439-98-7     | E421      | 0.000 | 05 mg/L | <0.000050 |           |
| nickel, dissolved               | 7440-02-0     | E421      | 0.000 | 05 mg/L | <0.00050  |           |
| potassium, dissolved            | 7440-09-7     | E421      | 0.08  | 5 mg/L  | <0.050    |           |
| selenium, dissolved             | 7782-49-2     | E421      | 0.000 | 05 mg/L | <0.000050 |           |
| silicon, dissolved              | 7440-21-3     | E421      | 0.08  | 5 mg/L  | <0.050    |           |
| silver, dissolved               | 7440-22-4     | E421      | 0.000 | 01 mg/L | <0.000010 |           |
| sodium, dissolved               | 7440-23-5     | E421      | 0.08  | 5 mg/L  | <0.050    |           |
| strontium, dissolved            | 7440-24-6     | E421      | 0.000 | )2 mg/L | <0.00020  |           |
| sulfur, dissolved               | 7704-34-9     | E421      | 0.5   | mg/L    | <0.50     |           |
| thallium, dissolved             | 7440-28-0     | E421      | 0.000 | 01 mg/L | <0.000010 |           |
| tin, dissolved                  | 7440-31-5     | E421      | 0.000 | )1 mg/L | <0.00010  |           |
| titanium, dissolved             | 7440-32-6     | E421      | 0.000 | 03 mg/L | <0.00030  |           |
| uranium, dissolved              | 7440-61-1     | E421      | 0.000 | 01 mg/L | <0.000010 |           |
| vanadium, dissolved             | 7440-62-2     | E421      | 0.000 | 05 mg/L | <0.00050  |           |
| zinc, dissolved                 | 7440-66-6     | E421      | 0.00  | 1 mg/L  | <0.0010   |           |
| Dissolved Metals (QCLot: 767115 | )             |           |       |         |           |           |
| chromium, dissolved             | 7440-47-3     | E421.Cr-L | 0.000 | )1 mg/L | <0.00010  |           |

 Page
 :
 11 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



## Laboratory Control Sample (LCS) Report

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

| Sub-Matrix: Water  | p-Matrix: Water   |       |           |               |              | Laboratory Control Sample (LCS) Report |            |           |  |  |
|--|-------------------|-------|-----------|---------------|--------------|--|------------|-----------|--|--|
|  |                   |       |           | Spike         | Recovery (%) | Recovery                               | Limits (%) |           |  |  |
| Analyte  | CAS Number Method | LOR   | Unit      | Concentration | LCS          | Low                                    | High       | Qualifier |  |  |
| Physical Tests (QCLot: 764762)   |                   |       |           |               |              |  |            |           |  |  |
| oxidation-reduction potential [ORP]  | E125              |       | mV        | 220 mV        | 99.8         | 95.4                                   | 104        |           |  |  |
| Physical Tests (QCLot: 764765)   |                   |       |           |               |              |  |            |           |  |  |
| turbidity  | E121              | 0.1   | NTU       | 200 NTU       | 100.0        | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765142)   |                   |       |           |               |              |  |            |           |  |  |
| solids, total suspended [TSS]  | E160-L            | 1     | mg/L      | 150 mg/L      | 94.8         | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765146)   |                   |       |           |               |              |  |            |           |  |  |
| solids, total dissolved [TDS]  | E162              | 10    | mg/L      | 1000 mg/L     | 97.0         | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765401)   |                   |       |           |               |              |  |            |           |  |  |
| turbidity  | E121              | 0.1   | NTU       | 200 NTU       | 102          | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765402)   |                   |       |           |               |              | 25.0                                   |            | 1         |  |  |
| turbidity  | E121              | 0.1   | NTU       | 200 NTU       | 103          | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765406)   | Food              |       | "         | "             |              | 05.0                                   | 445        | 1         |  |  |
| acidity (as CaCO3)   | E283              | 2     | mg/L      | 50 mg/L       | 107          | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765407)   | L-200             |       | 77 m/l    |               |              | 05.0                                   | 445        | 1         |  |  |
| acidity (as CaCO3)   | E283              | 2     | mg/L      | 50 mg/L       | 107          | 85.0                                   | 115        |           |  |  |
| Physical Tests (QCLot: 765588)   | E100              | 1     | uS/om     | 440.0.04      | 00.7         | 90.0                                   | 110        | ĺ         |  |  |
| conductivity   | = 100             | '     | μS/cm     | 146.9 μS/cm   | 99.7         | 90.0                                   | 110        |           |  |  |
| Physical Tests (QCLot: 765589)   | E108              |       | pH units  | 7 11 14       | 404          | 98.6                                   | 101        |           |  |  |
|  | [ [ 100           |       | pri units | 7 pH units    | 101          | 90.0                                   | 101        |           |  |  |
| Physical Tests (QCLot: 765590) alkalinity, total (as CaCO3)  | E290              | 1     | mg/L      | 500 mg/l      | 104          | 85.0                                   | 115        |           |  |  |
|  | 2230              |       | mg/L      | 500 mg/L      | 104          | 00.0                                   | 110        |           |  |  |
| Physical Tests (QCLot: 766409) solids, total suspended [TSS]   | E160-L            | 1     | mg/L      | 150 mg/L      | 98.2         | 85.0                                   | 115        |           |  |  |
|  | 2.00 2            |       | 9/2       | 100 mg/L      | 30.2         | 30.0                                   | 1.0        |           |  |  |
| Physical Tests (QCLot: 766414) solids, total dissolved [TDS]   | E162              | 10    | mg/L      | 1000 mg/L     | 94.4         | 85.0                                   | 115        |           |  |  |
| solido, total dissolved [126]  | 2.02              |       | 9/2       | 1000 Hig/L    | 04.4         | 55.5                                   |            |           |  |  |
| Anions and Nutrients (QCLot: 764740)   |                   |       |           |               |              |  |            |           |  |  |
| phosphate, ortho-, dissolved (as P)  | 14265-44-2 E378-U | 0.001 | mg/L      | 0.03 mg/L     | 98.1         | 80.0                                   | 120        |           |  |  |
| Anions and Nutrients (QCLot: 764773)   |                   |       |           |               |              |  | I          | I         |  |  |
| ammonia, total (as N)  | 7664-41-7 E298    | 0.005 | mg/L      | 0.2 mg/L      | 101          | 85.0                                   | 115        |           |  |  |
| Anions and Nutrients (QCLot: 764809)   |                   |       |           |               |              |  |            |           |  |  |
| fluoride   | 16984-48-8 E235.F | 0.02  | mg/L      | 1 mg/L        | 102          | 90.0                                   | 110        |           |  |  |
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 Page
 :
 12 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



Laboratory Control Sample (LCS) Report Sub-Matrix: Water Spike Recovery (%) Recovery Limits (%) CAS Number Method LOR Unit Qualifier Analyte Concentration LCS Low High Anions and Nutrients (QCLot: 764810) 24959-67-9 E235.Br-L 0.05 85.0 115 mg/L 0.5 mg/L 101 Anions and Nutrients (QCLot: 764811) chloride 16887-00-6 E235.CI-L 0.1 mg/L 90.0 110 100 mg/L 100 Anions and Nutrients (QCLot: 764812) nitrate (as N) 14797-55-8 E235.NO3-L 0.005 mg/L 2.5 mg/L 101 90.0 110 Anions and Nutrients (QCLot: 764813) 14797-65-0 E235.NO2-L 0.001 nitrite (as N) mg/L 0.5 mg/L 101 90.0 110 Anions and Nutrients (QCLot: 764814) 14808-79-8 E235.SO4 sulfate (as SO4) 0.3 mg/L 102 90.0 110 100 mg/L Anions and Nutrients (QCLot: 765467) 7723-14-0 E372-U 0.03 mg/L phosphorus, total 0.002 mg/L 102 0.08 120 Anions and Nutrients (QCLot: 765468) phosphorus, total 7723-14-0 E372-U 0.002 80.0 120 mg/L 0.03 mg/L 97.2 Anions and Nutrients (QCLot: 765499) ---- E318 Kjeldahl nitrogen, total [TKN] 0.05 mg/L 4 mg/L 99.3 75.0 125 Organic / Inorganic Carbon (QCLot: 764778) ---- E358-L 0.5 carbon, dissolved organic [DOC] mg/L 97.7 80.0 120 8.57 mg/L Organic / Inorganic Carbon (QCLot: 764779) carbon, total organic [TOC] ---- E355-L 0.5 mg/L 8.57 mg/L 104 0.08 120 Total Metals (QCLot: 764833) mercury, total 7439-97-6 E508 0.000005 80.0 120 mg/L 0.0001 mg/L 93.9 Total Metals (QCLot: 766892) chromium, total 7440-47-3 E420.Cr-L 0.0001 mg/L 0.25 mg/L 101 80.0 120 Total Metals (QCLot: 766893) 7429-90-5 E420 aluminum, total 0.003 mg/L 2 mg/L 106 80.0 120 antimony, total 7440-36-0 E420 0.0001 mg/L 1 mg/L 100 0.08 120 7440-38-2 E420 0.0001 mg/L 80.0 120 arsenic, total 1 mg/L 98.4 7440-39-3 E420 0.0001 mg/L 80.0 120 barium, total 0.25 mg/L 102 7440-41-7 E420 0.00002 80.0 120 beryllium, total mg/L 0.1 mg/L 97.5 7440-69-9 E420 0.00005 mg/L 80.0 120 bismuth, total 1 mg/L 100 boron, total 7440-42-8 E420 0.01 mg/L 80.0 120 1 mg/L 91.1 7440-43-9 E420 0.000005 mg/L 80.0 120 cadmium, total 0.1 mg/L 99.9 calcium, total 7440-70-2 E420 0.05 mg/L 97.2 80.0 120 50 mg/L 7440-48-4 E420 cobalt, total 0.0001 mg/L 0.08 120 0.25 mg/L 97.4

 Page
 :
 13 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

copper, dissolved

iron, dissolved



LINE CREEK OPERATION Project Laboratory Control Sample (LCS) Report Sub-Matrix: Water Spike Recovery (%) Recovery Limits (%) CAS Number Method LOR Unit Qualifier Analyte Concentration LCS Low High Total Metals (QCLot: 766893) - continued 7440-50-8 E420 0.0005 80.0 120 copper, total mg/L 0.25 mg/L 100 7439-89-6 E420 0.01 mg/L 0.08 120 iron, total 1 mg/L 106 lead, total 7439-92-1 E420 0.00005 mg/L 0.5 mg/L 105 0.08 120 lithium, total 7439-93-2 E420 0.001 mg/L 0.25 mg/L 101 80.0 120 7439-95-4 E420 magnesium, total 0.005 mg/L 50 mg/L 99.5 80.0 120 manganese, total 7439-96-5 E420 0.0001 mg/L 0.25 mg/L 113 80.0 120 7439-98-7 E420 0.00005 120 molybdenum, total mg/L 0.25 mg/L 99.4 80.0 nickel, total 7440-02-0 E420 0.0005 mg/L 98.0 80.0 120 0.5 mg/L 7440-09-7 E420 0.05 80.0 120 mg/L potassium, total 50 mg/L 105 7782-49-2 E420 0.00005 80.0 120 selenium, total mg/L 94.7 1 mg/L 7440-21-3 E420 silicon, total 0.1 60.0 140 mg/L 10 mg/L 102 silver, total 7440-22-4 E420 0.00001 mg/L 0.1 mg/L 95.2 80.0 120 7440-23-5 E420 0.05 0.08 120 sodium, total mg/L 50 mg/L 101 strontium, total 7440-24-6 E420 0.0002 mg/L 80.0 120 0.25 mg/L 101 7704-34-9 E420 sulfur, total 0.5 mg/L 50 mg/L 107 0.08 120 7440-28-0 E420 0.00001 80.0 120 thallium, total mg/L 1 mg/L 102 tin, total 7440-31-5 E420 0.0001 mg/L 0.5 mg/L 101 80.0 120 7440-32-6 E420 0.0003 80.0 120 titanium, total mg/L 0.25 mg/L 97.8 7440-61-1 E420 0.00001 mg/L 80.0 120 uranium, total 0.005 mg/L 104 7440-62-2 E420 0.0005 80.0 120 mg/L vanadium, total 0.5 mg/L 103 7440-66-6 E420 0.003 80.0 120 zinc, total mg/L 0.5 mg/L 91.4 7439-97-6 E509 0.000005 80.0 120 mercury, dissolved mg/L 0.0001 mg/L 92.2 Dissolved Metals (QCLot: 767114) 7429-90-5 E421 aluminum, dissolved 0.001 mg/L 109 80.0 120 2 mg/L antimony, dissolved 7440-36-0 E421 0.0001 mg/L 1 mg/L 104 80.0 120 7440-38-2 E421 0.0001 80.0 120 arsenic, dissolved mg/L 1 mg/L 103 7440-39-3 E421 0.0001 mg/L 80.0 120 barium, dissolved 0.25 mg/L 105 7440-41-7 E421 0.00002 80.0 120 mg/L beryllium, dissolved 0.1 mg/L 105 7440-69-9 E421 0.00005 mg/L 96.6 80.0 120 bismuth, dissolved 1 mg/L 7440-42-8 E421 0.01 80.0 120 boron, dissolved mg/L 1 mg/L 96.3 cadmium, dissolved 7440-43-9 E421 0.000005 mg/L 101 0.08 120 0.1 mg/L calcium, dissolved 7440-70-2 E421 0.05 0.08 120 mg/L 50 mg/L 102 cobalt, dissolved 7440-48-4 E421 0.0001 mg/L 103 0.08 120 0.25 mg/L

0.0002

0.01

mg/L

mg/L

0.25 mg/L

1 mg/L

101

102

0.08

0.08

120

120

7440-50-8 E421

7439-89-6 E421

 Page
 :
 14 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION

zinc, dissolved

chromium, dissolved

Dissolved Metals (QCLot: 767115)



Laboratory Control Sample (LCS) Report Sub-Matrix: Water Spike Recovery (%) Recovery Limits (%) CAS Number Method LOR Unit Qualifier Analyte Concentration LCS Low High Dissolved Metals (QCLot: 767114) - continued 7439-92-1 E421 0.00005 80.0 120 lead, dissolved mg/L 0.5 mg/L 99.0 7439-93-2 E421 0.001 mg/L 80.0 120 lithium, dissolved 0.25 mg/L 108 magnesium, dissolved 7439-95-4 E421 0.005 mg/L 50 mg/L 114 80.0 120 7439-96-5 E421 manganese, dissolved 0.0001 mg/L 0.25 mg/L 106 80.0 120 7439-98-7 E421 0.00005 molybdenum, dissolved mg/L 0.25 mg/L 101 80.0 120 7440-02-0 E421 0.0005 nickel, dissolved mg/L 0.5 mg/L 102 80.0 120 7440-09-7 E421 0.05 80.0 120 potassium, dissolved mg/L 50 mg/L 106 selenium, dissolved 7782-49-2 E421 0.00005 mg/L 1 mg/L 98.7 80.0 120 7440-21-3 E421 0.05 60.0 140 mg/L silicon, dissolved 10 mg/L 103 7440-22-4 E421 silver, dissolved 0.00001 mg/L 80.0 120 0.1 mg/L 95.5 7440-23-5 E421 120 0.05 mg/L 80.0 sodium, dissolved 50 mg/L 104 strontium, dissolved 7440-24-6 E421 0.0002 mg/L 0.25 mg/L 105 80.0 120 sulfur, dissolved 7704-34-9 E421 0.5 mg/L 50 mg/L 80.0 120 104 thallium, dissolved 7440-28-0 E421 0.00001 mg/L 95.9 80.0 120 1 mg/L 7440-31-5 E421 0.0001 tin, dissolved mg/L 0.5 mg/L 105 80.0 120 7440-32-6 E421 0.0003 mg/L 80.0 120 titanium, dissolved 0.25 mg/L 101 7440-61-1 E421 uranium, dissolved 0.00001 mg/L 0.005 mg/L 106 80.0 120 7440-62-2 E421 0.0005 80.0 mg/L 120 vanadium, dissolved 0.5 mg/L 107

0.001

0.0001

mg/L

mg/L

0.5 mg/L

0.25 mg/L

98.8

105

80.0

80.0

120

120

7440-66-6 E421

7440-47-3 E421.Cr-L

 Page
 :
 15 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



#### Matrix Spike (MS) Report

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

| Sub-Matrix: Water       |                                    |                                     |             |            | Matrix Spike (MS) Report |           |              |          |            |           |  |
|-------------------------|------------------------------------|-------------------------------------|-------------|------------|--------------------------|-----------|--------------|----------|------------|-----------|--|
|                         |                                    |                                     |             |            | Spi                      | ike       | Recovery (%) | Recovery | Limits (%) |           |  |
| Laboratory sample<br>ID | Client sample ID                   | Analyte                             | CAS Number  | Method     | Concentration            | Target    | MS           | Low      | High       | Qualifier |  |
| Anions and Nutri        | ents (QCLot: 764740)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216696-002           | LC_MT1_WS_LAEMP_DRY<br>_2022-11_NP | phosphate, ortho-, dissolved (as P) | 14265-44-2  | E378-U     | 0.0520 mg/L              | 0.05 mg/L | 104          | 70.0     | 130        |           |  |
| Anions and Nutri        | ents (QCLot: 764773)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | ammonia, total (as N)               | 7664-41-7   | E298       | 0.105 mg/L               | 0.1 mg/L  | 105          | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764809)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | fluoride                            | 16984-48-8  | E235.F     | 0.970 mg/L               | 1 mg/L    | 97.0         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764810)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | bromide                             | 24959-67-9  | E235.Br-L  | 0.479 mg/L               | 0.5 mg/L  | 95.8         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764811)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | chloride                            | 16887-00-6  | E235.CI-L  | 96.3 mg/L                | 100 mg/L  | 96.3         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764812)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | nitrate (as N)                      | 14797-55-8  | E235.NO3-L | 2.42 mg/L                | 2.5 mg/L  | 96.7         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764813)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | nitrite (as N)                      | 14797-65-0  | E235.NO2-L | 0.488 mg/L               | 0.5 mg/L  | 97.7         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 764814)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216689-002           | Anonymous                          | sulfate (as SO4)                    | 14808-79-8  | E235.SO4   | 94.5 mg/L                | 100 mg/L  | 94.5         | 75.0     | 125        |           |  |
| Anions and Nutri        | ents (QCLot: 765467)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216681-001           | Anonymous                          | phosphorus, total                   | 7723-14-0   | E372-U     | ND mg/L                  | 0.05 mg/L | ND           | 70.0     | 130        |           |  |
| Anions and Nutri        | ents (QCLot: 765468)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216696-005           | LC_GRCK_WS_LAEMP_D<br>RY_2022-11_N | phosphorus, total                   | 7723-14-0   | E372-U     | 0.0466 mg/L              | 0.05 mg/L | 93.1         | 70.0     | 130        |           |  |
| Anions and Nutri        | ents (QCLot: 765499)               |                                     |             |            |                          |           |              |          |            |           |  |
| CG2216695-003           | Anonymous                          | Kjeldahl nitrogen, total [TKN]      | <del></del> | E318       | 2.64 mg/L                | 2.5 mg/L  | 106          | 70.0     | 130        |           |  |
| Organic / Inorgar       | nic Carbon (QCLot: 7647            | 778)                                |             |            |                          |           |              |          |            |           |  |
| CG2216689-001           | Anonymous                          | carbon, dissolved organic [DOC]     |             | E358-L     | 5.43 mg/L                | 5 mg/L    | 108          | 70.0     | 130        |           |  |
| Organic / Inorgar       | nic Carbon (QCLot: 7647            | 779)                                |             |            |                          |           |              |          |            |           |  |
| CG2216689-001           | Anonymous                          | carbon, total organic [TOC]         |             | E355-L     | 5.51 mg/L                | 5 mg/L    | 110          | 70.0     | 130        |           |  |
| Total Metals (QC        | Lot: 764833)                       |                                     |             |            |                          |           |              |          |            |           |  |

 Page
 :
 16 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



Matrix Spike (MS) Report Sub-Matrix: Water Recovery (%) Recovery Limits (%) Spike Laboratory sample Client sample ID Analyte CAS Number Method Concentration Target MS Low High Qualifier Total Metals (QCLot: 764833) - continued CG2216696-002 LC MT1 WS LAEMP DRY mercury, total 7439-97-6 E508 0.0000977 mg/L 0.0001 mg/L 97.7 70.0 130 2022-11 NP Total Metals (QCLot: 766892) CG2216689-002 Anonymous chromium, total 7440-47-3 E420.Cr-L 0.388 mg/L 96.9 70.0 130 0.4 mg/L Total Metals (QCLot: 766893) CG2216689-002 Anonymous aluminum, total 7429-90-5 E420 2.27 mg/L 2 mg/L 113 70.0 130 antimony, total 7440-36-0 E420 0.199 mg/L 0.2 mg/L 99.6 70.0 130 arsenic, total 7440-38-2 E420 0.190 mg/L 0.2 mg/L 95.0 70.0 130 barium, total E420 7440-39-3 0.198 mg/L 98.8 70.0 130 0.2 mg/L beryllium, total 7440-41-7 E420 0.394 mg/L 98.6 70.0 130 0.4 mg/L bismuth, total 7440-69-9 E420 0.108 mg/L 0.1 mg/L 108 70.0 130 boron, total 7440-42-8 E420 0.904 mg/L 90.4 70.0 130 1 mg/L cadmium, total 7440-43-9 E420 0.0404 mg/L 0.04 mg/L 101 70.0 130 calcium, total E420 7440-70-2 ND mg/L 40 mg/L ND 70.0 130 cobalt, total 7440-48-4 E420 0.186 mg/L 0.2 mg/L 92.8 70.0 130 copper, total 7440-50-8 E420 0.199 mg/L 0.2 mg/L 99.7 70.0 130 iron, total E420 7439-89-6 20.0 mg/L 20 mg/L 100 70.0 130 lead, total 7439-92-1 E420 0.199 mg/L 0.2 mg/L 99.6 70.0 130 lithium, total 7439-93-2 E420 0.923 mg/L 1 mg/L 92.3 70.0 130 magnesium, total E420 7439-95-4 ND mg/L 10 mg/L ND 70.0 130 manganese, total E420 7439-96-5 0.204 mg/L 0.2 mg/L 102 70.0 130 molybdenum, total 7439-98-7 E420 0.195 mg/L 0.2 mg/L 97.7 70.0 130 nickel, total 7440-02-0 E420 0.373 mg/L 0.4 mg/L 93.2 70.0 130 potassium, total 7440-09-7 E420 40 mg/L 40.3 mg/L 101 70.0 130 selenium, total 7782-49-2 E420 0.399 mg/L 0.4 mg/L 99.7 70.0 130 silicon, total 7440-21-3 E420 101 mg/L 100 mg/L 101 70.0 130 silver, total 7440-22-4 E420 0.0436 ma/L 0.04 mg/L 109 70.0 130 sodium, total 7440-23-5 E420 18.6 mg/L 20 mg/L 93.0 70.0 130 strontium, total 7440-24-6 E420 0.196 mg/L 98.0 70.0 130 0.2 mg/L sulfur, total 7704-34-9 E420 188 mg/L 200 mg/L 94.0 70.0 130 thallium, total 7440-28-0 E420 0.0410 mg/L 0.04 mg/L 102 70.0 130 tin, total 7440-31-5 E420 0.197 mg/L 0.2 mg/L 98.7 70.0 130 titanium, total 7440-32-6 E420 0.382 mg/L 0.4 mg/L 95.5 70.0 130 uranium, total 7440-61-1 E420 0.0419 mg/L 0.04 mg/L 105 70.0 130 vanadium, total 7440-62-2 E420 0.958 mg/L 95.8 70.0 130 1 mg/L

 Page
 :
 17 of 18

 Work Order
 :
 CG2216696

 Client
 :
 Teck Coal Limited

 Project
 :
 LINE CREEK OPERATION



Matrix Spike (MS) Report Sub-Matrix: Water Recovery (%) Recovery Limits (%) Spike Laboratory sample Client sample ID Analyte CAS Number Method Concentration Target MS Low High Qualifier Total Metals (QCLot: 766893) - continued CG2216689-002 Anonymous zinc, total 7440-66-6 E420 3.53 mg/L 4 mg/L 88.4 70.0 130 Dissolved Metals (QCLot: 764834) CG2216696-003 LC\_CC1\_WS\_LAEMP\_DRY mercury, dissolved 7439-97-6 E509 0.0000968 mg/L 0.0001 mg/L 96.8 70.0 130 2022-11 NP Dissolved Metals (QCLot: 767114) CG2216696-003 LC CC1 WS LAEMP DRY aluminum, dissolved E421 7429-90-5 2.09 mg/L 2 mg/L 104 70.0 130 \_2022-11\_NP antimony, dissolved 7440-36-0 E421 0.196 mg/L 0.2 mg/L 97.8 70.0 130 arsenic, dissolved 7440-38-2 E421 0.202 mg/L 0.2 mg/L 101 70.0 130 barium, dissolved E421 7440-39-3 98.9 70.0 0.198 mg/L 0.2 mg/L 130 beryllium, dissolved 7440-41-7 E421 0.432 mg/L 108 70.0 130 0.4 mg/L bismuth, dissolved 7440-69-9 E421 0.0957 mg/L 0.1 mg/L 95.7 70.0 130 boron, dissolved 7440-42-8 E421 0.962 mg/L 96.2 70.0 130 1 mg/L cadmium, dissolved 7440-43-9 E421 0.0398 mg/L 99.6 70.0 130 0.04 mg/L calcium, dissolved ND mg/L 7440-70-2 E421 ND 70.0 130 40 mg/L cobalt, dissolved 7440-48-4 E421 0.201 mg/L 0.2 mg/L 100 70.0 130 copper, dissolved 7440-50-8 E421 0.201 mg/L 100 70.0 130 0.2 mg/L iron, dissolved 7439-89-6 E421 19.3 mg/L 20 mg/L 96.7 70.0 130 lead, dissolved 7439-92-1 E421 0.195 mg/L 0.2 mg/L 97.5 70.0 130 lithium, dissolved 7439-93-2 E421 1.08 mg/L 1 mg/L 108 70.0 130 magnesium, dissolved 7439-95-4 E421 ND mg/L 10 mg/L ND 70.0 130 manganese, dissolved E421 0.2 mg/L 7439-96-5 0.206 mg/L 103 70.0 130 molybdenum, dissolved 7439-98-7 E421 0.212 mg/L 106 70.0 130 0.2 mg/L nickel, dissolved 7440-02-0 E421 0.400 mg/L 0.4 mg/L 100 70.0 130 potassium, dissolved 7440-09-7 E421 40.7 mg/L 40 mg/L 102 70.0 130 selenium, dissolved 7782-49-2 E421 0.394 mg/L 0.4 mg/L 98.6 70.0 130 silicon, dissolved 7440-21-3 E421 96.8 mg/L 100 mg/L 96.8 70.0 130 silver, dissolved 7440-22-4 E421 0.0408 ma/L 0.04 mg/L 102 70.0 130 sodium, dissolved 7440-23-5 E421 21.5 mg/L 20 mg/L 108 70.0 130 strontium, dissolved 7440-24-6 E421 0.213 mg/L 106 70.0 130 0.2 mg/L sulfur, dissolved 7704-34-9 E421 195 mg/L 70.0 130 200 mg/L 97.5 thallium, dissolved 7440-28-0 E421 0.0378 mg/L 0.04 mg/L 94.6 70.0 130 tin, dissolved 7440-31-5 E421 0.195 mg/L 97.7 70.0 130 0.2 mg/L titanium, dissolved 7440-32-6 E421 0.371 mg/L 0.4 mg/L 92.7 70.0 130 uranium, dissolved 7440-61-1 E421 0.0428 mg/L 0.04 mg/L 107 70.0 130 vanadium, dissolved 7440-62-2 E421 102 70.0 130 1.02 mg/L 1 mg/L

Page 18 of 18 CG2216696 Work Order: Client

Teck Coal Limited



| Sub-Matrix: Water                            | Matrix: Water                      |                     |            |                    | Matrix Spike (MS) Report |          |                     |      |      |           |  |
|--|------------------------------------|---------------------|------------|--------------------|--------------------------|----------|---------------------|------|------|-----------|--|
|  |                                    |                     |            | Spike Recovery (%) |                          | Recovery | Recovery Limits (%) |      |      |           |  |
| Laboratory sample<br>ID                      | Client sample ID                   | Analyte             | CAS Number | Method             | Concentration            | Target   | MS                  | Low  | High | Qualifier |  |
| Dissolved Metals (QCLot: 767114) - continued |                                    |                     |            |                    |                          |          |                     |      |      |           |  |
| CG2216696-003                                | LC_CC1_WS_LAEMP_DRY                | zinc, dissolved     | 7440-66-6  | E421               | 3.84 mg/L                | 4 mg/L   | 96.0                | 70.0 | 130  |           |  |
| Dissolved Metals                             | issolved Metals (QCLot: 767115)    |                     |            |                    |                          |          |                     |      |      |           |  |
| CG2216696-003                                | LC_CC1_WS_LAEMP_DRY<br>_2022-11_NP | chromium, dissolved | 7440-47-3  | E421.Cr-L          | 0.407 mg/L               | 0.4 mg/L | 102                 | 70.0 | 130  |           |  |

**Teck** LAEMP DRY 2022-11 ALS RUSH N/A COC ID: TURNAROUND TIME: Regulat PROJECT/CLIENT INFO OTHER INFO LABORATORY Lab Name ALS Facility Name / Job# Line Creek Operation Report Format / Distribution Excel Project Manager Nicole Zathey Email Lyudmyla.Shvets@ALSGlobal.com Email 2: teckcoal@equisonlinc.com Address Box 2003 Address 2559 29 Street NE Email 3 Teck Lab Results@teck.co 15km North Hwy 43 Email 4: Hannah.Penner@teck.co BC Province City Calgary AB Email 5: City Sparwood Province aquascilab@teck.com Postal Code T1Y 7B5 V0B 2G0 Country Canada Country Canada Email 6: lborwon@minnow.ca **Environmental Division** Phone Number 1-403-407-1781 -425-8478 VPO00816101 PO number Calgary SAMPLE DETAILS ANALYSIS REQUESTED Filtered - F: Field, L: Lab, F Work Order Reference N N N CG2216696 H2SO4 HCL HCL HNO3 HNO3 NONE H2SO4 Hazardous Material (Yes/No) FECKCOAL\_ROUTIN TECKCOAL\_METNH G\_D FECKCOAL\_METNH G\_T TOC\_TKN\_NH3\_TP Mercury\_Dissolved Mercury\_Total Telephone: +1 403 407 1800 G=Grab Sample Location Field Time C=Com # Of Date 36 Matrix (24hr) Sample ID (sys loc code) Cont 90490 LC RD1 WS LAEMP DRY 2022-#DIAM TP2 #NAM 2022/11/94 LC RD1 WS G 1 1 1 1 11 NP LCMTI\_WS-LAFMP\_DRY 2022/11/16 10:30 × LC-MT w s G × X × × × × LC. CCI-WS-LAEMP-DRY 2022/11/20 #PEASM W 5 × LCCCI X X X × 10:30 X X 7 10 1011-11-NP C- FRB.WS -LAEMP-DRY-2022 11 200 10:30 #NAM LCFRB W S 6 × X × × አ x 2022-11-N **7**€? LC-GRCK. WS-LAGHP-DRY #NAM 7 E2 2022/11/20 10:30 LC-GRCK WS K X × × 4 1 LC-FRUS-WS-LAEMP-PRY-#NAM G 2022/11/28 13:30 × × LC-FRUS WS ~ \* × ~ × 7 E? C- DOEF - WS - LACHT - DRY -#NAM 2022 11 29 [0:30 LC PCEF WS × × × X X × × #NAM #NAM #NAM ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS RELINQUISHED BY/AFFILIATION DATE/TIME ACCEPTED BY/AFFILIATION DATE/TIME BOURDBIN VALLEAU NOV 3012022 nunnas SERVICE REQUEST (rush - subject to availability) Klalleur Regular (default) 46 970.7535 Sampler's Name Mobile # Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge 2012. Sampler's Signature Date/Time

For Emergency <1 Day, ASAP or Weekend - Contact ALS

## **SELENIUM SPECIATION**

BAL Final Report 2205247 (Finalized 02-June-22)

18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

June 2, 2022

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Teck Resources Limited - Vancouver Mike Pope 421 Pine Avenue Sparwood, B.C. CANADA V0B2G0 mike.pope@teck.com

Re: Line creek operations

Dear Mike Pope,

On May 19, 2022, Brooks Applied Labs (BAL) received four (4) aqueous samples. The samples were loggedin for total recoverable selenium [Se], dissolved Se [Se], and Se speciation analyses, according to the chainof-custody (COC) form.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

#### Total Recoverable Se and Dissolved Se

Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

#### Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenocyanate [SeCN], methylseleninic selenite [Se(IV)], selenate acid [MeSe(IV)]. [Se(VI)]. selenomethionine methaneselenonic acid [MeSe(VI)], [SeMet], selenosulfate [SeSO<sub>3</sub>], dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium

Confidential BAL Final Report 2205247

species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute

Senior Project Manager

Jeremy@brooksapplied.com

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**Project ID:** TRL-VC2101 **PM:** Jeremy Maute

BROOKS APPLIED BAL Final Report 2205247 Client PM: Mike Pope Client Project: Line creek operations

# Report Information

#### **Laboratory Accreditation**

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <a href="http://www.brooksapplied.com/resources/certificates-permits/">http://www.brooksapplied.com/resources/certificates-permits/</a> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

#### **Field Quality Control Samples**

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

#### **Common Abbreviations**

| AR  | as received                         | MS  | matrix spike                       |
|-----|-------------------------------------|-----|------------------------------------|
| BAL | Brooks Applied Labs                 | MSD | matrix spike duplicate             |
| BLK | method blank                        | ND  | non-detect                         |
| BS  | blank spike                         | NR  | non-reportable                     |
| CAL | calibration standard                | N/C | not calculated                     |
| CCB | continuing calibration blank        | PS  | post preparation spike             |
| CCV | continuing calibration verification | REC | percent recovery                   |
| COC | chain of custody record             | RPD | relative percent difference        |
| D   | dissolved fraction                  | SCV | secondary calibration verification |
| DUP | duplicate                           | SOP | standard operating procedure       |
| IBL | instrument blank                    | SRM | reference material                 |
| ICV | initial calibration verification    | T   | total fraction                     |
| MDL | method detection limit              | TR  | total recoverable fraction         |
| MRL | method reporting limit              |     |                                    |

#### **Definition of Data Qualifiers**

(Effective 3/23/2020)

- E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
- Holding time and/or preservation requirements not met. Please see narrative for explanation.
- J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
- **J-1** Estimated value. A full explanation is presented in the narrative.
- **M** Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
- **N** Spike recovery was not within acceptance criteria. Please see narrative for explanation.
- **R** Rejected, unusable value. A full explanation is presented in the narrative.
- U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
- X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
- **Z** Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA <u>SOW ILM03.0</u>, Exhibit B, Section III, pg. B-18, and the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010</u>. These supersede all previous qualifiers ever employed by BAL.

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**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

## **Accreditation Information**

#### Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard) Issued on: July 1, 2021; Valid to: June 30, 2022

Certificate Number: E87982-37

| Method    | Matrix   | TNI Accredited Analyte(s)  |  |  |  |  |
|-----------|--|--|--|--|--|--|
| EPA 1638  | Non-Potable Waters                                   | Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn   |  |  |  |  |
| EPA 200.8 | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                               |  |  |  |  |
|           | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                   |  |  |  |  |
| EPA 6020  | Solids/Chemicals & Biological                        | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn                      |  |  |  |  |
| BAL-5000  | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness |  |  |  |  |
|           | Solids/Chemicals                                     | Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn                                   |  |  |  |  |
|           | Biological   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn                  |  |  |  |  |
| EPA 1640  | Non-Potable Waters                                   | Cd, Cu, Pb, Ni, Zn   |  |  |  |  |
| EPA 1631E | Non-Potable Waters,<br>Solids/Chemicals & Biological | Total Mercury  |  |  |  |  |
| EPA 1630  | Non-Potable Waters                                   | Methyl Mercury   |  |  |  |  |
| BAL-3200  | Solids/Chemicals & Biological                        | Methyl Mercury   |  |  |  |  |
| BAL-4100  | Non-Potable Waters                                   | As(III), As(V), DMAs, MMAs   |  |  |  |  |
| BAL-4201  | Non-Potable Waters                                   | Se(IV), Se(VI)   |  |  |  |  |
| BAL-4300  | Non-Potable Waters<br>Solid/Chemicals                | Cr(VI)   |  |  |  |  |
| SM2340B   | Non-Potable Waters                                   | Hardness   |  |  |  |  |

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**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2205247 Client PM: Mike Pope Client Project: Line creek operations

## **Accreditation Information**

# Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

| Method  | Matrix   | ISO and Non-Gov. TNI Accredited Analyte(s)  |  |  |  |  |  |
|---|--|---|--|--|--|--|--|
| EPA 1638 Mod<br>EPA 200.8 Mod<br>EPA 6020 Mod | Non-Potable Waters   | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn                   |  |  |  |  |  |
| BAL-5000                                      | Solids/Chemicals & Biological                                | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only) |  |  |  |  |  |
| EPA 1640 Mod                                  | Non-Potable Waters   | Cd, Cu, Pb, Ni, Zn<br>Ag, As, Cr, Co, Se, Tl, V (ISO Only)  |  |  |  |  |  |
| EPA 1631E Mod<br>BAL-3100                     | Non-Potable Waters,<br>Solids/Chemicals &<br>Biological/Food | Total Mercury   |  |  |  |  |  |
| EPA 1630 Mod<br>BAL-3200                      | Non-Potable Waters,<br>Solids/Chemicals<br>Biological        | Methyl Mercury  |  |  |  |  |  |
| EPA 1632A Mod                                 | Non-Potable Waters   | Inorganic Arsenic (ISO Only)  |  |  |  |  |  |
| BAL-3300                                      | Biological/Food<br>Solids/Chemicals                          | Inorganic Arsenic (ISO Only)  |  |  |  |  |  |
| AOAC 2015.01 Mod<br>BAL-5000                  | Food   | As, Cd, Hg, Pb  |  |  |  |  |  |
| <b>5.1.</b> 4466                              | Non-Potable Waters   | As(III), As(V), DMAs, MMAs  |  |  |  |  |  |
| BAL-4100                                      | Biological by BAL-4117                                       | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |  |  |  |  |  |
| BAL-4101                                      | Food by BAL-4117   | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |  |  |  |  |  |
| BAL-4201                                      | Non-Potable Waters   | Se(IV), Se(VI), SeCN, SeMet   |  |  |  |  |  |
| BAL-4300                                      | Non-Potable Waters,<br>Solid/Chemicals                       | Cr(VI)  |  |  |  |  |  |
| SM 3500-Fe<br>BAL-4500                        | Non-Potable Waters   | Fe, Fe(II) (ISO Only)   |  |  |  |  |  |
| SM2340B                                       | Non-Potable Waters   | Hardness  |  |  |  |  |  |
| SM 2540G<br>BAL-0501                          | Solids/Chemicals &<br>Biological                             | % Dry Weight  |  |  |  |  |  |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

# Sample Information

| Sample                                      | Lab ID     | <b>Report Matrix</b> | Туре   | Sampled    | Received   |
|---|------------|----------------------|--------|------------|------------|
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-05_NP     | 2205247-01 | WS                   | Sample | 05/11/2022 | 05/19/2022 |
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-05_NP     | 2205247-02 | WS                   | Sample | 05/11/2022 | 05/19/2022 |
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-05 NP     | 2205247-03 | WS                   | Sample | 05/11/2022 | 05/19/2022 |
| <br>LC_GRCK_WS_LAEMP_LCO_DRY_<br>2022-05 NP | 2205247-04 | WS                   | Sample | 05/11/2022 | 05/19/2022 |
| <br>LC_GRCK_WS_LAEMP_LCO_DRY_<br>2022-05 NP | 2205247-05 | WS                   | Sample | 05/11/2022 | 05/19/2022 |
| <br>LC_GRCK_WS_LAEMP_LCO_DRY_<br>2022-05 NP | 2205247-06 | WS                   | Sample | 05/11/2022 | 05/19/2022 |

# **Batch Summary**

| Analyte   | Lab Matrix | Method       | Prepared   | Analyzed   | Batch   | Sequence |
|-----------|------------|--------------|------------|------------|---------|----------|
| DMSeO     | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| MeSe(IV)  | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| MeSe(VI)  | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| Se        | Water      | EPA 1638 Mod | 05/20/2022 | 05/23/2022 | B221118 | S220564  |
| Se(IV)    | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| Se(VI)    | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| SeCN      | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| SeMet     | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| SeSO3     | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |
| Unk Se Sp | Water      | SOP BAL-4201 | 05/19/2022 | 05/20/2022 | B221103 | S220553  |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

# Sample Results

| Sample                              | Analyte                             | Report Matrix                    | Basis | Result  | Qualifier | MDL   | MRL   | Unit | Batch   | Sequence |  |  |  |
|-------------------------------------|-------------------------------------|----------------------------------|-------|---------|-----------|-------|-------|------|---------|----------|--|--|--|
| LC FRUS WS                          | LAEMP LCO                           | DRY 2022-05 NF                   | •     |         |           |       |       |      |         |          |  |  |  |
| 2205247-01                          | DMSeO                               | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | MeSe(IV)                            | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | MeSe(VI)                            | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | Se(IV)                              | WS                               | D     | 0.175   |           | 0.010 | 0.075 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | Se(VI)                              | WS                               | D     | 52.7    |           | 0.010 | 0.055 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | SeCN                                | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | SeMet                               | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | SeSO3                               | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-01                          | Unk Se Sp                           | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B221103 | S220553  |  |  |  |
| I C FRIIS WS                        | LC_FRUS_WS_LAEMP_LCO_DRY_2022-05_NP |                                  |       |         |           |       |       |      |         |          |  |  |  |
| 2205247-02                          | _ <i></i> Se                        | _ <b>D</b> .(1_2022-00_/\)<br>WS | D     | 49.0    |           | 0.165 | 0.528 | μg/L | B221118 | S220564  |  |  |  |
| 2200241-02                          | 00                                  | ***                              | Б     | 40.0    |           | 0.100 | 0.020 | µ9/∟ | BZZTTTO | 0220004  |  |  |  |
| LC_FRUS_WS                          | _LAEMP_LCO                          | _DRY_2022-05_NF                  | •     |         |           |       |       |      |         |          |  |  |  |
| 2205247-03                          | Se                                  | WS                               | TR    | 49.4    |           | 0.165 | 0.528 | μg/L | B221118 | S220564  |  |  |  |
| LC GRCK WS LAEMP LCO DRY 2022-05 NP |                                     |                                  |       |         |           |       |       |      |         |          |  |  |  |
| 2205247-04                          | DMSeO                               | _ <i>DR1_2022-03_N</i><br>WS     | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | MeSe(IV)                            | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | MeSe(VI)                            | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | Se(IV)                              | WS                               | D     | 0.033   | J         | 0.010 | 0.075 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | Se(VI)                              | WS                               | D     | 1.52    | -         | 0.010 | 0.055 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | SeCN                                | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | SeMet                               | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | SeSO3                               | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B221103 | S220553  |  |  |  |
| 2205247-04                          | Unk Se Sp                           | WS                               | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B221103 | S220553  |  |  |  |
| 10 0001/ 11/0                       |                                     | DDV 2020 05 **                   | n     |         |           |       |       |      |         |          |  |  |  |
|                                     |                                     | _DRY_2022-05_N                   |       | 4.00    |           | 0.465 | 0.500 | /1   | D004440 | 0000504  |  |  |  |
| 2205247-05                          | Se                                  | WS                               | D     | 1.68    |           | 0.165 | 0.528 | μg/L | B221118 | S220564  |  |  |  |
| LC_GRCK_WS_LAEMP_LCO_DRY_2022-05_NP |                                     |                                  |       |         |           |       |       |      |         |          |  |  |  |
| 2205247-06                          | Se                                  | WS                               | TR    | 1.79    |           | 0.165 | 0.528 | μg/L | B221118 | S220564  |  |  |  |



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

## Accuracy & Precision Summary

Batch: B221103 Lab Matrix: Water Method: SOP BAL-4201

| Sample       | Analyte                   | Native     | Spike      | Result | Units | <b>REC &amp; Limits</b> | RPD & Limits |
|--------------|---------------------------|------------|------------|--------|-------|-------------------------|--------------|
| B221103-BS1  | Blank Spike, (2124033)    |            |            |        |       |                         |              |
|              | MeSe(IV)                  |            | 5.095      | 5.515  | μg/L  | 108% 75-125             |              |
|              | Se(IV)                    |            | 5.000      | 4.996  | μg/L  | 100% 75-125             |              |
|              | Se(VI)                    |            | 5.000      | 4.875  | μg/L  | 98% 75-125              |              |
|              | SeCN                      |            | 5.015      | 4.810  | μg/L  | 96% 75-125              |              |
|              | SeMet                     |            | 4.932      | 4.935  | μg/L  | 100% 75-125             |              |
| B221103-DUP4 | Duplicate, (2205247-04)   |            |            |        |       |                         |              |
|              | DMSeO                     | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | MeSe(IV)                  | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | MeSe(VI)                  | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | Se(IV)                    | 0.033      |            | 0.027  | μg/L  |                         | 22% 25       |
|              | Se(VI)                    | 1.520      |            | 1.490  | μg/L  |                         | 2% 25        |
|              | SeCN                      | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | SeMet                     | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | SeSO3                     | ND         |            | ND     | μg/L  |                         | N/C 25       |
|              | Unk Se Sp                 | ND         |            | ND     | μg/L  |                         | N/C 25       |
| B221103-MS4  | Matrix Spike, (2205247-0  | 4)         |            |        |       |                         |              |
|              | Se(IV)                    | 0.033      | 4.900      | 4.741  | μg/L  | 96% 75-125              |              |
|              | Se(VI)                    | 1.520      | 5.100      | 6.358  | μg/L  | 95% 75-125              |              |
|              | SeCN                      | ND         | 1.962      | 1.703  | μg/L  | 87% 75-125              |              |
|              | SeMet                     | ND         | 1.977      | 1.835  | μg/L  | 93% 75-125              |              |
| B221103-MSD4 | Matrix Spike Duplicate, ( | 2205247-04 | 1          |        |       |                         |              |
|              | Se(IV)                    | 0.033      | ,<br>4.900 | 4.693  | μg/L  | 95% 75-125              | 1% 25        |
|              | Se(VI)                    | 1.520      | 5.100      | 6.366  | μg/L  | 95% 75-125              | 0.1% 25      |
|              | SeCN                      | ND         | 1.962      | 1.725  | μg/L  | 88% 75-125              | 1% 25        |
|              | SeMet                     | ND         | 1.977      | 1.824  | μg/L  | 92% 75-125              | 0.6% 25      |



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

## Accuracy & Precision Summary

Batch: B221118 Lab Matrix: Water Method: EPA 1638 Mod

| Sample<br>B221118-BS1 | Analyte                          | Native                     | Spike                         | Result              | Units                        | REC & | Limits | RPD & Limits |
|-----------------------|----------------------------------|----------------------------|-------------------------------|---------------------|------------------------------|-------|--------|--------------|
| B221110-B31           | Blank Spike, (2128022)<br>Se     |                            | 200.0                         | 195.1               | μg/L                         | 98%   | 75-125 |              |
| B221118-BS2           | Blank Spike, (2128022)<br>Se     |                            | 200.0                         | 195.9               | μg/L                         | 98%   | 75-125 |              |
| B221118-BS3           | Blank Spike, (2128022)<br>Se     |                            | 200.0                         | 197.9               | μg/L                         | 99%   | 75-125 |              |
| B221118-SRM1          | Reference Material (21450        | 11, TMDA 5                 |                               |                     |                              | -     | 75.405 |              |
|                       | Se                               |                            | 14.30                         | 13.87               | μg/L                         | 97%   | 75-125 |              |
| B221118-SRM2          | Reference Material (21450)<br>Se | 11, TMDA 5                 | <b>1.5 Reference</b><br>14.30 | Standard -<br>14.08 | - <b>Bottle 10 -</b><br>μg/L | •     | 75-125 |              |
| B221118-SRM3          | Reference Material (21450        | 11, TMDA 5                 | <b>1.5 Reference</b><br>14.30 | Standard - 13.91    | - <b>Bottle 10 -</b><br>μg/L | •     | 75-125 |              |
| B221118-DUP3          | Duplicate, (2205247-06)<br>Se    | 1.793                      |                               | 1.721               | μg/L                         |       |        | 4% 20        |
| B221118-MS3           | Matrix Spike, (2205247-06)<br>Se | 1.793                      | 220.0                         | 216.5               | μg/L                         | 98%   | 75-125 |              |
| B221118-MSD3          | Matrix Spike Duplicate, (2:      | <b>205247-06)</b><br>1.793 | 220.0                         | 221.6               | μg/L                         | 100%  | 75-125 | 2% 20        |



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

### Method Blanks & Reporting Limits

Batch: B221103 Matrix: Water

Method: SOP BAL-4201 Analyte: DMSeO

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

### Method Blanks & Reporting Limits

Analyte: Se(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015

Analyte: Se(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: SeCN

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |
|              |        |       |

 Average: 0.000
 MDL: 0.002

 Limit: 0.010
 MRL: 0.010

Analyte: SeMet

| Sample        | Result | Units |
|---------------|--------|-------|
| B221103-BLK1  | 0.00   | μg/L  |
| B221103-BLK2  | 0.00   | μg/L  |
| B221103-BLK3  | 0.00   | μg/L  |
| B221103-BI K4 | 0.00   | ua/l  |

**Average:** 0.000 **MDL:** 0.002 **Limit:** 0.005 **MRL:** 0.005



BAL Final Report 2205247 Client PM: Mike Pope Client Project: Line creek operations

## Method Blanks & Reporting Limits

Analyte: SeSO3

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: Unk Se Sp

| Sample       | Result | Units |
|--------------|--------|-------|
| B221103-BLK1 | 0.00   | μg/L  |
| B221103-BLK2 | 0.00   | μg/L  |
| B221103-BLK3 | 0.00   | μg/L  |
| B221103-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2205247 Client PM: Mike Pope Client Project: Line creek operations

## Method Blanks & Reporting Limits

Batch: B221118 Matrix: Water

Method: EPA 1638 Mod

Analyte: Se

| Sample       | Result | Units |
|--------------|--------|-------|
| B221118-BLK1 | 0.097  | μg/L  |
| B221118-BLK2 | 0.071  | μg/L  |
| B221118-BLK3 | 0.083  | μg/L  |
| B221118-BLK4 | 0.028  | μg/L  |

**Average:** 0.070 **MDL:** 0.150 **Limit:** 0.480 **MRL:** 0.480



BAL Final Report 2205247
Client PM: Mike Pope
Client Project: Line creek operations

2205247

## Sample Containers

| Sam  | ID: 2205247-01<br>ple:<br>FRUS_WS_LAEMP_LCO_DR\ | / 2022-05 NP |     | Report Matrix: WS<br>Sample Type: Sample + Sum | Collected: 05/11/2022<br>Received: 05/19/2022 |    |                                      |  |  |
|--|---|--------------|-----|--|---|----|--------------------------------------|--|--|
| _  | Container                                       | Size         | Lot | Preservation                                   | P-Lot   | рН | Ship. Cont.                          |  |  |
| Α  | Cent Tube 15mL Se-Sp                            | 15 mL        | na  | none   | na  | na | Cooler 5 -<br>2205247                |  |  |
| В  | XTRA_VOL  | 15 mL        | na  | none   | na  | na | Cooler 5 -<br>2205247                |  |  |
| С  | XTRA_VOL  | 125 mL       | na  | none   | na  | na | Cooler 5 -<br>2205247                |  |  |
| Sam  | ID: 2205247-02<br>ple:<br>FRUS WS LAEMP LCO DRY | / 2022-05 NP |     | Report Matrix: WS<br>Sample Type: Sample + Sum |   |    | cted: 05/11/2022<br>ived: 05/19/2022 |  |  |
| _  | Container                                       | Size         | Lot | Preservation                                   | P-Lot   | рН | Ship. Cont.                          |  |  |
| Α  | Client-Provided - TM                            | 40 mL        | na  | 10% HNO3 (BAL)                                 | 2152004                                       | <2 | Cooler 5 -<br>2205247                |  |  |
| Sam  | ID: 2205247-03<br>ple:<br>FRUS WS LAEMP LCO DRY | / 2022-05 NP |     | Report Matrix: WS<br>Sample Type: Sample + Sum | Collected: 05/11/2022<br>Received: 05/19/2022 |    |                                      |  |  |
| _  | Container                                       | Size         | Lot | Preservation                                   | P-Lot   | рН | Ship. Cont.                          |  |  |
| Α  | Client-Provided - TM                            | 40 mL        | na  | 10% HNO3 (BAL)                                 | 2152004                                       | <2 | Cooler 5 -<br>2205247                |  |  |
| Lab ID: 2205247-04 Sample: LC GRCK WS LAEMP LCO DRY 2022-05 NP |   |              |     | Report Matrix: WS<br>Sample Type: Sample + Sum |   |    | cted: 05/11/2022<br>ived: 05/19/2022 |  |  |
| _  | Container                                       | Size         | Lot | Preservation                                   | P-Lot   | рН | Ship. Cont.                          |  |  |
| Α  | Cent Tube 15mL Se-Sp                            | 15 mL        | na  | none   | na  | na | Cooler 5 -<br>2205247                |  |  |
| В  | XTRA_VOL  | 15 mL        | na  | none   | na  | na | Cooler 5 -<br>2205247                |  |  |
| С  | XTRA_VOL  | 125 mL       | na  | none   | na  | na | Cooler 5 -                           |  |  |

**Project ID**: TRL-VC2101 **PM**: Jeremy Maute



BAL Final Report 2205247 Client PM: Mike Pope Client Project: Line creek operations

#### Sample Containers

**Lab ID**: 2205247-05

Sample:

LC\_GRCK\_WS\_LAEMP\_LCO\_DRY\_2022-05\_NP

Des Container

Client-Provided - TM 40 mL

Report Matrix: WS
Sample Type: Sample + Sum

Lot Preservation na 10% HNO3 (BAL)

ation P-Lot

P-Lot pH 2152004 <2

Cooler 5 -2205247

Collected: 05/11/2022 Received: 05/19/2022

Collected: 05/11/2022

Received: 05/19/2022

Ship. Cont.

Lab ID: 2205247-06

Sample:

LC\_GRCK\_WS\_LAEMP\_LCO\_DRY\_2022-05\_NP

Des Container Size
A Client-Provided - TM 40 mL

Report Matrix: WS

Lot

na

Sample Type: Sample + Sum

Preservation 10% HNO3 (BAL) P-Lot 2152004 pH Ship. Cont. <2 Cooler 5 -

2205247

#### **Shipping Containers**

Cooler 5 - 2205247

Received: May 19, 2022 7:00

Tracking No: PAPS#RWHV99228 via Courier

Coolant Type: Ice Temperature: 1.8 °C Description: Large Cooler Damaged in transit? No Returned to client? No Comments: IR#33 Custody seals present? No Custody seals intact? No COC present? Yes

|      | The second secon | — ** ** ** ** ** ** ** ** ** ** ** ** ** |
|------|--|--|
| 11.5 | and the second   | _  |
|      |  |  |
|      |  |  |
|      |  |  |
|      |  | _  |

| ieck                                | COC ID:  | LCO Dry         | LAEN                        | 4P_2022_MAY | Brooks      | TURN               | AROUND         | TIM              | 1E:                  |              |             |                 |        |         |           | RUSH                                     |                        |   |             |                |
|-------------------------------------|--|-----------------|-----------------------------|-------------|-------------|--------------------|----------------|------------------|----------------------|--------------|-------------|-----------------|--------|---------|-----------|--|------------------------|---|-------------|----------------|
| PRO                                 | PROJECT/CLIENT INFO                                |                 |                             |             | LABORATORY  |                    |                |                  | THE ROOM             |              |             |                 | OTHE   | RINFO   |           | 110                                      |                        |   |             |                |
| Facility Name / Job#                | Line creek operations                              |                 |                             |             |             |                    | Lab Name       | Broo             | ks App               | plied La     | bs          |                 | Re     | port Fo | rmat / D  | istributio                               | on                     | Excel                                   | PDF         | EDD            |
| Project Manager                     | Mike Pope  |                 |                             |             |             | La                 | b Contact      | Ben <sup>1</sup> | Wozni                | ak           |             |                 | Ema    | ail 1:  |           |  |                        | ¥                                       | X           | X              |
| Email                               | Mike Pope@teck.com                                 |                 |                             |             |             |                    | Email          | Ben@             | @broo                | ksappli      | ed.com      |                 | Ema    | ail 2:  | teckcual? | equisoniu                                | ie.comi                |   |             | N              |
| Address                             | 421 Pine Ave                                       |                 |                             |             |             |                    | Address        | 1880             | 4 Nort               | h Creek      | Parkway     |                 | Ema    | ail 3:  |           | Results@t                                |                        | X                                       | X           | 1.             |
|                                     |  |                 |                             |             |             |                    |                | Suite            | 100                  |              |             |                 | Ema    | ail 4:  |           | Labilited                                |                        | x                                       | X           | 1              |
| City                                | Sparw  | ond.            |                             | Province BC |             |                    | City           | Both             | ell                  |              | Province    | WA              | Ema    | ail 5:  | -         | aminnaw.                                 |                        | x                                       | X"          | T <sub>V</sub> |
| Postal Code                         | V0B  | 2G0             |                             | Country Can | ada '       | Po                 | ostal Code     | 9801             | 1                    |              | Country     | United          | Ema    | ail 6:  |           |  | minnow o               | x                                       |             | l <sub>v</sub> |
| Phone Number                        | 250-425-8202                                       |                 |                             |             |             | Phon               | e Number       | (206)            | 753-6                | 5158         | -           | -               | PO nu  | umber   | Lorenta   | -11-5-11-11-11-11-11-11-11-11-11-11-11-1 | 748                    | 540                                     |             |                |
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|                                     |  |                 | faterial (Y                 |             |             |                    |                | 3.00             | peciation            |              |             |                 |        |         |           |  |                        |   |             |                |
| Sample ID                           | Sample Location<br>(sys loc code)                  | Field<br>Matrix | Hazardous Material (Yes/No) | Date        | Time (24hr) | G=Grab<br>C=Com    | # Of<br>Cont.  | TEAT             | Brooks_Se_Speciation | Brooks_Se_D  | Brooks_Se_T |                 |        |         |           |  |                        |   |             |                |
| LC_FRUS_WS_LAEMP_LCO_DRY_2022-05_NP | I.C FRUS   | ws              | No                          | 11-May-22   | 10:30       | G                  | 1              |                  | 1                    |              |             |                 |        |         |           |  |                        |   |             | +-             |
| LC_FRUS_WS_LAEMP_LCO_DRY_2022-05_NP | LC FRUS  | ws              | No                          | 11-May-22   | 10:30       | G                  | 2              |                  |                      | 1            | 1           |                 |        |         |           |  |                        |   |             |                |
| LC_GRCK_WS_LAEMP_LCO_DRY_2022-05_NP | LC_GRCK  | ws              | No                          | 11-May-22   | 13:30       | G                  | 1              |                  | 1                    |              |             |                 |        |         |           |  |                        |   |             |                |
| LC_GRCK_WS_LAEMP_LCO_DRY_2022-05_NP | LC_GRCK  | WS              | No                          | 11-May-22   | 13:30       | G                  | 2              |                  |                      | 1            | 1           | -               |        |         |           | -  |                        |   |             | +              |
|                                     |  |                 |                             |             |             |                    |                |                  |                      |              |             |                 |        |         |           |  |                        |   |             |                |
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Revision 004

STRAIGHT BILL OF LADING NOT NEGOTIABLE

No. 92280

24 Hour Hot Shot Service

Sparwood, BC Terrace, BC

Effective 7/29/20

Vancouver, BC Calgary, AB

Prince George, BC \*\*
Edmonton, AB Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

Tumbler Ridge, BC Hinton, AB Gillette, WY

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#### **SELENIUM SPECIATION**

BAL Final Report 2206435 (Finalized 22-July-22)

July 22, 2022

Teck Resources Limited - Vancouver Nicole Zathev 421 Pine Avenue Sparwood, B.C. CANADA V0B2G0 nicole.zathey@teck.com

Re: Line creek operations

Dear Nicole Zathey,

On June 30, 2022, Brooks Applied Labs (BAL) received four (4) aqueous samples. The samples were loggedin for total recoverable selenium [Se], dissolved Se [Se], and Se speciation analyses, according to the chainof-custody (COC) form.

The client sample LC\_CC1\_WS\_LAEMP\_DRY\_2022-06\_NP was listed on the COC form, but there were no containers with this description included in the sample shipment. Brooks Applied Labs (BAL) did receive an extra set of samples. The information on the container labels is provided in in the table below.

Extra Samples Received with the Sample Shipment

| Sample ID (on container label) | Analysis                 |
|--------------------------------|--------------------------|
| LC_MTI_WS_2022-06-NP           | Se Speciation            |
| LC_MTI_WS_2022-06-NP_NAL       | Dissolved Recoverable Se |
| LC_MTI_WS_2022-06-NP_NAL       | Total Recoverable Se     |

The client was informed, and BAL was advised that the LC\_MTI samples were the missing LC\_CC1 samples present on the COC form. For reporting, the LC\_MTI samples were renamed to reflect the LC\_CC1 samples described on the COC form. A summary of the Sample ID designations is provided in the table below.

**Samples ID Cross Reference Table** 

| Laboratory ID | Sample ID (on COC form)        | Sample ID (on container label) | Analysis                |
|---------------|--------------------------------|--------------------------------|-------------------------|
| 2206435-07    | LC_CC1_WS_LAEMP_DRY_2022-06_NP | LC_MTI_WS_2022-06-NP           | Se Speciation           |
| 2206435-08    | LC_CC1_WS_LAEMP_DRY_2022-06_NP | LC_MTI_WS_2022-06-NP_NAL       | Dissolved Se            |
| 2206435-09    | LC_CC1_WS_LAEMP_DRY_2022-06_NP | LC_MTI_WS_2022-06-NP_NAL       | Total Recoverable<br>Se |

For samples 2206435-07, 2206435-08, and 2206435-09, the **Sample ID** values provided on the COC form (*column two in the table above*) were used for reporting.

**Date/Time Collected** values listed on the chain-of-custody (COC) form did not exactly match the corresponding **Date/Time Collected** values on the container labels for 2206435-02 and 2206435-03. The discrepancies are described in the table below.

**Date/Time Collected Discrepancies** 

| Laboratory<br>ID | Sample ID                               | Date/Time<br>Collected (on COC<br>form) | Date/Time Collected (or container label) |  |  |
|------------------|---|---|--|--|--|
| 2206435-02       | LC_FRUS_WS_LAEMP_LCO_DRY_2022-<br>06_NP | 06/22/2022 12:00                        | 06/21/2022 12:00                         |  |  |
| 2206435-03       | LC_FRUS_WS_LAEMP_LCO_DRY_2022-<br>06_NP | 06/22/2022 12:00                        | 06/21/2022 12:00                         |  |  |

2206435-02 and 2206435-03 were logged in and reported using the **Date/Time Collected** values listed on the COC form (column 3 in the table above).

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

#### Total Recoverable Se and Dissolved Se

Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

In the trace metals digest (Batch B221452), the four method blank samples (B221452-BLK1, B221452-BLK2, B221452-BLK3, and B221452-BLK4) produced selenium results greater than the associated method reporting limits (MRL). Associated client sample results are greater than ten times the value of the elevated results in the method blanks. The potential the impact of the of the elevated selenium in (B221452-BLK1, B221452-BLK3, and B221452-BLK4) is minimal for these samples. No corrective actions were needed, and no data were qualified based on the elevated selenium in the Batch B221452 method blanks.

#### Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(IV)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(IV)], selenomethionine [SeMet], selenosulfate  $[SeSO_3]$ , and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk SeSp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute

Senior Project Manager

Jeremy@brooksapplied.com

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

### Report Information

#### **Laboratory Accreditation**

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <a href="http://www.brooksapplied.com/resources/certificates-permits/">http://www.brooksapplied.com/resources/certificates-permits/</a> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

#### **Field Quality Control Samples**

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

#### **Common Abbreviations**

| AR  | as received                         | MS  | matrix spike                       |
|-----|-------------------------------------|-----|------------------------------------|
| BAL | Brooks Applied Labs                 | MSD | matrix spike duplicate             |
| BLK | method blank                        | ND  | non-detect                         |
| BS  | blank spike                         | NR  | non-reportable                     |
| CAL | calibration standard                | N/C | not calculated                     |
| CCB | continuing calibration blank        | PS  | post preparation spike             |
| CCV | continuing calibration verification | REC | percent recovery                   |
| COC | chain of custody record             | RPD | relative percent difference        |
| D   | dissolved fraction                  | SCV | secondary calibration verification |
| DUP | duplicate                           | SOP | standard operating procedure       |
| IBL | instrument blank                    | SRM | reference material                 |
| ICV | initial calibration verification    | Т   | total fraction                     |
| MDL | method detection limit              | TR  | total recoverable fraction         |
| MRL | method reporting limit              |     |                                    |

#### **Definition of Data Qualifiers**

(Effective 3/23/2020)

- E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
- Holding time and/or preservation requirements not met. Please see narrative for explanation.
- J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
- **J-1** Estimated value. A full explanation is presented in the narrative.
- **M** Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
- **N** Spike recovery was not within acceptance criteria. Please see narrative for explanation.
- **R** Rejected, unusable value. A full explanation is presented in the narrative.
- U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
- X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
- **Z** Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA <u>SOW ILM03.0</u>, Exhibit B, Section III, pg. B-18, and the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010</u>. These supersede all previous qualifiers ever employed by BAL.

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## **Accreditation Information**

#### Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022

Certificate Number: E87982-37

| Method    | Matrix   | TNI Accredited Analyte(s)  |
|-----------|--|--|
| EPA 1638  | Non-Potable Waters                                   | Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn   |
| EPA 200.8 | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                               |
|           | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                   |
| EPA 6020  | Solids/Chemicals & Biological                        | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn                      |
|           | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness |
| BAL-5000  | Solids/Chemicals                                     | Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn                                   |
|           | Biological   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn                  |
| EPA 1640  | Non-Potable Waters                                   | Cd, Cu, Pb, Ni, Zn   |
| EPA 1631E | Non-Potable Waters,<br>Solids/Chemicals & Biological | Total Mercury  |
| EPA 1630  | Non-Potable Waters                                   | Methyl Mercury   |
| BAL-3200  | Solids/Chemicals & Biological                        | Methyl Mercury   |
| BAL-4100  | Non-Potable Waters                                   | As(III), As(V), DMAs, MMAs   |
| BAL-4201  | Non-Potable Waters                                   | Se(IV), Se(VI)   |
| BAL-4300  | Non-Potable Waters<br>Solid/Chemicals                | Cr(VI)   |
| SM2340B   | Non-Potable Waters                                   | Hardness   |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

#### **Accreditation Information**

## Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

| Method                       | Matrix   | ISO and Non-Gov. TNI Accredited Analyte(s)  |  |  |  |  |  |
|------------------------------|--|---|--|--|--|--|--|
| EPA 1638 Mod                 | Non-Potable Waters   | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn                   |  |  |  |  |  |
| EPA 6020 Mod                 |  |   |  |  |  |  |  |
| BAL-5000                     | Solids/Chemicals & Biological                                | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only) |  |  |  |  |  |
| EPA 1640 Mod                 | Non-Potable Waters   | Cd, Cu, Pb, Ni, Zn<br>Ag, As, Cr, Co, Se, Tl, V (ISO Only)  |  |  |  |  |  |
| EPA 1631E Mod                | Non-Potable Waters,<br>Solids/Chemicals &<br>Biological/Food | Total Mercury   |  |  |  |  |  |
| BAL-3100                     | , , ,  |   |  |  |  |  |  |
| EPA 1630 Mod                 | Non-Potable Waters,<br>Solids/Chemicals                      | Methyl Mercury  |  |  |  |  |  |
| BAL-3200                     | Biological   | ,,  |  |  |  |  |  |
| EPA 1632A Mod                | Non-Potable Waters   | Inorganic Arsenic (ISO Only)  |  |  |  |  |  |
| BAL-3300                     | Biological/Food  |   |  |  |  |  |  |
|                              | Solids/Chemicals   | Inorganic Arsenic (ISO Only)  |  |  |  |  |  |
| AOAC 2015.01 Mod<br>BAL-5000 | Food   | As, Cd, Hg, Pb  |  |  |  |  |  |
|                              | Non-Potable Waters   | As(III), As(V), DMAs, MMAs  |  |  |  |  |  |
| BAL-4100                     | Biological by BAL-4117                                       | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |  |  |  |  |  |
| BAL-4101                     | Food by BAL-4117   | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |  |  |  |  |  |
| BAL-4201                     | Non-Potable Waters   | Se(IV), Se(VI), SeCN, SeMet   |  |  |  |  |  |
| BAL-4300                     | Non-Potable Waters,<br>Solid/Chemicals                       | Cr(VI)  |  |  |  |  |  |
| SM 3500-Fe<br>BAL-4500       | Non-Potable Waters   | Fe, Fe(II) (ISO Only)   |  |  |  |  |  |
| SM2340B                      | Non-Potable Waters   | Hardness  |  |  |  |  |  |
| SM 2540G<br>BAL-0501         | Solids/Chemicals & Biological                                | % Dry Weight  |  |  |  |  |  |



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## Sample Information

| Sample                                  | Lab ID     | Report Matrix | Type   | Sampled    | Received   |
|---|------------|---------------|--------|------------|------------|
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-06_NP | 2206435-01 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-06_NP | 2206435-02 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| LC_FRUS_WS_LAEMP_LCO_DRY_<br>2022-06_NP | 2206435-03 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| Sample does not exist                   | 2206435-04 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| Sample does not exist                   | 2206435-05 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| Sample does not exist                   | 2206435-06 | WS            | Sample | 06/22/2022 | 06/30/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>6_NP      | 2206435-07 | WS            | Sample | unknown    | 06/30/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>6_NP      | 2206435-08 | WS            | Sample | unknown    | 06/30/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>6_NP      | 2206435-09 | WS            | Sample | unknown    | 06/30/2022 |

## **Batch Summary**

| Analyte   | Lab Matrix | Method       | Prepared   | Analyzed   | Batch   | Sequence |
|-----------|------------|--------------|------------|------------|---------|----------|
| DMSeO     | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| MeSe(IV)  | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| MeSe(VI)  | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| Se        | Water      | EPA 1638 Mod | 07/01/2022 | 07/08/2022 | B221452 | S220697  |
| Se(IV)    | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| Se(VI)    | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| SeCN      | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| SeMet     | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| SeSO3     | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |
| Unk Se Sp | Water      | SOP BAL-4201 | 06/29/2022 | 07/01/2022 | B221439 | S220685  |



BAL Final Report 2206435
Client PM: Nicole Zathey
Client Project: Line creek operations

## Sample Results

| Sample      | Analyte     | Report Matrix                | Basis | Result  | Qualifier | MDL   | MRL   | Unit | Batch    | Sequence |
|-------------|-------------|------------------------------|-------|---------|-----------|-------|-------|------|----------|----------|
| LC FRUS WS  | LAEMP LCO   | DRY 2022-06 NF               | •     |         |           |       |       |      |          |          |
| 2206435-01  | DMSeO       | ws                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-01  | MeSe(IV)    | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-01  | MeSe(VI)    | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-01  | Se(IV)      | WS                           | D     | 0.079   |           | 0.010 | 0.075 | μg/L | B221439  | S220685  |
| 2206435-01  | Se(VI)      | WS                           | D     | 21.3    |           | 0.010 | 0.055 | μg/L | B221439  | S220685  |
| 2206435-01  | SeCN        | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B221439  | S220685  |
| 2206435-01  | SeMet       | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-01  | SeSO3       | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B221439  | S220685  |
| 2206435-01  | Unk Se Sp   | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B221439  | S220685  |
|             |             | DDV 0000 00 M                | _     |         |           |       |       |      |          |          |
|             |             | _DRY_2022-06_NF              |       | 00.7    |           | 0.405 | 0.500 |      | D004450  | 000000   |
| 2206435-02  | Se          | WS                           | D     | 23.7    |           | 0.165 | 0.528 | μg/L | B221452  | S220697  |
| IC EDIIS WS | I AEMP I CO | DRY 2022-06 NF               | •     |         |           |       |       |      |          |          |
| 2206435-03  | _ <i></i>   | _ <b>DK1_2022-00_W</b><br>WS | TR    | 23.4    |           | 0.165 | 0.528 | μg/L | B221452  | S220697  |
| 2200433-03  | 00          | WO                           | 111   | 20.4    |           | 0.100 | 0.020 | ру/L | DZZ 140Z | 0220031  |
| LC_CC1_WS_I | LAEMP_DRY_2 | 2022-06_NP                   |       |         |           |       |       |      |          |          |
| 2206435-07  | DMSeO       | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-07  | MeSe(IV)    | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-07  | MeSe(VI)    | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-07  | Se(IV)      | WS                           | D     | 0.080   |           | 0.010 | 0.075 | μg/L | B221439  | S220685  |
| 2206435-07  | Se(VI)      | WS                           | D     | 21.2    |           | 0.010 | 0.055 | μg/L | B221439  | S220685  |
| 2206435-07  | SeCN        | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B221439  | S220685  |
| 2206435-07  | SeMet       | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B221439  | S220685  |
| 2206435-07  | SeSO3       | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B221439  | S220685  |
| 2206435-07  | Unk Se Sp   | WS                           | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B221439  | S220685  |
| LC CC1 WS I | AEMD DDY 1  | 2022 OF ND                   |       |         |           |       |       |      |          |          |
|             |             | <b>—</b>                     | Б     | 22.4    |           | 0.165 | 0.520 | ua/l | D2244E2  | 000007   |
| 2206435-08  | Se          | WS                           | D     | 23.4    |           | 0.165 | 0.528 | μg/L | B221452  | S220697  |
| LC_CC1_WS_I | LAEMP DRY 2 | 2022-06 NP                   |       |         |           |       |       |      |          |          |
| 2206435-09  | Se -        | ws                           | TR    | 24.2    |           | 0.165 | 0.528 | μg/L | B221452  | S220697  |



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## Accuracy & Precision Summary

Batch: B221439 Lab Matrix: Water Method: SOP BAL-4201

| Sample       | Analyte                   | Native     | Spike | Result | Units        | REC & Limits | RPD & Limits |
|--------------|---------------------------|------------|-------|--------|--------------|--------------|--------------|
| B221439-BS1  | Blank Spike, (2124033)    |            |       |        |              |              |              |
|              | MeSe(IV)                  |            | 5.095 | 5.761  | μg/L         | 113% 75-125  |              |
|              | Se(IV)                    |            | 5.000 | 4.815  | μg/L         | 96% 75-125   |              |
|              | Se(VI)                    |            | 5.000 | 4.567  | μg/L         | 91% 75-125   |              |
|              | SeCN                      |            | 5.015 | 4.982  | μg/L         | 99% 75-125   |              |
|              | SeMet                     |            | 4.932 | 4.865  | μg/L         | 99% 75-125   |              |
| B221439-DUP4 | Duplicate, (2206434-07)   |            |       |        |              |              |              |
|              | DMSeO                     | 0.020      |       | 0.019  | μg/L         |              | 8% 25        |
|              | MeSe(IV)                  | 0.042      |       | 0.044  | μg/L         |              | 4% 25        |
|              | MeSe(VI)                  | ND         |       | ND     | μg/L         |              | N/C 25       |
|              | Se(IV)                    | 0.523      |       | 0.525  | μg/L         |              | 0.4% 25      |
|              | Se(VI)                    | 2.104      |       | 2.081  | μg/L         |              | 1% 25        |
|              | SeCN                      | ND         |       | ND     | μg/L         |              | N/C 25       |
|              | SeMet                     | ND         |       | ND     | μg/L         |              | N/C 25       |
|              | SeSO3                     | ND         |       | ND     | μg/L         |              | N/C 25       |
|              | Unk Se Sp                 | ND         |       | ND     | μg/L         |              | N/C 25       |
| B221439-MS4  | Matrix Spike, (2206434-0  | 7)         |       |        |              |              |              |
|              | Se(IV)                    | 0.523      | 4.900 | 4.942  | μg/L         | 90% 75-125   |              |
|              | Se(VI)                    | 2.104      | 5.100 | 6.583  | μg/L         | 88% 75-125   |              |
|              | SeCN                      | ND         | 1.962 | 1.783  | μg/L         | 91% 75-125   |              |
|              | SeMet                     | ND         | 1.977 | 1.901  | μg/L         | 96% 75-125   |              |
| B221439-MSD4 | Matrix Spike Duplicate, ( | 2206434-07 | 1     |        |              |              |              |
|              | Se(IV)                    | 0.523      | 4.900 | 4.932  | μg/L         | 90% 75-125   | 0.2% 25      |
|              | Se(VI)                    | 2.104      | 5.100 | 6.535  | μg/L         | 87% 75-125   | 0.7% 25      |
|              | SeCN                      | ND         | 1.962 | 1.774  | μg/L         | 90% 75-125   | 0.5% 25      |
|              | SeMet                     | ND         | 1.977 | 1.894  | μg/L<br>μg/L | 96% 75-125   | 0.4% 25      |
|              | CONTOL                    | 140        | 1.077 | 1.00 r | P9′ <b>-</b> | 3070 70 120  | 0.170 20     |



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## Accuracy & Precision Summary

Batch: B221452 Lab Matrix: Water Method: EPA 1638 Mod

| Sample<br>B221452-BS1 | Analyte                                     | Native                      | Spike                  | Result              | Units                       | REC & | Limits | RPD & Lir | nits |
|-----------------------|---|-----------------------------|------------------------|---------------------|-----------------------------|-------|--------|-----------|------|
| B221432-B31           | <b>Blank Spike</b> , <b>(2137005)</b><br>Se |                             | 200.0                  | 186.3               | μg/L                        | 93%   | 75-125 |           |      |
| B221452-BS2           | Blank Spike, (2137005)<br>Se                |                             | 200.0                  | 195.5               | μg/L                        | 98%   | 75-125 |           |      |
| B221452-SRM1          | Reference Material (22140                   | 10, TMDA 5                  | 51.5 Referenc          | e Standard          | - Bottle 2 -                | SRM)  |        |           |      |
|                       | Se  |                             | 14.30                  | 14.34               | μg/L                        | 100%  | 75-125 |           |      |
| B221452-SRM2          | Reference Material (22140)                  | 10, TMDA 5                  | 51.5 Referenc<br>14.30 | e Standard<br>13.38 | <b>- Bottle 2 -</b><br>μg/L | •     | 75-125 |           |      |
|                       |   |                             |                        |                     |                             |       |        |           |      |
| B221452-DUP2          | <b>Duplicate, (2206435-03)</b><br>Se        | 23.43                       |                        | 23.32               | μg/L                        |       |        | 0.5%      | 20   |
| B221452-MS2           | Matrix Spike, (2206435-03)<br>Se            | )<br>23.43                  | 220.0                  | 235.2               | μg/L                        | 96%   | 75-125 |           |      |
| B221452-MSD2          | Matrix Spike Duplicate, (2)                 | <b>206435-03</b> )<br>23.43 | 220.0                  | 230.2               | ug/l                        | 040/  | 75-125 | 2%        | 20   |
|                       | S€  | 23.43                       | 220.0                  | 230.2               | μg/L                        | 9470  | 10-120 | ∠%        | 20   |



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

#### Method Blanks & Reporting Limits

Batch: B221439 Matrix: Water

Method: SOP BAL-4201 Analyte: DMSeO

 Sample
 Result
 Units

 B221439-BLK1
 0.00
 μg/L

 B221439-BLK2
 0.00
 μg/L

 B221439-BLK3
 0.00
 μg/L

 B221439-BLK4
 0.00
 μg/L

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005

Analyte: MeSe(IV)

 Sample
 Result
 Units

 B221439-BLK1
 0.00
 μg/L

 B221439-BLK2
 0.00
 μg/L

 B221439-BLK3
 0.00
 μg/L

 B221439-BLK4
 0.00
 μg/L

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(VI)

 Sample
 Result
 Units

 B221439-BLK1
 0.00
 μg/L

 B221439-BLK2
 0.00
 μg/L

 B221439-BLK3
 0.00
 μg/L

 B221439-BLK4
 0.00
 μg/L

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

### Method Blanks & Reporting Limits

| Analyte: | Se(I | V) |
|----------|------|----|
|----------|------|----|

| Sample       | Result | Units |
|--------------|--------|-------|
| B221439-BLK1 | 0.00   | μg/L  |
| B221439-BLK2 | 0.00   | μg/L  |
| B221439-BLK3 | 0.00   | μg/L  |
| B221439-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.002 Limit: 0.015 MRL: 0.015

#### Analyte: Se(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B221439-BLK1 | 0.00   | μg/L  |
| B221439-BLK2 | 0.00   | μg/L  |
| B221439-BLK3 | 0.00   | μg/L  |
| B221439-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

#### Analyte: SeCN

| Sample       |   | Result | Units |
|--------------|---|--------|-------|
| B221439-BLK1 |   | 0.00   | μg/L  |
| B221439-BLK2 |   | 0.00   | μg/L  |
| B221439-BLK3 |   | 0.00   | μg/L  |
| B221439-BLK4 |   | 0.00   | μg/L  |
|              | _ |        |       |

 Average: 0.000
 MDL: 0.002

 Limit: 0.010
 MRL: 0.010

#### Analyte: SeMet

| Sample        | Result | Units |
|---------------|--------|-------|
| B221439-BLK1  | 0.00   | μg/L  |
| B221439-BLK2  | 0.00   | μg/L  |
| B221439-BLK3  | 0.00   | μg/L  |
| B221439-BI K4 | 0.00   | ua/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## Method Blanks & Reporting Limits

Analyte: SeSO3

| Sample       | Result | Units |
|--------------|--------|-------|
| B221439-BLK1 | 0.00   | μg/L  |
| B221439-BLK2 | 0.00   | μg/L  |
| B221439-BLK3 | 0.00   | μg/L  |
| B221439-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: Unk Se Sp

| Sample       | Result | Units |
|--------------|--------|-------|
| B221439-BLK1 | 0.00   | μg/L  |
| B221439-BLK2 | 0.00   | μg/L  |
| B221439-BLK3 | 0.00   | μg/L  |
| B221439-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

## Method Blanks & Reporting Limits

Batch: B221452 Matrix: Water

Method: EPA 1638 Mod

Analyte: Se

| Sample       | Result | Units |
|--------------|--------|-------|
| B221452-BLK1 | 0.626  | μg/L  |
| B221452-BLK2 | 0.566  | μg/L  |
| B221452-BLK3 | 0.574  | μg/L  |
| B221452-BLK4 | 0.521  | μg/L  |

**Average:** 0.572 **MDL:** 0.150 **Limit:** 0.480 **MRL:** 0.480



BAL Final Report 2206435
Client PM: Nicole Zathey
Client Project: Line creek operations

## Sample Containers

| Sam  | ID: 2206435-01<br>ple:<br>FRUS_WS_LAEMP_LCO_DR | Y 2022-06 NP |   | Report Matrix: WS<br>Sample Type: Sample + Sum |         |   | cted: 06/22/2022<br>ived: 06/30/2022 |
|--|--|--------------|---|--|---------|---|--------------------------------------|
|  | Container                                      | Size         | Lot   | Preservation                                   | P-Lot   | рН  | Ship. Cont.                          |
| Α  | Cent Tube 15mL Se-Sp                           | 15 mL        | na  | none   | na      | na  | Cooler 6 -<br>2206435                |
| В  | XTRA_VOL                                       | 15 mL        | na  | none   | na      | na  | Cooler 6 -<br>2206435                |
| С  | XTRA_VOL                                       | 125 mL       | na  | none   | na      | na  | Cooler 6 -<br>2206435                |
| •  |  |              |   | Report Matrix: WS<br>Sample Type: Sample + Sum |         |   | cted: 06/22/2022<br>ived: 06/30/2022 |
| _  | Container                                      | Size         | Lot   | Preservation                                   | P-Lot   | рН  | Ship. Cont.                          |
| Α  | Client-Provided - TM                           | 40 mL        | na  | 10% HNO3 (BAL)                                 | 2218038 | <2  | Cooler 6 -<br>2206435                |
| Lab ID: 2206435-03 Sample: LC_FRUS_WS_LAEMP_LCO_DRY_2022-06_NP |  |              | Report Matrix: WS Sample Type: Sample + Sum |  |         | Collected: 06/22/2022<br>Received: 06/30/2022 |                                      |
| _  | Container                                      | Size         | Lot   | Preservation                                   | P-Lot   | рН  | Ship. Cont.                          |
| Α  | Client-Provided - TM                           | 40 mL        | na  | 10% HNO3 (BAL)                                 | 2218038 | <2  | Cooler 6 -<br>2206435                |
|  | ID: 2206435-04 ple: Sample does not exist      |              |   | Report Matrix: WS Sample Type: Sample + Sum    |         |   | cted: 06/22/2022<br>ived: 06/30/2022 |
|  | Container                                      | Size         | Lot   | Preservation                                   | P-Lot   | рН  | Ship. Cont.                          |
| Α  | Cent Tube 15mL Se-Sp                           | 15 mL        | na  | none   | na      | na  | Cooler 6 -<br>2206435                |
| В  | XTRA_VOL                                       | 15 mL        | na  | none   | na      | na  | Cooler 6 -<br>2206435                |
| С  | XTRA_VOL                                       | 125 mL       | na  | none   | na      | na  | Cooler 6 -<br>2206435                |



BAL Final Report 2206435
Client PM: Nicole Zathey
Client Project: Line creek operations

## **Sample Containers**

| Samı                 | D: 2206435-05 ple: Sample does not exist Container | Size          | Lot | Report Matrix: WS Sample Type: Sample + Sum Preservation | P-Lot   | Recei           | ted: 06/22/2022<br>ved: 06/30/2022               |  |
|----------------------|--|---------------|-----|--|---------|-----------------|--|--|
| A                    | Client-Provided - TM                               | 40 mL         | na  | 10% HNO3 (BAL)   | 2218038 | <b>pH</b><br><2 | Ship. Cont.<br>Cooler 6 -<br>2206435             |  |
|                      | D: 2206435-06 ple: Sample does not exist           |               |     | Report Matrix: WS Sample Type: Sample + Sum              |         |                 | ted: 06/22/2022<br>ved: 06/30/2022               |  |
|                      | Container  | Size          | Lot | Preservation   | P-Lot   | pH              | Ship. Cont.                                      |  |
| Α                    | Client-Provided - TM                               | 40 mL         | na  | 10% HNO3 (BAL)   | 2218038 | <2              | Cooler 6 -<br>2206435                            |  |
|                      | <b>D</b> : 2206435-07                              |               |     | Report Matrix: WS  |         | Coll            | ected: unknown                                   |  |
|                      | ple: LC_CC1_WS_LAEMP_D                             |               |     | Sample Type: Sample + Sum                                |         |                 | ved: 06/30/2022                                  |  |
|                      | Container  | Size          | Lot | Preservation   | P-Lot   | рН              | Ship. Cont.                                      |  |
| Α                    | Cent Tube 15mL Se-Sp                               | 15 mL         | na  | none   | na      | na              | Cooler 6 -<br>2206435                            |  |
| В                    | XTRA_VOL   | 15 mL         | na  | none   | na      | na              | Cooler 6 -<br>2206435                            |  |
| С                    | XTRA_VOL   | 125 mL        | na  | none   | na      | na              | Cooler 6 -<br>2206435                            |  |
|                      | <b>D</b> : 2206435-08<br>ple: LC_CC1_WS_LAEMP_D    | RY 2022-06 NP |     | Report Matrix: WS Sample Type: Sample + Sum              |         |                 | ected: unknown<br>ved: 06/30/2022                |  |
| -                    | Container  | Size          | Lot | Preservation   | P-Lot   | pH              | Ship. Cont.                                      |  |
| Α                    | Client-Provided - TM                               | 40 mL         | na  | 10% HNO3 (BAL)   | 2218038 | <2              | Cooler 6 -<br>2206435                            |  |
| Sam <sub> </sub> Des | D: 2206435-09 ple: LC_CC1_WS_LAEMP_Di Container    | Size          | Lot | Report Matrix: WS Sample Type: Sample Preservation       | P-Lot   | Receive pH      | ected: unknown<br>ved: 06/30/2022<br>Ship. Cont. |  |
| Α                    | Client-Provided - TM                               | 40 mL         | na  | 10% HNO3 (BAL)   | 2218038 | <2              | Cooler 6 -<br>2206435                            |  |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2206435 Client PM: Nicole Zathey Client Project: Line creek operations

### **Shipping Containers**

Cooler 6 - 2206435

Received: June 30, 2022 7:00

Tracking No: PAPS#RWHV55065 via Courier

Coolant Type: Ice Temperature: -1.8 °C Description: stryrofoam cooler Damaged in transit? No Returned to client? No Comments: IR#:33 Custody seals present? No Custody seals intact? No COC present? Yes

|  | COC ID:  | LCO Dry           | y LAEN                      | AP_2022_June       | Brooks        | TURN.  | AROUNE        | TIM     | Œ:                   |             |             |          |            |                    |   | RUSH:       |              |        |          |        |
|--|--|-------------------|-----------------------------|--------------------|---------------|--|---------------|---------|----------------------|-------------|-------------|----------|------------|--------------------|---|-------------|--------------|--------|----------|--------|
| PRO  | PROJECT/CLIENT INTO Facility Name / Job# Line creek operations |                   |                             |                    |               | LABORATORY   |               |         |                      |             |             |          | OTHER INFO |                    |   |             |              |        |          |        |
| Facility Name / Job#   |  |                   |                             |                    |               | Lab Name Brooks Applied Labs   |               |         |                      |             |             | Re       | ort Fo     | rmat / Di          | istributio                              | n           | Excel        | PDF    | ED       |        |
| Project Manager  | Nicole Zathey  |                   |                             |                    |               | Lab Contact Ben Wozniak  |               |         |                      |             |             |          | Ema        | il 1:              | + 7/5/2×0                               | e D         |              | X      | X        | l.v    |
| Email  | nicole.zathev@teck.com   |                   |                             |                    |               |  | Email         | Ben@    | broo                 | ksapplie    | d.com       |          | Ema        | il 2:              | 100000000000000000000000000000000000000 | inguisontin | e comi       | A TODA |          | T.     |
| Address  | 421 Pine Ave   |                   |                             |                    |               | Address 18804 North Creek Parkway  |               |         |                      |             |             | Ema      | il 3:      | - International    | Results at                              |             | Y            | v      | 1        |        |
|  |  |                   |                             |                    | for           |  |               | Suite   | 100                  |             |             |          | Ema        | il 4;              | PERSONAL PROPERTY.                      | Labifateck  |              | y .    |          | v.     |
| City   | Sparwo   | od                |                             | Province BC        |               |  | City          | Bothe   | ell                  |             | Province    | WA       | Ema        | il 5:              |   |             |              | J      | v.       | 20.7   |
| Postal Code  |  |                   |                             | Country Canada     |               | Po   | ostal Code    | 98011   | 1                    |             |             | United ! | Ema        |                    | Robin valleau@minnow                    |             |              | ,      | 0        | U.     |
| Phone Number   |  |                   |                             |                    |               |  | ie Number     | _       |                      | 158         |             |          | PO nu      |                    | LOWSHIE S.                              | Gricacina   | PO 81        |        | 1/3      | - 10   |
|  | SAMPLE DET   | AILS              |                             | 2002 .0054.000000; | 1000 E        | S L  |               | 1       |                      | ANA         | LYSIS RI    | OUEST    |            |                    | 4000                                    | 276         | need (2) Fee |        | L Fred A | Lah, N |
|  |  |                   |                             |                    |               |  |               |         | _                    |             |             |          |            |                    |   |             |              |        | 100      |        |
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| LC_FRUS_WS_LAEMP_LCO_DRY_2022-06_NP  | LC_FRUS  | WS                | No                          | 22-Jun-22          | 12:00         | G  | 2             |         |                      | 1           | 1           |          |            |                    |   |             |              |        |          | 4      |
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| LC_CC1_WS_LAEMP_DRY_2022-06_NP   | LC-CC1   | WS                | No                          | 22-Jun-22          | 12:00         | G  | 2             |         |                      | 1           | 1           |          |            |                    |   |             |              |        |          | +      |
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|  |  |                   |                             |                    |               | -  |               |         |                      |             |             |          |            |                    | 1                                       | -           |              | -      |          | +      |
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|  | Regula   | r (default) X     |                             | Sampler's          | Name          | HEE  | II.           | tobiv ' | Valles               | 111         |             | T        |            |                    |   | 4           | 16-970-7     | 535    |          |        |
| Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge |  |                   |                             | Samplet S Name     |               |  | Robin Valleau |         |                      |             | Ш           |          |            |                    | •                                       | - e - 1 V*1 |              |        |          |        |
|  |  |                   |                             | Sampler's S        | ignature      |  |               |         |                      |             |             | Date     | /Time      | Time June 22, 2022 |   |             |              |        |          |        |
| For Emergency <1 Day,  | ASAP or Weekend - Co   | ntact ALS         |                             |                    | -8            | 1  |               |         |                      |             |             |          |            |                    |   |             |              |        |          |        |

55065

# RW Hot Shot Service Inc. 24 Hour Hot Shot Service PHONE: (250) 425-7447

STRAIGHT BILL OF LADING NOT NEGOTIABLE

FAX: (250) 425-7450

| INVOICE TO  |  |  |  |   |                                  | DATE                               | ne 28-22   |  |  |  |  |  |
|---|--|--|--|---|----------------------------------|------------------------------------|--|--|--|--|--|--|
| BILL OF LADING #  |  |  |  | PURCHASE ORDER NUMBER   |                                  |                                    |  |  |  |  |  |  |
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| INTERLINE CARRI   | ER   | V  | AY BILL #  |   |                                  |                                    |  |  |  |  |  |  |
| SPECIAL INSTRUC   | TIONS  | B)c(# )  | 1200A  | 063   |                                  |                                    |  |  |  |  |  |  |
| PACKAGES  |  | DESCRIPTION OF ARTICLES  | AND SPECIAL MARKS  |   | WEIGHT<br>(Subject to Correction | ) F                                | FREIGHT CHARGES                                  |  |  |  |  |  |
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|   |  |  |  |   | ministration.                    | If not in                          | dicated shipping will automatically move collect |  |  |  |  |  |
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| UNIT#   | PERMIT#  |  | liability of carrier is \$2  | JATION: Maximum<br>2 00 per lb. (\$4 41 per<br>lared valuation states   |                                  |                                    |  |  |  |  |  |  |
| 13  |  |  | otherwise  |   | \$                               | SUB                                | TOTAL  |  |  |  |  |  |
| DRIVER'S SIGNATU  | JRE - PICK UP BY   |  | DRIVER'S SIGNATU   | RE DELIVERY BY  |                                  | GST                                |  |  |  |  |  |  |
| NOTICE OF CLAIM: (a) No ca<br>respect of such loss damage of  | irrier is liable for loss, damage or delay of any g<br>or delay is given in writing to the originating can   | oods under the Bill of Lading unless not<br>her or the delivering carrier within sixty i   | the therefor setting out particulars of the income the goods of the go | origin, destination and gale of shipment in the case of failure to make delivery copy of the gald freight bill  | claimed in shipment              | TOTAL &                            |  |  |  |  |  |  |
| (b) The final statement of<br>RECEIVED at the point of our<br>destined as indicated be<br>this mutually agreed, as to eac<br>all the conditions standard Bill | writer is labile for loss, damage or delay of any given relaying given in writing to the originating care to the claim must be filled within in nin on the date specified from the consignor me town which the carrier agrees to call the carrier of all or any of the goods over all or all of Ladding in opened at the read to the carrier agrees. The care of the carrier of the carrier of the goods over all or all of Ladding in opened at the read to by the consideration of the goods listed in the Bill of Ladding is governing the carrier of the goods listed in the Bill of Ladding is governing the carrier of the goods listed in the Bill of Ladding is governing the carrier of the goods listed in the Bill of Ladding is governing the carrier of the goods listed in the Bill of Ladding is governing the carrier of the carrier of the goods listed in the Bill of Ladding is governing the carrier of | intoned herein the property herein desiry and to deliver to the consignity portion of the route to destination and have hereto agreed by the consignor as the control of the consignor as the control of the consignor as the control of the consignor as the control of the control | cribed in apparent good order except as<br>ined at the said destination, sub<br>dias to each paily of any time interested in<br>diaccepted for himself and his assigns<br>of and his assigns.  | s noted (contents and condition of contents) pect to the rates and classifica in all or any of the goods that every ser Printed or written including conditions's | inipment subject to power at     | IF AT OWNER'S RISK, WRITE ORD HERE |  |  |  |  |  |  |
| SHIPPER   | irch are hereby agreed by the cons<br>if the goods listed in the Bilt of Lading is govern  | ed by regulation in force in the jurisdiction  | CONSIGNEE  |   | uch conditions                   | DATE                               | 30   |  |  |  |  |  |
| PRINT   |  |  | CONSIGNEE  | 01/0  | TIME                             | TIME                               |  |  |  |  |  |  |
| SHIPPER<br>SIGN   |  |  | SIGN   | GST # 8   | 64540398RT0001                   | NUMBE                              | R OF PIECES RECEIVED                             |  |  |  |  |  |
| AMISS SERVING WHITE   | E Office YELLOW Carrie   | PINK. Consignee  | GOLDENROAD Shipp   | per   |                                  |                                    | YOU  |  |  |  |  |  |
| Cooler II   | D: Cover V   |  | COC(Y/N)   | Temperature:  | :-1.8                            |                                    | IR: 33   |  |  |  |  |  |
| Coolant   |  | Blue Ice Am  | bient  |   |                                  |                                    |  |  |  |  |  |  |
| Notes:  |  |  |  | 2.0   |                                  |                                    | 1  |  |  |  |  |  |
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| Sample 1  |  | 40nl 025.  | 16 40 nc fet   | <u>&amp;</u>  | lastic yearl                     | Plc3fa                             |  |  |  |  |  |  |
|   | er Types:  | GICSS toles  | C 6/cs/ O/c  | stic  | 161655                           | 1"                                 | 1  |  |  |  |  |  |
| Opened  | By: ERL  | •  | Date: 6/30/  | 22  |                                  |                                    |  |  |  |  |  |  |
| DEEE  | R46430122  |  |  |   |                                  |                                    |  |  |  |  |  |  |

Effective 7/29/20

**Revision 004** 

#### **SELENIUM SPECIATION**

BAL Final Report 2209181 (Finalized 21-Sept-22) September 21, 2022

Confidential

Teck Resources Limited - Vancouver Nicole Zathey 421 Pine Avenue Sparwood, B.C. CANADA V0B2G0 nicole.zathey@teck.com

Re: Line Creek Operation

Dear Nicole Zathey,

On September 15, 2022, Brooks Applied Labs (BAL) received four (4) aqueous samples. The samples were logged-in for total recoverable selenium [Se], dissolved Se [Se], and Se speciation analyses, according to the chain-of-custody (COC) form.

**Sample ID** values listed on the chain-of-custody (COC) form did not exactly match the corresponding **Sample ID** values listed on container labels for samples 2209181-01, 2209181-02, 2209181-03, 2209181-05, and 2209181-06. The discrepancies are described in the table below.

Sample ID Agreement Issues

| Laboratory ID | Sample ID<br>(From COC)              | Sample ID<br>(From Container Label)  |  |  |  |  |  |
|---------------|--------------------------------------|--------------------------------------|--|--|--|--|--|
| 2209181-01    | LC_FRB_LAEMP_DRY_2022-09_N           | LC_FRB_LAEMP_DRY_2022-09_N           |  |  |  |  |  |
| 2209181-02    | LC_FRB_LAEMP_DRY_2022-09_NP-<br>NAL  | LC_FRB_LAEMP_DRY_2022-09_NP-NAL      |  |  |  |  |  |
| 2209181-03    | LC_FRB_LAEMP_DRY_2022-09_NP-<br>NAL  | LC_FRB_LAEMP_DRY_2022-09_NP-NAL      |  |  |  |  |  |
| 2209181-05    | LC_FRUS_LAEMP_DRY_2022-09_NP-<br>NAL | LC_FRUS_LAEMP_DRY_2022-09_NP-<br>NAL |  |  |  |  |  |
| 2209181-06    | LC_FRUS_LAEMP_DRY_2022-09_NP-<br>NAL | LC_FRUS_LAEMP_DRY_2022-09_NP-<br>NAL |  |  |  |  |  |

2209181-01, 2209181-02, 2209181-03, 2209181-05, and 2209181-06 were logged in and reported using the **Sample ID** values listed on the COC form.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

#### Total Recoverable Se and Dissolved Se

Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

#### Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(IV)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(IV)], selenomethionine [SeMet], selenosulfate  $[SeSO_3]$ , and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute

Senior Project Manager

Jeremy@brooksapplied.com

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209181
Client PM: Nicole Zathey
Client Project: Line Creek Operation

#### **Report Information**

#### **Laboratory Accreditation**

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <a href="http://www.brooksapplied.com/resources/certificates-permits/">http://www.brooksapplied.com/resources/certificates-permits/</a> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

#### **Field Quality Control Samples**

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

#### **Common Abbreviations**

| AR  | as received                         | MS  | matrix spike                       |
|-----|-------------------------------------|-----|------------------------------------|
| BAL | Brooks Applied Labs                 | MSD | matrix spike duplicate             |
| BLK | method blank                        | ND  | non-detect                         |
| BS  | blank spike                         | NR  | non-reportable                     |
| CAL | calibration standard                | N/C | not calculated                     |
| CCB | continuing calibration blank        | PS  | post preparation spike             |
| CCV | continuing calibration verification | REC | percent recovery                   |
| COC | chain of custody record             | RPD | relative percent difference        |
| D   | dissolved fraction                  | SCV | secondary calibration verification |
| DUP | duplicate                           | SOP | standard operating procedure       |
| IBL | instrument blank                    | SRM | reference material                 |
| ICV | initial calibration verification    | T   | total fraction                     |
| MDL | method detection limit              | TR  | total recoverable fraction         |
| MRL | method reporting limit              |     |                                    |

#### **Definition of Data Qualifiers**

(Effective 3/23/2020)

- E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
- Holding time and/or preservation requirements not met. Please see narrative for explanation.
- J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
- **J-1** Estimated value. A full explanation is presented in the narrative.
- **M** Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
- **N** Spike recovery was not within acceptance criteria. Please see narrative for explanation.
- **R** Rejected, unusable value. A full explanation is presented in the narrative.
- U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
- X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
- **Z** Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA <u>SOW ILM03.0</u>, Exhibit B, Section III, pg. B-18, and the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010</u>. These supersede all previous qualifiers ever employed by BAL.

**Project ID**: TRL-VC2101 **PM**: Jeremy Maute



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## **Accreditation Information**

#### Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2021; Valid to: June 30, 2022

Certificate Number: E87982-37

| Method    | Matrix   | TNI Accredited Analyte(s)  |
|-----------|--|--|
| EPA 1638  | Non-Potable Waters                                   | Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn   |
| EPA 200.8 | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                               |
|           | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                   |
| EPA 6020  | Solids/Chemicals & Biological                        | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn                      |
|           | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness |
| BAL-5000  | Solids/Chemicals                                     | Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn                                   |
|           | Biological   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn                  |
| EPA 1640  | Non-Potable Waters                                   | Cd, Cu, Pb, Ni, Zn   |
| EPA 1631E | Non-Potable Waters,<br>Solids/Chemicals & Biological | Total Mercury  |
| EPA 1630  | Non-Potable Waters                                   | Methyl Mercury   |
| BAL-3200  | Solids/Chemicals & Biological                        | Methyl Mercury   |
| BAL-4100  | Non-Potable Waters                                   | As(III), As(V), DMAs, MMAs   |
| BAL-4201  | Non-Potable Waters                                   | Se(IV), Se(VI)   |
| BAL-4300  | Non-Potable Waters<br>Solid/Chemicals                | Cr(VI)   |
| SM2340B   | Non-Potable Waters                                   | Hardness   |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

### **Accreditation Information**

# Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

| Method                        | Matrix   | ISO and Non-Gov. TNI Accredited Analyte(s)  |
|-------------------------------|--|---|
| EPA 1638 Mod<br>EPA 200.8 Mod | Non-Potable Waters   | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn                   |
| EPA 6020 Mod                  |  |   |
| BAL-5000                      | Solids/Chemicals & Biological                                | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only) |
| EPA 1640 Mod                  | Non-Potable Waters   | Cd, Cu, Pb, Ni, Zn<br>Ag, As, Cr, Co, Se, Tl, V (ISO Only)  |
| EPA 1631E Mod                 | Non-Potable Waters,<br>Solids/Chemicals &<br>Biological/Food | Total Mercury   |
| BAL-3100                      | , ,  |   |
| EPA 1630 Mod                  | Non-Potable Waters,<br>Solids/Chemicals                      | Methyl Mercury  |
| BAL-3200                      | Biological   | ,   |
| EPA 1632A Mod                 | Non-Potable Waters   | Inorganic Arsenic (ISO Only)  |
| BAL-3300                      | Biological/Food  | In annualis Arabasis (190 Only)   |
|                               | Solids/Chemicals   | Inorganic Arsenic (ISO Only)  |
| AOAC 2015.01 Mod<br>BAL-5000  | Food   | As, Cd, Hg, Pb  |
| B                             | Non-Potable Waters   | As(III), As(V), DMAs, MMAs  |
| BAL-4100                      | Biological by BAL-4117                                       | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |
| BAL-4101                      | Food by BAL-4117   | Inorganic Arsenic, DMAs, MMAs (ISO Only)  |
| BAL-4201                      | Non-Potable Waters   | Se(IV), Se(VI), SeCN, SeMet   |
| BAL-4300                      | Non-Potable Waters,<br>Solid/Chemicals                       | Cr(VI)  |
| SM 3500-Fe<br>BAL-4500        | Non-Potable Waters   | Fe, Fe(II) (ISO Only)   |
| SM2340B                       | Non-Potable Waters   | Hardness  |
| SM 2540G<br>BAL-0501          | Solids/Chemicals & Biological                                | % Dry Weight  |



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Information

| Sample                               | Lab ID     | Report Matrix | Type   | Sampled    | Received   |
|--------------------------------------|------------|---------------|--------|------------|------------|
| LC_FRB_LAEMP_DRY_2022-09_N           | 2209181-01 | WS            | Sample | 09/10/2022 | 09/15/2022 |
| LC_FRB_LAEMP_DRY_2022-09_NP<br>-NAL  | 2209181-02 | WS            | Sample | 09/10/2022 | 09/15/2022 |
| LC_FRB_LAEMP_DRY_2022-09_NP<br>-NAL  | 2209181-03 | WS            | Sample | 09/10/2022 | 09/15/2022 |
| LC_FRUS_LAEMP_DRY_2022-09_N          | 2209181-04 | WS            | Sample | 09/10/2022 | 09/15/2022 |
| LC_FRUS_LAEMP_DRY_2022-09_N<br>P-NAL | 2209181-05 | WS            | Sample | 09/10/2022 | 09/15/2022 |
| LC_FRUS_LAEMP_DRY_2022-09_N<br>P-NAL | 2209181-06 | WS            | Sample | 09/10/2022 | 09/15/2022 |

### **Batch Summary**

| Analyte   | Lab Matrix | Method       | Prepared   | Analyzed   | Batch   | Sequence |
|-----------|------------|--------------|------------|------------|---------|----------|
| DMSeO     | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| MeSe(IV)  | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| MeSe(VI)  | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| Se        | Water      | EPA 1638 Mod | 09/16/2022 | 09/20/2022 | B222134 | S220972  |
| Se(IV)    | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| Se(VI)    | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| SeCN      | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| SeMet     | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| SeSO3     | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |
| Unk Se Sp | Water      | SOP BAL-4201 | 09/14/2022 | 09/15/2022 | B222056 | S220953  |



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

# Sample Results

| Sample      | Analyte            | Report Matrix    | Basis | Result  | Qualifier | MDL   | MRL   | Unit | Batch                | Sequence |
|-------------|--------------------|------------------|-------|---------|-----------|-------|-------|------|----------------------|----------|
| LC FRB LAEI | MP DRY 2022-       | ·09 N            |       |         |           |       |       |      |                      |          |
| 2209181-01  | DMSeO              | -<br>WS          | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-01  | MeSe(IV)           | WS               | D     | 0.012   | J         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-01  | MeSe(VI)           | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-01  | Se(IV)             | WS               | D     | 0.168   |           | 0.020 | 0.075 | μg/L | B222056              | S220953  |
| 2209181-01  | Se(VI)             | WS               | D     | 34.7    |           | 0.010 | 0.055 | μg/L | B222056              | S220953  |
| 2209181-01  | SeCN               | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B222056              | S220953  |
| 2209181-01  | SeMet              | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-01  | SeSO3              | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B222056              | S220953  |
| 2209181-01  | Unk Se Sp          | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B222056              | S220953  |
| LC EDD LAE  | MD DDV 2022        | OO NE NA         |       |         |           |       |       |      |                      |          |
|             | MP_DRY_2022-<br>Se | .09_NP-NAL<br>WS | TR    | 39.9    |           | 0.165 | 0.528 | ua/l | B222134              | 5220072  |
| 2209181-02  | 36                 | VVS              | IK    | 39.9    |           | 0.103 | 0.326 | μg/L | DZZZ 13 <del>4</del> | S220972  |
| LC_FRB_LAE  | MP_DRY_2022-       | ·09_NP-NAL       |       |         |           |       |       |      |                      |          |
| 2209181-03  | Se                 | WS               | D     | 36.9    |           | 0.165 | 0.528 | μg/L | B222134              | S220972  |
|             |                    |                  |       |         |           |       |       |      |                      |          |
|             | EMP_DRY_202        | <del>_</del>     |       |         |           |       |       | _    |                      |          |
| 2209181-04  | DMSeO              | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-04  | MeSe(IV)           | WS               | D     | 0.013   | J         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-04  | MeSe(VI)           | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-04  | Se(IV)             | WS               | D     | 0.169   |           | 0.020 | 0.075 | μg/L | B222056              | S220953  |
| 2209181-04  | Se(VI)             | WS               | D     | 42.2    |           | 0.010 | 0.055 | μg/L | B222056              | S220953  |
| 2209181-04  | SeCN               | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B222056              | S220953  |
| 2209181-04  | SeMet              | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B222056              | S220953  |
| 2209181-04  | SeSO3              | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B222056              | S220953  |
| 2209181-04  | Unk Se Sp          | WS               | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B222056              | S220953  |
| LC FRUS LAI | EMP DRY 202        | 2-09 NP-NAL      |       |         |           |       |       |      |                      |          |
| 2209181-05  | Se                 | WS WS            | TR    | 37.5    |           | 0.165 | 0.528 | μg/L | B222134              | S220972  |
|             |                    |                  |       |         |           |       |       |      |                      |          |
|             | EMP_DRY_202        | _                |       |         |           |       |       |      |                      |          |
| 2209181-06  | Se                 | WS               | D     | 41.4    |           | 0.165 | 0.528 | μg/L | B222134              | S220972  |



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B222056 Lab Matrix: Water Method: SOP BAL-4201

| Sample       | Analyte                   | Native     | Spike | Result | Units | REC & Limits | RPD & Limits |
|--------------|---------------------------|------------|-------|--------|-------|--------------|--------------|
| B222056-BS1  | Blank Spike, (2124033)    |            |       |        |       |              |              |
|              | MeSe(IV)                  |            | 5.095 | 5.504  | μg/L  | 108% 75-125  |              |
|              | Se(IV)                    |            | 5.000 | 4.917  | μg/L  | 98% 75-125   |              |
|              | Se(VI)                    |            | 5.000 | 4.657  | μg/L  | 93% 75-125   |              |
|              | SeCN                      |            | 5.015 | 4.709  | μg/L  | 94% 75-125   |              |
|              | SeMet                     |            | 4.932 | 4.821  | μg/L  | 98% 75-125   |              |
| B222056-DUP5 | Duplicate, (2209181-04)   |            |       |        |       |              |              |
|              | DMSeO                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | MeSe(IV)                  | 0.013      |       | ND     | μg/L  |              | N/C 25       |
|              | MeSe(VI)                  | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Se(IV)                    | 0.169      |       | 0.172  | μg/L  |              | 2% 25        |
|              | Se(VI)                    | 42.16      |       | 42.48  | μg/L  |              | 0.7% 25      |
|              | SeCN                      | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeMet                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeSO3                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Unk Se Sp                 | ND         |       | ND     | μg/L  |              | N/C 25       |
| B222056-MS5  | Matrix Spike, (2209181-0  | 4)         |       |        |       |              |              |
|              | Se(IV)                    | 0.169      | 4.900 | 5.007  | μg/L  | 99% 75-125   |              |
|              | Se(VI)                    | 42.16      | 5.100 | 47.46  | μg/L  | NR 75-125    |              |
|              | SeCN                      | ND         | 1.962 | 1.850  | μg/L  | 94% 75-125   |              |
|              | SeMet                     | ND         | 1.977 | 1.892  | μg/L  | 96% 75-125   |              |
| B222056-MSD5 | Matrix Spike Duplicate, ( | 2209181-04 | )     |        |       |              |              |
|              | Se(IV)                    | 0.169      | 4.900 | 4.903  | μg/L  | 97% 75-125   | 2% 25        |
|              | Se(VI)                    | 42.16      | 5.100 | 46.96  | μg/L  | NR 75-125    | N/C 25       |
|              | SeCN                      | ND         | 1.962 | 1.816  | μg/L  | 93% 75-125   | 2% 25        |
|              | SeMet                     | ND         | 1.977 | 1.909  | μg/L  | 97% 75-125   | 0.9% 25      |



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B222134 Lab Matrix: Water Method: EPA 1638 Mod

| Sample<br>B222134-BS1 | Analyte                                     | Native                     | Spike         | Result         | Units                          | REC 8 | Limits | RPD & Lir | mits |
|-----------------------|---|----------------------------|---------------|----------------|--------------------------------|-------|--------|-----------|------|
|                       | <b>Blank Spike</b> , <b>(2128023)</b><br>Se |                            | 200.0         | 163.3          | μg/L                           | 82%   | 75-125 |           |      |
| B222134-BS2           | Blank Spike, (2128023)<br>Se                |                            | 200.0         | 159.2          | μg/L                           | 80%   | 75-125 |           |      |
| B222134-BS3           | Blank Spike, (2128023)<br>Se                |                            | 200.0         | 160.1          | μg/L                           | 80%   | 75-125 |           |      |
| B222134-SRM1          | Reference Material (221401<br>Se            | 14, TMDA 5                 | 1.5 Reference | Standard       | - Bottle 6 - \$<br>µg/L        | •     | 75-125 |           |      |
|                       |   |                            |               |                |                                |       |        |           |      |
| B222134-SRM2          | Reference Material (221401<br>Se            | 14, TMDA 5                 | 14.30         | Standard 12.50 | - <b>Bottle 6 - \$</b><br>µg/L | •     | 75-125 |           |      |
| B222134-SRM3          | Reference Material (221401                  | 4, TMDA 5                  |               |                |                                | •     |        |           |      |
|                       | Se  |                            | 14.30         | 11.52          | µg/L                           | 81%   | 75-125 |           |      |
| B222134-DUP1          | <b>Duplicate, (2209182-02)</b><br>Se        | 64.23                      |               | 68.25          | μg/L                           |       |        | 6%        | 20   |
| B222134-MS1           | Matrix Spike, (2209182-02)<br>Se            | 64.23                      | 220.0         | 268.3          | μg/L                           | 93%   | 75-125 |           |      |
| B222134-MSD1          | Matrix Spike Duplicate, (22<br>Se           | <b>209182-02)</b><br>64.23 | 220.0         | 242.4          | μg/L                           | 81%   | 75-125 | 10%       | 20   |



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

### Method Blanks & Reporting Limits

Batch: B222056 Matrix: Water

Method: SOP BAL-4201 Analyte: DMSeO

 Sample
 Result
 Units

 B222056-BLK1
 0.00
 μg/L

 B222056-BLK2
 0.00
 μg/L

 B222056-BLK3
 0.00
 μg/L

 B222056-BLK4
 0.00
 μg/L

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(IV)

 Sample
 Result
 Units

 B222056-BLK1
 0.00
 μg/L

 B222056-BLK2
 0.00
 μg/L

 B222056-BLK3
 0.00
 μg/L

 B222056-BLK4
 0.00
 μg/L

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(VI)

 Sample
 Result
 Units

 B222056-BLK1
 0.00
 μg/L

 B222056-BLK2
 0.00
 μg/L

 B222056-BLK3
 0.00
 μg/L

 B222056-BLK4
 0.00
 μg/L

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

### Method Blanks & Reporting Limits

Analyte: Se(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222056-BLK1 | 0.00   | μg/L  |
| B222056-BLK2 | 0.00   | μg/L  |
| B222056-BLK3 | 0.00   | μg/L  |
| B222056-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.004 Limit: 0.015 MRL: 0.015

Analyte: Se(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222056-BLK1 | 0.00   | μg/L  |
| B222056-BLK2 | 0.00   | μg/L  |
| B222056-BLK3 | 0.00   | μg/L  |
| B222056-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: SeCN

| Result | Units                |
|--------|----------------------|
| 0.00   | μg/L                 |
| 0.00   | μg/L                 |
| 0.00   | μg/L                 |
| 0.00   | μg/L                 |
|        | 0.00<br>0.00<br>0.00 |

 Average: 0.000
 MDL: 0.002

 Limit: 0.010
 MRL: 0.010

Analyte: SeMet

| Sample       | Result | Units |
|--------------|--------|-------|
| B222056-BLK1 | 0.00   | μg/L  |
| B222056-BLK2 | 0.00   | μg/L  |
| B222056-BLK3 | 0.00   | μg/L  |
| B222056-BLK4 | 0.00   | μg/L  |

**Average:** 0.000 **MDL:** 0.002 **Limit:** 0.005 **MRL:** 0.005



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Analyte: SeSO3

| Sample       | Result | Units |
|--------------|--------|-------|
| B222056-BLK1 | 0.00   | μg/L  |
| B222056-BLK2 | 0.00   | μg/L  |
| B222056-BLK3 | 0.00   | μg/L  |
| B222056-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.002 Limit: 0.011 MRL: 0.011

Analyte: Unk Se Sp

| Sample       | Result | Units |
|--------------|--------|-------|
| B222056-BLK1 | 0.00   | μg/L  |
| B222056-BLK2 | 0.00   | μg/L  |
| B222056-BLK3 | 0.00   | μg/L  |
| B222056-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Batch: B222134 Matrix: Water

Method: EPA 1638 Mod

Analyte: Se

| Sample       | Result | Units |
|--------------|--------|-------|
| B222134-BLK1 | 0.023  | μg/L  |
| B222134-BLK2 | 0.073  | μg/L  |
| B222134-BLK3 | 0.041  | μg/L  |
| B222134-BLK4 | -0.013 | μg/L  |

 Average: 0.031
 MDL: 0.150

 Limit: 0.480
 MRL: 0.480



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Containers

|                           |  |                 |                   | Report Matrix: WS Collected: 0                |                      |   |                       |  |
|---------------------------|--|-----------------|-------------------|---|----------------------|---|-----------------------|--|
|                           | ple: LC_FRB_LAEMP_DRY_2                            |                 |                   | Sample Type: Sample + Sum                     | Received: 09/15/2022 |   |                       |  |
|                           | Container  | Size            | Lot               | Preservation                                  | P-Lot                | рН  | Ship. Cont.           |  |
| Α                         | Cent Tube 15mL Se-Sp                               | 15 mL           | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |
| В                         | XTRA_VOL   | 15 mL           | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |
| С                         | XTRA_VOL   | 125 mL          | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |
|                           | D: 2209181-02                                      | ACCO OO NID NAL |                   | Report Matrix: WS                             |                      |   | cted: 09/10/2022      |  |
|                           | ple: LC_FRB_LAEMP_DRY_2                            | _               | 1 -4              | Sample Type: Sample + Sum                     | D.L.at               |   | ved: 09/15/2022       |  |
|                           | Container  | Size            | Lot               | Preservation                                  | P-Lot                | рН  | Ship. Cont.           |  |
| Α                         | Client-Provided - TM                               | 40 mL           | na                | 10% HNO3 (BAL)                                | 2230023              | <2  | Cooler 2 -<br>2209181 |  |
| <b>Lab ID:</b> 2209181-03 |  |                 | Report Matrix: WS | Collected: 09/10/2022<br>Received: 09/15/2022 |                      |   |                       |  |
|                           | ple: LC_FRB_LAEMP_DRY_2 Container                  | <del>-</del>    | 1 -4              | Sample Type: Sample + Sum Preservation        | D.L.at               |   |                       |  |
|                           |  | Size            | Lot               |   | P-Lot                | pН  | Ship. Cont.           |  |
| Α                         | Client-Provided - TM                               | 40 mL           | na                | 10% HNO3 (BAL)                                | 2230023              | <2  | Cooler 2 -<br>2209181 |  |
|                           | I <b>D</b> : 2209181-04<br>ple: LC_FRUS_LAEMP_DRY_ | 2022-09 N       |                   | Report Matrix: WS Sample Type: Sample + Sum   |                      | Collected: 09/10/2022<br>Received: 09/15/2022 |                       |  |
|                           | Container  | Size            | Lot               | Preservation                                  | P-Lot                | pH  | Ship. Cont.           |  |
| A                         | Cent Tube 15mL Se-Sp                               | 15 mL           | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |
| В                         | XTRA_VOL   | 15 mL           | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |
| С                         | XTRA_VOL   | 125 mL          | na                | none  | na                   | na  | Cooler 4 -<br>2209181 |  |

Project ID: TRL-VC2101 PM: Jeremy Maute



BAL Final Report 2209181 Client PM: Nicole Zathey Client Project: Line Creek Operation

### Sample Containers

Lab ID: 2209181-05

Sample:

LC FRUS LAEMP DRY 2022-09 NP-NAL **Des Container** 

Client-Provided - TM

40 mL

40 ml

Report Matrix: WS

Sample Type: Sample + Sum

Lot **Preservation** na

10% HNO3 (BAL)

P-Lot 2230023 рH Ship. Cont. <2

Cooler 2 -2209181

Collected: 09/10/2022

Received: 09/15/2022

Lab ID: 2209181-06

Sample:

LC\_FRUS\_LAEMP\_DRY\_2022-09\_NP-NAL **Des Container** Size

Client-Provided - TM

Report Matrix: WS

Lot

na

Sample Type: Sample + Sum

**Preservation** 10% HNO3 (BAL)

P-Lot 2230023 рΗ

<2

Ship. Cont. Cooler 2 -

Collected: 09/10/2022 Received: 09/15/2022

2209181

### **Shipping Containers**

Cooler 2 - 2209181

Received: September 15, 2022 7:10 Tracking No: RWHV95580 via Courier

Coolant Type: Ice Temperature: 5.3 °C

Cooler 4 - 2209181

Received: September 15, 2022 7:10 Tracking No: RWHV95580 via Courier

Coolant Type: Ice Temperature: 2.4 °C

Cooler 4 - 2209181

Received: September 15, 2022 7:43 Tracking No: RWHV95580 via Courier

Coolant Type: Ice Temperature: 2.4 °C **Description:** Styrofoam cooler Damaged in transit? No Returned to client? No Comments: IR#:1

**Description:** Styrofoam Cooler Damaged in transit? No Returned to client? No Comments: IR#:2

**Description:** Styrofoam Cooler Damaged in transit? No Returned to client? No Comments: IR#:2

Custody seals present? No Custody seals intact? No **COC present?** Yes

Custody seals present? No Custody seals intact? No

COC present? Yes

Custody seals present? No Custody seals intact? No **COC present?** Yes

BAL Final Report 2209181 KEP LAEWP DRY 2022-TURNAROUND TIME: RUSH NA COC ID: Regular UN BBOOKS OTHER INFO LABORATORY PROJECT/CLIENT INFO Lab Name Brooks Applied Labs Facility Name / Job# Line Creek Operation Email 1: AquaScrLub@Teck.com Lab Contact Ben Wozniak Project Manager Nicole Zathey Email 2: teckcoal@equisonline.com Email Ben@brooksapplied.com Email Nicole.Zathey@Teck.com Email 3: Teck Lab Results@teck.com Address 421 Prine Avenue Address 13751 Lake City Way Email 4: Lisa Bowron@minnow.ca Suite 108 Email 5: Robin Valleau@monow.ca BC City Seattle City Sparwood Province Province WA Email 5: Jessica Ritz th Teck com Postal Code V0B 2G0 Country Canada Postal Code 98125 Country United \$ PO number VPO00817033 Phone Number 1-250-425-8478 Phone Number (206) 753-6158 SAMPLE DETAILS ANALYSIS REQUESTED Filtered - F: Field, L: Lab, Fl.: Field & Lub, N: None F N Hazardous Material (Yes/No) Brooks\_Se\_Speciation Brooks\_Se\_D Brooks\_Se\_T G=Grab Sample Location Field C=Com # Of Sample ID (sys loc code) Matrix Date Time (24hr) Cont LC\_FRB\_WS\_LAEMP\_DRY\_2022-09\_N LC\_FRB 2022/09/10 WS G 14:00 1 1 LC\_FRB WS 2022/09/10 LC\_FRB\_WS\_LAEMP\_DRY\_2022-09\_NP-NAL 14:00 G 2 1 1 LC FRUS WS 2022/09/10 LC\_FRUS\_WS\_LAEMP\_DRY\_2022-09\_N 9:00 G 1 1 LC\_FRUS LC\_FRUS\_WS\_LAEMP\_DRY\_2022-09\_NP-NAL WS 2022/09/10 9:00 G 2 1 1 RELINQUISHED BY/AFFILIATION DATE/TIME ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS ACCEPTED BY/AFFILIATION DATE/TIME Jennifer Ings/Minnow ############## NW BAC SERVICE REQUEST (rush - subject to availability) Regular (default) 519-500-3444 Sampler's Name Jennifer Ings Mobile # Priority (2-3 business days) - 50% surcharge X Land La Par Emergency (1 Business Day) - 100% surcharge Sampler's Signature September 12, 2022 Date/Time For Emergency <1 Day, ASAP or Weekend - Contact ALS

NOT NEGOTIABLE

250-425-7447 24 Hour Hot Skot Service No. 95580

Confidential

Sparwood, BC Terrace, BC Red Deer, AB

Vancouver, BC Calgary, AB Montreal, QC

Prince George, BC **Edmonton, AB** Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

DATE

Tumbler Ridge, BC

BAL Final Report 2209181

Hinton, AB Gillette, WY

| INVOICE FO   |  |   |  | Day Book            |  |
|--|--|---|--|---------------------|--|
| BILL OF LADING #   | Torest Estimate  | PURCHASE ORDER  | NUMBER   |                     |  |
| SHIPPER (FROM)   | HIPPER (FROM)  |   |  |                     |  |
| STREET   |  | STREET  |  |                     |  |
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| Coolant Type: (Ice ) Blue Ice  | Ambient  |   |  |                     |  |
| Notes:   |  |   | ) C  | £                   |  |

Effective 7/29/2

**Sampling Locations:** 

Sample Types:

**Container Types:** 

Opened By: ERL



Date: 4/15/22

Revision 004

SP

T/D

T/D

SP

NOT NEGOTIABLE

250-425-7447 24 Hour Hot Skot Service טסככל יחון

Confidential

Sparwood, BC Terrace, BC Red Deer, AB

Vancouver, BC Calgary, AB Montreal, QC

Prince George, BC Edmonton, AB Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

DATE

BAL Final Report 2209181 Tumbler Ridge, BC Hinton, AB Gillette, WY

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| IR: 2.  |  |  |   |   |              |                                     |
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Notes:

**Sampling Locations:** 

Sample Types:

40 M

SP 125mL Plantic

EV T/D

T/D

SP T/D

**Container Types:** Opened By: AM

Date: 9/15

Revision 004

Effective 7/29/20



T/D

### **SELENIUM SPECIATION**

BAL Final Report 2209283 (Finalized Oct-12-22)

BAL Final Report 2209283

18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

October 12, 2022

Confidential

Teck Resources Limited - Vancouver Nicole Zathey 421 Pine Avenue Sparwood, B.C. CANADA V0B2G0 nicole.zathey@teck.com

Re: Line Creek Operation

Dear Nicole Zathey,

On September 22, 2022, Brooks Applied Labs (BAL) received eight (8) aqueous samples. The samples were logged-in for total recoverable selenium [Se], dissolved Se [Se], and Se speciation analyses, according to the chain-of-custody (COC) form.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. All sample fractions for total recoverable Se and dissolved Se were preserved within the (14 calendar day) preservation holding time.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

#### Total Recoverable Se and Dissolved Se

Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

#### Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(IV)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], methaneselenonic acid [MeSe(VI)], selenomethionine [SeMef], selenosulfate  $[SeSO_3]$ , and dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [Unk SeSp].

Confidential BAL Final Report 2209283

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute Senior Project Manager

Jeremy@brooksapplied.com

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### Report Information

#### **Laboratory Accreditation**

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <a href="http://www.brooksapplied.com/resources/certificates-permits/">http://www.brooksapplied.com/resources/certificates-permits/</a> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

#### **Field Quality Control Samples**

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

#### **Common Abbreviations**

| AR  | as received                         | MS  | matrix spike                       |
|-----|-------------------------------------|-----|------------------------------------|
| BAL | Brooks Applied Labs                 | MSD | matrix spike duplicate             |
| BLK | method blank                        | ND  | non-detect                         |
| BS  | blank spike                         | NR  | non-reportable                     |
| CAL | calibration standard                | N/C | not calculated                     |
| CCB | continuing calibration blank        | PS  | post preparation spike             |
| CCV | continuing calibration verification | REC | percent recovery                   |
| COC | chain of custody record             | RPD | relative percent difference        |
| D   | dissolved fraction                  | scv | secondary calibration verification |
| DUP | duplicate                           | SOP | standard operating procedure       |
| IBL | instrument blank                    | SRM | reference material                 |
| ICV | initial calibration verification    | Т   | total fraction                     |
| MDL | method detection limit              | TR  | total recoverable fraction         |
| MRL | method reporting limit              |     |                                    |

#### **Definition of Data Qualifiers**

(Effective 3/23/2020)

- E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
- Holding time and/or preservation requirements not met. Please see narrative for explanation.
- J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
- **J-1** Estimated value. A full explanation is presented in the narrative.
- **M** Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
- **N** Spike recovery was not within acceptance criteria. Please see narrative for explanation.
- **R** Rejected, unusable value. A full explanation is presented in the narrative.
- U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
- X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
- **Z** Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA <u>SOW ILM03.0</u>, Exhibit B, Section III, pg. B-18, and the <u>USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010</u>. These supersede all previous qualifiers ever employed by BAL.

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### **Accreditation Information**

#### Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard) Issued on: July 1, 2021; Valid to: June 30, 2022

Certificate Number: E87982-37

| Method    | Matrix   | TNI Accredited Analyte(s)  |
|-----------|--|--|
| EPA 1638  | Non-Potable Waters                                   | Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn   |
| EPA 200.8 | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                               |
| EPA 6020  | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn                   |
|           | Solids/Chemicals & Biological                        | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn                      |
| BAL-5000  | Non-Potable Waters                                   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness |
|           | Solids/Chemicals                                     | Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn                                   |
|           | Biological   | Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn                  |
| EPA 1640  | Non-Potable Waters                                   | Cd, Cu, Pb, Ni, Zn   |
| EPA 1631E | Non-Potable Waters,<br>Solids/Chemicals & Biological | Total Mercury  |
| EPA 1630  | Non-Potable Waters                                   | Methyl Mercury   |
| BAL-3200  | Solids/Chemicals & Biological                        | Methyl Mercury   |
| BAL-4100  | Non-Potable Waters                                   | As(III), As(V), DMAs, MMAs   |
| BAL-4201  | Non-Potable Waters                                   | Se(IV), Se(VI)   |
| BAL-4300  | Non-Potable Waters<br>Solid/Chemicals                | Cr(VI)   |
| SM2340B   | Non-Potable Waters                                   | Hardness   |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### **Accreditation Information**

# Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2)

Issued by: ANAB

Issued on: September 21, 2021; Valid to: March 30, 2024

| Method                                  | Matrix   | ISO and Non-Gov. TNI Accredited Analyte(s)   |
|---|--|--|
| EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod | Non-Potable Waters   | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn                      |
| BAL-5000                                | Solids/Chemicals & Biological                                | Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn<br>Hg (Biological Only) |
| EPA 1640 Mod                            | Non-Potable Waters   | Cd, Cu, Pb, Ni, Zn<br>Ag, As, Cr, Co, Se, Tl, V (ISO Only)   |
| EPA 1631E Mod<br>BAL-3100               | Non-Potable Waters,<br>Solids/Chemicals &<br>Biological/Food | Total Mercury  |
| EPA 1630 Mod<br>BAL-3200                | Non-Potable Waters,<br>Solids/Chemicals<br>Biological        | Methyl Mercury   |
| EPA 1632A Mod                           | Non-Potable Waters   | Inorganic Arsenic (ISO Only)   |
| BAL-3300                                | Biological/Food<br>Solids/Chemicals                          | Inorganic Arsenic (ISO Only)   |
| AOAC 2015.01 Mod<br>BAL-5000            | Food   | As, Cd, Hg, Pb   |
| DAI 4400                                | Non-Potable Waters   | As(III), As(V), DMAs, MMAs   |
| BAL-4100                                | Biological by BAL-4117                                       | Inorganic Arsenic, DMAs, MMAs (ISO Only)   |
| BAL-4101                                | Food by BAL-4117   | Inorganic Arsenic, DMAs, MMAs (ISO Only)   |
| BAL-4201                                | Non-Potable Waters   | Se(IV), Se(VI), SeCN, SeMet  |
| BAL-4300                                | Non-Potable Waters,<br>Solid/Chemicals                       | Cr(VI)   |
| SM 3500-Fe<br>BAL-4500                  | Non-Potable Waters   | Fe, Fe(II) (ISO Only)  |
| SM2340B                                 | Non-Potable Waters   | Hardness   |
| SM 2540G<br>BAL-0501                    | Solids/Chemicals & Biological                                | % Dry Weight   |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

# Sample Information

| Sample                                  | Lab ID     | Report Matrix | Type   | Sampled    | Received   |
|---|------------|---------------|--------|------------|------------|
| LC_DCEF_WS_LAEMP_DRY_2022-<br>09_N      | 2209283-01 | WS            | Sample | 09/12/2022 | 09/22/2022 |
| LC_DCEF_WS_LAEMP_DRY_2022-<br>09_NP-NAL | 2209283-02 | WS            | Sample | 09/12/2022 | 09/22/2022 |
| LC_DCEF_WS_LAEMP_DRY_2022-<br>09_NP-NAL | 2209283-03 | WS            | Sample | 09/12/2022 | 09/22/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>09_N      | 2209283-04 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>09_NP-NAL | 2209283-05 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>09_NP-NAL | 2209283-06 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-0<br>9_N       | 2209283-07 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-0<br>9_N-NAL   | 2209283-08 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-0<br>9_N-NAL   | 2209283-09 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>9_N       | 2209283-10 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>9_N-NAL   | 2209283-11 | WS            | Sample | 09/14/2022 | 09/22/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-0<br>9_N-NAL   | 2209283-12 | WS            | Sample | 09/14/2022 | 09/22/2022 |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

# **Batch Summary**

| Analyte   | <b>Lab Matrix</b> | Method       | Prepared   | Analyzed   | Batch   | Sequence |
|-----------|-------------------|--------------|------------|------------|---------|----------|
| DMSeO     | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| DMSeO     | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| MeSe(IV)  | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| MeSe(IV)  | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| MeSe(VI)  | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| MeSe(VI)  | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| Se        | Water             | EPA 1638 Mod | 09/23/2022 | 09/26/2022 | B222203 | S221000  |
| Se(IV)    | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| Se(IV)    | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| Se(VI)    | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| Se(VI)    | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| SeCN      | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| SeCN      | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| SeMet     | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| SeMet     | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| SeSO3     | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| SeSO3     | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |
| Unk Se Sp | Water             | SOP BAL-4201 | 09/27/2022 | 09/27/2022 | B222236 | S221003  |
| Unk Se Sp | Water             | SOP BAL-4201 | 09/29/2022 | 10/01/2022 | B222236 | S221017  |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

# Sample Results

| Sample     | Analyte     | Report Matrix          | Basis | Result             | Qualifier | MDL   | MRL   | Unit         | Batch   | Sequence           |
|------------|-------------|------------------------|-------|--------------------|-----------|-------|-------|--------------|---------|--------------------|
| LC DCEF WS | LAEMP DRY   | 2022-09 N              |       |                    |           |       |       |              |         |                    |
| 2209283-01 | DMSeO       | ws                     | D     | ≤ 0.010            | U         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-01 | MeSe(IV)    | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-01 | MeSe(VI)    | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-01 | Se(IV)      | WS                     | D     | ≤ 0.020            | U         | 0.020 | 0.075 | μg/L         | B222236 | S221003            |
| 2209283-01 | Se(VI)      | WS                     | D     | 1.49               |           | 0.010 | 0.055 | μg/L         | B222236 | S221003            |
| 2209283-01 | SeCN        | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.050 | μg/L         | B222236 | S221003            |
| 2209283-01 | SeMet       | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-01 | SeSO3       | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.055 | μg/L         | B222236 | S221003            |
| 2209283-01 | Unk Se Sp   | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.075 | μg/L         | B222236 | S221003            |
| IC DOFF WS | I AFMP DRY  | _2022-09_NP-NAL        |       |                    |           |       |       |              |         |                    |
| 2209283-02 | _ <i></i>   | _2022-03_N/ -NAL<br>WS | D     | 1.56               |           | 0.165 | 0.528 | μg/L         | B222203 | S221000            |
| 2200200-02 | 00          | ***                    | D     | 1.00               |           | 0.100 | 0.020 | M9/L         | DEELECO | 0221000            |
| LC_DCEF_WS | _LAEMP_DRY  | _2022-09_NP-NAL        |       |                    |           |       |       |              |         |                    |
| 2209283-03 | Se          | WS                     | TR    | 1.44               |           | 0.165 | 0.528 | μg/L         | B222203 | S221000            |
| LC_GRCK_WS | LAEMD DOV   | 2022 00 N              |       |                    |           |       |       |              |         |                    |
| 2209283-04 | DMSeO       | _2022-09_N<br>WS       | D     | ≤ 0.010            | U         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-04 | MeSe(IV)    | WS                     | D     | ≤ 0.010<br>≤ 0.010 | U         | 0.010 | 0.025 | μg/L<br>μg/L | B222236 | S221003<br>S221003 |
| 2209283-04 | MeSe(VI)    | WS                     | D     | ≤ 0.010<br>≤ 0.010 | U         | 0.010 | 0.025 | μg/L<br>μg/L | B222236 | S221003            |
| 2209283-04 | Se(IV)      | WS                     | D     | 0.035              | J         | 0.020 | 0.075 | μg/L         | B222236 | S221003            |
| 2209283-04 | Se(VI)      | WS                     | D     | 1.85               | Ū         | 0.010 | 0.055 | μg/L         | B222236 | S221003            |
| 2209283-04 | SeCN        | WS                     | D     | ≤ 0.010            | U         | 0.010 | 0.050 | μg/L         | B222236 | S221003            |
| 2209283-04 | SeMet       | WS                     | D     | ≤ 0.010            | Ü         | 0.010 | 0.025 | μg/L         | B222236 | S221003            |
| 2209283-04 | SeSO3       | WS                     | D     | ≤ 0.010            | Ü         | 0.010 | 0.055 | μg/L         | B222236 | S221003            |
| 2209283-04 | Unk Se Sp   | WS                     | D     | ≤ 0.010            | Ü         | 0.010 | 0.075 | μg/L         | B222236 | S221003            |
|            |             |                        |       |                    |           |       |       | 1-3/         |         |                    |
|            |             | 2022-09_NP-NAL         |       |                    |           |       |       |              |         |                    |
| 2209283-05 | Se          | WS                     | D     | 1.69               |           | 0.165 | 0.528 | μg/L         | B222203 | S221000            |
| LC GRCK WS | S LAEMP DRY | 2022-09 NP-NAL         | _     |                    |           |       |       |              |         |                    |
| 2209283-06 | Se          | - ws                   | TR    | 1.83               |           | 0.165 | 0.528 | μg/L         | B222203 | S221000            |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

# Sample Results

| Sample      | Analyte     | Report Matrix | Basis | Result  | Qualifier | MDL   | MRL   | Unit                 | Batch   | Sequence |
|-------------|-------------|---------------|-------|---------|-----------|-------|-------|----------------------|---------|----------|
| LC MT1 WS   | LAEMP DRY 2 | 2022-09 N     |       |         |           |       |       |                      |         |          |
| 2209283-07  | DMSeO       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221003  |
| 2209283-07  | MeSe(IV)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221003  |
| 2209283-07  | MeSe(VI)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221003  |
| 2209283-07  | Se(IV)      | WS            | D     | ≤ 0.020 | U         | 0.020 | 0.075 | μg/L                 | B222236 | S221003  |
| 2209283-07  | Se(VI)      | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L                 | B222236 | S221003  |
| 2209283-07  | SeCN        | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L                 | B222236 | S221003  |
| 2209283-07  | SeMet       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221003  |
| 2209283-07  | SeSO3       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L                 | B222236 | S221003  |
| 2209283-07  | Unk Se Sp   | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L                 | B222236 | S221003  |
| IC MT1 WS I | IAFMP DRY 2 | 2022-09 N-NAL |       |         |           |       |       |                      |         |          |
| 2209283-08  | Se          | WS            | D     | 0.208   | J         | 0.165 | 0.528 | μg/L                 | B222203 | S221000  |
| 2200200 00  |             |               |       | 0.200   | Ü         | 0.100 | 0.020 | <b>⊬</b> 9/ <b>–</b> | 522200  | 0221000  |
| LC_MT1_WS_I | LAEMP_DRY_2 | 2022-09_N-NAL |       |         |           |       |       |                      |         |          |
| 2209283-09  | Se          | WS            | TR    | ≤ 0.165 | U         | 0.165 | 0.528 | μg/L                 | B222203 | S221000  |
|             |             |               |       |         |           |       |       |                      |         |          |
| LC_CC1_WS_I |             | _             | _     |         |           | 0.040 | 0.005 |                      | B000000 |          |
| 2209283-10  | DMSeO       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L<br>"            | B222236 | S221017  |
| 2209283-10  | MeSe(IV)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L<br>"            | B222236 | S221017  |
| 2209283-10  | MeSe(VI)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221017  |
| 2209283-10  | Se(IV)      | WS            | D     | 0.032   | J         | 0.020 | 0.075 | μg/L                 | B222236 | S221017  |
| 2209283-10  | Se(VI)      | WS            | D     | 1.53    |           | 0.010 | 0.055 | μg/L<br>"            | B222236 | S221017  |
| 2209283-10  | SeCN        | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L                 | B222236 | S221017  |
| 2209283-10  | SeMet       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L                 | B222236 | S221017  |
| 2209283-10  | SeSO3       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L                 | B222236 | S221017  |
| 2209283-10  | Unk Se Sp   | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L                 | B222236 | S221017  |
| LC_CC1_WS_I | LAEMP_DRY_2 | 2022-09_N-NAL |       |         |           |       |       |                      |         |          |
| 2209283-11  | Se          | WS            | D     | 1.87    |           | 0.165 | 0.528 | μg/L                 | B222203 | S221000  |
| LC CC1 WS   | LAEMP DRY 2 | 2022-09 N-NAL |       |         |           |       |       |                      |         |          |
| 2209283-12  | Se          | WS            | TR    | 1.81    |           | 0.165 | 0.528 | μg/L                 | B222203 | S221000  |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B222203 Lab Matrix: Water Method: EPA 1638 Mod

| Sample                                   | Analyte                          | Native     | Spike                          | Result              | Units                          | REC & Limits              | RPD & Limits |
|--|----------------------------------|------------|--------------------------------|---------------------|--------------------------------|---------------------------|--------------|
| B222203-BS1 Blank Spike, (2128023)<br>Se | Blank Spike, (2128023)<br>Se     |            | 200.0                          | 174.3               | μg/L                           | 87% 75-12                 | 5            |
| B222203-BS2                              | Blank Spike, (2128023)<br>Se     |            | 200.0                          | 178.8               | μg/L                           | 89% 75-129                | 5            |
| B222203-BS3                              | Blank Spike, (2128023)<br>Se     |            | 200.0                          | 179.9               | μg/L                           | 90% 75-12                 | 5            |
| B222203-BS4                              | Blank Spike, (2128023)<br>Se     |            | 200.0                          | 173.4               | μg/L                           | 87% 75-12                 | 5            |
| B222203-BS5                              | Blank Spike, (2128023)<br>Se     |            | 200.0                          | 182.9               | μg/L                           | 91% 75-12                 | 5            |
| B222203-SRM1                             | Reference Material (22140)<br>Se | 16, TMDA 5 | 5 <b>1.5 Referenc</b><br>14.30 | e Standard<br>12.81 | - <b>Bottle 8 - 3</b><br>μg/L  | <b>SRM)</b><br>90% 75-12  | 5            |
| B222203-SRM2                             | Reference Material (22140)<br>Se | 16, TMDA 5 | 51.5 Referenc<br>14.30         | e Standard<br>13.33 | - <b>Bottle 8 - \$</b><br>µg/L | <b>SRM)</b><br>93% 75-12  | 5            |
| B222203-SRM3                             | Reference Material (22140)<br>Se | 16, TMDA 5 | 51.5 Referenc<br>14.30         | e Standard<br>13.09 | - <b>Bottle 8 - \$</b><br>µg/L | <b>SRM)</b><br>92% 75-129 | 5            |
| B222203-SRM4                             | Reference Material (22140)<br>Se | 16, TMDA 5 | 5 <b>1.5 Referenc</b><br>14.30 | e Standard<br>13.25 | - <b>Bottle 8 - \$</b><br>µg/L | <b>SRM)</b><br>93% 75-12  | 5            |
| B222203-SRM5                             | Reference Material (22140)<br>Se | 16, TMDA 5 | 51.5 Referenc<br>14.30         | e Standard<br>13.11 | - <b>Bottle 8 - \$</b><br>µg/L | <b>SRM)</b><br>92% 75-12  | 5            |
| B222203-DUP1                             | Duplicate, (2209283-06)<br>Se    | 1.829      |                                | 1.882               | μg/L                           |                           | 3% 20        |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B222203 Lab Matrix: Water Method: EPA 1638 Mod

| Sample<br>B222203-MS1 | Analyte<br>Matrix Spike, (2209283-06) | Native                     | Spike | Result | Units | REC & Limits | RPD & Limits |
|-----------------------|---------------------------------------|----------------------------|-------|--------|-------|--------------|--------------|
|                       | Se                                    | 1.829                      | 220.0 | 198.2  | μg/L  | 89% 75-125   |              |
| B222203-MSD1          | Matrix Spike Duplicate, (22<br>Se     | <b>209283-06)</b><br>1.829 | 220.0 | 202.7  | μg/L  | 91% 75-125   | 2% 20        |



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B222236 Lab Matrix: Water Method: SOP BAL-4201

| Sample       | Analyte                   | Native     | Spike | Result | Units | REC & Limits | RPD & Limits |
|--------------|---------------------------|------------|-------|--------|-------|--------------|--------------|
| B222236-BS1  | Blank Spike, (2236035)    |            |       |        |       |              |              |
|              | MeSe(IV)                  |            | 5.095 | 5.336  | μg/L  | 105% 75-125  |              |
|              | Se(IV)                    |            | 5.000 | 5.147  | μg/L  | 103% 75-125  |              |
|              | Se(VI)                    |            | 5.000 | 4.836  | μg/L  | 97% 75-125   |              |
|              | SeCN                      |            | 5.015 | 4.828  | μg/L  | 96% 75-125   |              |
|              | SeMet                     |            | 4.982 | 4.782  | μg/L  | 96% 75-125   |              |
| B222236-DUP1 | Duplicate, (2209289-06)   |            |       |        |       |              |              |
|              | DMSeO                     | 0.013      |       | ND     | μg/L  |              | N/C 25       |
|              | MeSe(IV)                  | 0.013      |       | 0.015  | μg/L  |              | 9% 25        |
|              | MeSe(VI)                  | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Se(IV)                    | 0.219      |       | 0.223  | μg/L  |              | 2% 25        |
|              | Se(VI)                    | 20.72      |       | 20.98  | μg/L  |              | 1% 25        |
|              | SeCN                      | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeMet                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeSO3                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Unk Se Sp                 | ND         |       | ND     | μg/L  |              | N/C 25       |
| B222236-MS1  | Matrix Spike, (2209289-0  | 6)         |       |        |       |              |              |
|              | Se(IV)                    | 0.219      | 4.900 | 5.274  | μg/L  | 103% 75-125  |              |
|              | Se(VI)                    | 20.72      | 5.100 | 26.18  | μg/L  | NR 75-125    |              |
|              | SeCN                      | ND         | 1.962 | 1.977  | μg/L  | 101% 75-125  |              |
|              | SeMet                     | ND         | 1.977 | 2.015  | μg/L  | 102% 75-125  |              |
| B222236-MSD1 | Matrix Spike Duplicate, ( | 2209289-06 | )     |        |       |              |              |
|              | Se(IV)                    | 0.219      | 4.900 | 5.335  | μg/L  | 104% 75-125  | 1% 25        |
|              | Se(VI)                    | 20.72      | 5.100 | 26.45  | μg/L  | NR 75-125    | N/C 25       |
|              | SeCN                      | ND         | 1.962 | 1.970  | μg/L  | 100% 75-125  | 0.4% 25      |
|              | SeMet                     | ND         | 1.977 | 2.010  | μg/L  | 102% 75-125  | 0.2% 25      |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Batch: B222203 Matrix: Water

Method: EPA 1638 Mod

Analyte: Se

| Sample       | Result | Units |
|--------------|--------|-------|
| B222203-BLK1 | -0.026 | μg/L  |
| B222203-BLK2 | -0.076 | μg/L  |
| B222203-BLK3 | -0.031 | μg/L  |
| B222203-BLK4 | -0.040 | μg/L  |
| B222203-BLK5 | -0.054 | μg/L  |

 Average: -0.045
 MDL: 0.150

 Limit: 0.480
 MRL: 0.480



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### Method Blanks & Reporting Limits

Batch: B222236 Matrix: Water

Method: SOP BAL-4201 Analyte: DMSeO

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | ua/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### Method Blanks & Reporting Limits

Analyte: Se(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.0009 | μg/L  |
| B222236-BLK2 | 0.0005 | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.004 Limit: 0.015 MRL: 0.015

Analyte: Se(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.001  | μg/L  |
| B222236-BLK2 | 0.0007 | μg/L  |
| B222236-BLK3 | 0.0005 | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

 Average: 0.001
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: SeCN

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |
|              |        |       |

 Average: 0.000
 MDL: 0.002

 Limit: 0.010
 MRL: 0.010

Analyte: SeMet

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | ua/l  |

**Average:** 0.000 **MDL:** 0.002 **Limit:** 0.005 **MRL:** 0.005



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Analyte: SeSO3

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

**Average:** 0.000 **MDL:** 0.002 **Limit:** 0.011 **MRL:** 0.011

Analyte: Unk Se Sp

| Sample       | Result | Units |
|--------------|--------|-------|
| B222236-BLK1 | 0.00   | μg/L  |
| B222236-BLK2 | 0.00   | μg/L  |
| B222236-BLK3 | 0.00   | μg/L  |
| B222236-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

## Sample Containers

| <b>Lab ID:</b> 2209283-01<br><b>Sample:</b> LC_DCEF_WS_LAEMP_DRY_2022-09_N      |                      |        |  | Report Matrix: WS<br>Sample Type: Sample + Sum |   |                                     | cted: 09/12/2022<br>ved: 09/22/2022 |
|---|----------------------|--------|--|--|---|-------------------------------------|-------------------------------------|
| Des   | Container            | Size   | Lot  | Preservation                                   | P-Lot   | рН                                  | Ship. Cont.                         |
| Α   | Cent Tube 15mL Se-Sp | 15 mL  | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |
| В   | XTRA_VOL             | 15 mL  | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |
| С   | XTRA_VOL             | 125 mL | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |
| Lab ID: 2209283-02 Sample: LC_DCEF_WS_LAEMP_DRY_2022-09_NP-NAL                  |                      |        | Report Matrix: WS<br>Sample Type: Sample + Sum                 |  |   | cted: 09/12/2022<br>ved: 09/22/2022 |                                     |
|   | Container            | Size   | Lot  | Preservation                                   | P-Lot   | рН                                  | Ship. Cont.                         |
| A   | Client-Provided - TM | 40 mL  | na   | 10% HNO3 (BAL)                                 | 2230023   | <2                                  | Cooler 6 -<br>2209283               |
| Lab ID: 2209283-03 Sample: LC DCEF WS LAEMP DRY 2022-09 NP-NAL                  |                      |        | Report Matrix: WS Sample Type: Sample + Sum                    |  | Collected: 09/12/2022<br>Received: 09/22/2022                   |                                     |                                     |
| _   | Container            | Size   | Lot  | Preservation                                   | P-Lot   | рН                                  | Ship. Cont.                         |
| A   | Client-Provided - TM | 40 mL  | na   | 10% HNO3 (BAL)                                 | 2230023   | <2                                  | Cooler 6 -<br>2209283               |
| Lab ID: 2209283-04 Sample: LC_GRCK_WS_LAEMP_DRY_2022-09_N Des Container Size Lo |                      | Lot    | Report Matrix: WS Sample Type: Sample + Sum Preservation P-Lot |  | Collected: 09/14/2022<br>Received: 09/22/2022<br>pH Ship. Cont. |                                     |                                     |
| Α   | Cent Tube 15mL Se-Sp | 15 mL  | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |
| В   | XTRA_VOL             | 15 mL  | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |
| С   | XTRA_VOL             | 125 mL | na   | none   | na  | na                                  | Cooler 7 -<br>2209283               |



BAL Final Report 2209283

Client PM: Nicole Zathey

Client Project: Line Creek Operation

2209283

### Sample Containers

Lab ID: 2209283-05 Report Matrix: WS Collected: 09/14/2022 Sample: Received: 09/22/2022 Sample Type: Sample + Sum LC GRCK WS LAEMP DRY 2022-09 NP-NAL **Des Container** Lot **Preservation** P-Lot рH Ship. Cont. 10% HNO3 (BAL) Client-Provided - TM 40 mL na 2230023 <2 Cooler 6 -2209283 Lab ID: 2209283-06 Report Matrix: WS Collected: 09/14/2022 Received: 09/22/2022 Sample: Sample Type: Sample + Sum LC\_GRCK\_WS\_LAEMP\_DRY\_2022-09\_NP-NAL рΗ **Des Container** Size **Preservation** P-Lot Lot Ship. Cont. Client-Provided - TM 40 ml 10% HNO3 (BAL) 2230023 <2 Cooler 6 na 2209283 Lab ID: 2209283-07 Report Matrix: WS Collected: 09/14/2022 Sample: LC MT1 WS LAEMP DRY 2022-09 N Sample Type: Sample + Sum Received: 09/22/2022 **Des Container** Size **Preservation** P-Lot Lot pН Ship. Cont. 15 mL Α Cent Tube 15mL Se-Sp none Cooler 7 na na na 2209283 В XTRA VOL 15 mL na none na na Cooler 7 -2209283 С XTRA\_VOL Cooler 7 -125 mL na none na na 2209283 Lab ID: 2209283-08 Collected: 09/14/2022 Report Matrix: WS Received: 09/22/2022 Sample: Sample Type: Sample + Sum LC\_MT1\_WS\_LAEMP\_DRY\_2022-09\_N-NAL **Des Container** Size Lot **Preservation** P-Lot pН Ship. Cont. Client-Provided - TM 40 mL 10% HNO3 (BAL) 2230023 <2 Cooler 6 na 2209283 Lab ID: 2209283-09 Report Matrix: WS Collected: 09/14/2022 Sample: Received: 09/22/2022 Sample Type: Sample + Sum LC MT1 WS LAEMP DRY 2022-09 N-NAL Ship. Cont. **Des Container** Size **Preservation** P-Lot Lot Ha Client-Provided - TM 40 mL 10% HNO3 (BAL) 2230023 <2 Cooler 6 na

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

2209283

# Sample Containers

| <b>Lab ID:</b> 2209283-10<br><b>Sample:</b> LC_CC1_WS_LAEMP_DRY_2022-09_N |                      | Report Matrix: WS Sample Type: Sample + Sum    |     | Collected: 09/14/2022<br>Received: 09/22/2022 |                                      |    |                       |
|---|----------------------|--|-----|---|--------------------------------------|----|-----------------------|
|   | Container            | Size   | Lot | Preservation                                  | P-Lot                                | рН | Ship. Cont.           |
| Α   | Cent Tube 15mL Se-Sp | 15 mL  | na  | none  | na                                   | na | Cooler 7 -<br>2209283 |
| В   | XTRA_VOL             | 15 mL  | na  | none  | na                                   | na | Cooler 7 -<br>2209283 |
| С   | XTRA_VOL             | 125 mL   | na  | none  | na                                   | na | Cooler 7 -<br>2209283 |
| Lab ID: 2209283-11 Sample: LC CC1 WS LAEMP DRY 2022-09 N-NAL              |                      | Report Matrix: WS<br>Sample Type: Sample + Sum |     | Collected: 09/14/2022<br>Received: 09/22/2022 |                                      |    |                       |
| Des   | Container            | Size   | Lot | Preservation                                  | P-Lot                                | рН | Ship. Cont.           |
| Α   | Client-Provided - TM | 40 mL  | na  | 10% HNO3 (BAL)                                | 2230023                              | <2 | Cooler 6 -<br>2209283 |
| Lab ID: 2209283-12 Sample: LC_CC1_WS_LAEMP_DRY_2022-09_N-NAL              |                      | Report Matrix: WS<br>Sample Type: Sample + Sum |     |   | cted: 09/14/2022<br>ived: 09/22/2022 |    |                       |
| Des   | Container            | Size   | Lot | Preservation                                  | P-Lot                                | рН | Ship. Cont.           |
| Α   | Client-Provided - TM | 40 mL  | na  | 10% HNO3 (BAL)                                | 2230023                              | <2 | Cooler 6 -            |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2209283
Client PM: Nicole Zathey
Client Project: Line Creek Operation

### **Shipping Containers**

Cooler 6 - 2209283

**Received:** September 22, 2022 7:37 **Tracking No:** RWHV95583 via Courier

Coolant Type: Blue Ice Temperature: 12.5 °C

Cooler 7 - 2209283

**Received:** September 22, 2022 7:37 **Tracking No:** RWHV95583 via Courier

Coolant Type: Blue Ice Temperature: -0.8 °C Description: Styrofoam Cooler Damaged in transit? No Returned to client? No Comments: IR#:1

Description: Styrofoam Cooler Damaged in transit? No Returned to client? No Comments: IR#:1 Custody seals present? No Custody seals intact? No COC present? Yes

Custody seals present? No Custody seals intact? No COC present? Yes

| 21 | Ωf | 2 |
|----|----|---|
|    |    |   |

Jennifer Ings

10 1 3

Mobile #

Date/Time

519-500-3444

September 19, 2022

Sampler's Name

Sampler's Signature

SERVICE REQUEST (rush - subject to availability)

Regular (default)

Priority (2-3 business days) - 50% surcharge X

Emergency (1 Business Day) - 100% surcharge

For Emergency <1 Day, ASAP or Weekend - Contact ALS

STRAIGHT BILL OF LADING NOT NEGOTIABLE

24 Hour Hot Shot Service

Sparwood, BC Terrace, BC Red Deer, AB

Vancouver, BC Calgary, AB Montreal, QC

Prince George, BC Edmonton, AB Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

Tumbler Ridge, BC Hinton, AB Gillette, WY

| INVOICE TO   | 100 300  | MAHAM  |   |   |  | DATE SOLD DO (23)  |
|--|--|--|---|---|--|--|
| BILL OF LADING   | #  |  |   | PURCHASE ORDE   | RNUMBER  |  |
| SHIPPER (FROM  | (i)  | 1  |   | CONSIGNEE (TO)  | Andread la   | r garage and a second  |
| STREET   | LAND COM   |  |   | STREET  |  | VEN NE   |
| CITY/PROVINCE  | COL PLE  |  | POSTAL CODE   | CITY/PROVINCE   | u 10   | POSTAL CODE  |
| SPECIAL INSTRU   | UCTIONS  |  |   | THE R   |  | FREIGHT CHARGES  |
| PACKAGES   |  | DESCRIPTION OF ARTIC   | LES AND SPECIAL MARKS   |   | WEIGHT   | SHIPPER TO CHECK   |
|  |  |  |   |   | (Subject to Correction)  | □ PREPAID □ COLLECT If not indicated, snipping will automatically move collect   |
| 7  | Contrac  |  | Y   | 1.6   | Tyle lles  | FEE  |
|  |  | 7  | 1 1111  | 11.3  | 000 (0)  | WAITING  |
|  |  |  | 1-12-2  |   |  |  |
|  | 0 11   | 1.10   | 06  | -   |  | XPU  |
|  | KINI   | THO  | SSX   | <   |  | CHARGES  |
|  | 1110   | 110  | 000   | )   |  | FSC  |
| I IN RET   |  |  |   |   |  |  |
| UNIT #   |  |  | DECLARED VALU-<br>liability of carrier is \$2<br>kilogram) unless declar<br>otherwise.  | .00 per lb. (\$4.41 per   | \$   | SUB TOTAL  |
| DRIVER'S SIGNAT  | URE - PICK UP BY   | PICK UP TIME   | DRIVER'S SIGNATUR   | F - DELIVERY BY   | FINISH TIME  | SUB IOTAL  |
|  |  | The state of   |   |   |  | GST  |
| NOTICE OF CLAIM: (a) No conspect of such loss, damage b) The fina statement RECEIVAD at the point is less than day appeared in the mutually appeared in the mutual of issuing a land. En the first of issuing with the state of is | camer to the for his sidemage or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay of any or delay or delay of any or delay or | goods under the Bill of Lading unless affier or the lillhering carner within stine (9) in units from the date entioned herein, the property herein dirry and to deriver to the contany portion of the route to destination, chaire hereto agreed by the consignor gnor and accepted for himself. | notice, there is, eiting our particular of the<br>ixty (60) days after the delivery of the poods, or<br>of shipment together with a con-<br>lescitud, in apparent good order a sept as<br>signed at the said destination subject<br>signed at the said destination subject<br>and accepted to himself and the destination<br>and accepted to himself and the destign. En<br>1 and this assigns. | destination and date of shift<br>in the case of failure to make deli-<br>y of the paid freight bill<br>loted contents and condition of out to the rates and classi-<br>all or any of the goods, that even<br>nited to written including condition | momen of the goods and the estimated amount dis-<br>vivery within nine (9) months from the date of ship-<br>montens of package unknown) marked, consigned<br>inclusion in affect on the date of ship-<br>inclusion in affect on the date of ship-<br>ting ship-ship-ship-ship-ship-ship-ship-ship- | med in ordinate in |
| HIPPER<br>PHYT   | ** It is seen in the Big of Lading is gover  | med by regulation in force in the junsd  | CONSIGNEE PRINT   | s subject to the conditions set or  | if in such conditions  | DATE   |
| SHIPPE"  |  | 111  | CONSIGNEE   |   |  | TIME   |
|  | E: Office YELLOW: Corrie   | er PINK: Consignee   | GOLDENROAD: Shippe  | GST#  | 864540398RT0001  | NUMBER OF PIECES RECEIVED  |
| OR POLICE  |  |  | District Colors   | STATE INTO  | n de biten, autobie  |  |
| Coole  | rID: cevier6   |  | COC (YN)  | Temperati   | ire: 12.5  | IR: Z  |
| Çoola  | nt Type: Ice   | Blue Ice   | Ambient   |   |  |  |

Notes:

Sampling Locations:

Sample Types:

**Container Types:** Opened By: ERL

T/D

SP

T/D

Date: 9/27/22



Revision 004

SP

Effective 7/29/20

INVOICE TO

STRAIGHT BILL OF LADING NOT NEGOTIABLE



BAL Final Report 2209283

No. 95583

Sparwood, BC Terrace, BC Red Deer, AB Vancouver, BC Caigary, AB Montreal, QC Prince George, BC Edmonton, AB Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

DATE

Tumbler Ridge, BC Hinton, AB Gillette, WY

| BILL OF LADING #   |   |  |  | PURCHASE ORDER  | NUMBER  | 1 198  |
|--|---|--|--|---|---|--|
| SHIPPER (FROM)   | 1 7   | A  |  | CONSIGNEE (TO)  |   |  |
| STREET   | Letter  | CA   |  | STREET  | the last  | S PARTY NAMED IN   |
| BILL AND IN  |   | K  |  | SINCE   | EXECUTE OF  | WALLE TO   |
| CITY/PROVINCE  |   |  | POSTAL CODE  | CITY/PROVINCE   | 1.10  | POSTAL CODE  |
| SPECIAL INSTRUCTIONS   |   |  |  | 1 20063 1832  | 0.154   | EDECUT CHARGES   |
| PACKAGES   |   |  |  |   |   | FREIGHT CHARGES SHIPPER TO CHECK                           |
| PAUNAGES   |   | DESCRIPTION OF ART   | ICLES AND SPECIAL MARKS  |   | (Subject to Correction)   | □PREPAID □COLLECT  |
|  |   |  |  | 9270  |   | If not indicated, shipping will automatically move collect |
| 12 12 17   | MINE  | E WWW  | to the second  |   | VILLE   | FEE  |
| Control of the last of the las | -1-1-   |  | 2011   | 11.3  | ONOR IND  |  |
| E S S S S S S S S S S S S S S S S S S S  | 11 4 11   | DESCRIPTION OF   | A SHIP SHIP  |   |   | WAITING  |
|  |   |  |  |   |   | XPU  |
| ESTECHE ST   | A.T   |  | CEO  | 2   |   |  |
|  | IM  | 440  | M  | 7   |   | CHARGES  |
|  | 110   | 111  | 1000   |   |   | FSC  |
|  |   |  |  |   |   | LEGISLA WILLIAM  |
| UNIT #   |   |  | DECLARED VALUE   | JATION: Maximum   |   | US   |
|  |   |  | kilogram) unless ded<br>otherwise.   | 2.00 per lb. (\$4.41 per lared valuation states   | \$  | SUB TOTAL  |
| DRIVER'S SIGNATURE - PI  | CK UP BY  | PICK UP TIME   | DRIVER'S SIGNATU   | RE - DELIVERY BY  | FINISH TIME   | SUB TUTAL  |
|  |   |  | Diverto dionaro  | NE - DELIVER! B!  | FINISH TIME   | GST  |
| OTICE OF CLAIM: (s) No carrier is liable for   | or loss, damage or delay of a   | ny goods under the Bill of Lading uni-   | ess notice, thereto, selting out particulars of the  | of m. destination and date of shipme  | this of the poods and the estimated amount claimed  |  |
| b) The final statement of the claim<br>ECEIVED at the point of origin on the date<br>estined as indicated below which  | must be fited within specified from the consignor the carrier agrees to c   | camer of the sellyering camer within<br>nine (9) months from the di-<br>mentioned herein, the property here-<br>carry and to deliver to the co-            | sty (60) days after the delivery of the goods, alle of shipment together with a count described, in apparent good order, except as onsigned, at the said destination, sub- | on the case of failure to make deliver,<br>py of the paid fraight bill<br>noted contents and condition of conte | within nine (9) months from the date of shipment.<br>ents of package unknown, marked, consigned and   | TOTAL \$   |
| is including agreed, as to each carrier of all<br>is the conditions standard Bill of Lading, in pi<br>ne data of issuing, which are here<br>he Contract for the carriage of the goods list   | or any of the goods over all o<br>ower at the date of issuing, w<br>iby agreed by the con-<br>ed in the Bill of Lading is gov | or any portion of the route to destinate<br>high are hereto agreed by the consig<br>signor and accepted for hims<br>remed by regulation in force in the wa | ion, and as to each party of any time interested<br>nor and accepted for himself and his assigns.<br>self and his assigns,<br>and of the time and place of shapment and    | in all or any of the goods, that every se<br>trinted or written, including conditions se                        | int of the goods and the estimated amount claimed<br>within nine (9) months from the date of shipment<br>ents of package timonorin, marked, consigned and<br>titto in effect on the date of shipment<br>envice to be parformed hereunder shall be subject to<br>a stake by the standard bill of Lading, in power at<br>such conditions. | IF AT OWNER'S RISK, WRITE ORD HERE                         |
| HIPPER<br>RINT   |   |  | CONSIGNEE  | and subject to the conditions set out in  | such conditions   | DATE   |
|  |   |  |  |   |   |  |
| HIPPER<br>IGN  |   |  | CONSIGNEE  |   |   | TIME   |
| WHITE: Office  | YELLOW: Carri   | ier PINK: Consigne   | e GOLDENROAD: Shipp  | GST # 86  | 4540398RT0001   | NUMBER OF PIECES RECEIVED                                  |
| OII PRINTING   |   |  |  |   |   |  |
|  | 7 0   |  |  | A LONG TOWN   |   |  |
| Cooler ID: (   | onler 7   |  | coc (Y)N)  | Temperature   | e: ~ O. 8   | IR: 7  |
|  | _   |  |  |   | 0 - 0   | ····   |
| Coolant Type   | e: Ice  | Blue Ice   | Ambient  |   |   |  |
| Notes:   |   |  |  | /   |   |  |
| Committies   | and a line  | 00   | 11/  | 1 (1  | 14  |  |

Sampling Locations:

Sample Types:
Container Types:

Opened By: ERL

T/D (SP) T/D 125AL PICSHIZ PICSHIC

125n 4 90 Stiz Date: 9/22/22

COPY

T/D

SP

CONC

FICSTEL

T/D

Revision 004

SP

T/D

Effective 7/29/20

#### **SELENIUM SPECIATION**

BAL Final Report 2212302 (Finalized 13-Jan-23) Confidential BAL Final Report 2212302

January 13, 2023

Teck Resources Limited - Vancouver Nicole Zathey Box 2003 15km North Hwy 43 Sparwood, B.C. CANADA V0B2G0 nicole.zathey@teck.com

Re: Line Creek Operation

Dear Nicole Zathey,

On December 15, 2022, Brooks Applied Labs (BAL) received twelve (12) aqueous samples. The samples were logged-in for total recoverable selenium [Se], dissolved Se [Se], and Se speciation analyses, according to the chain-of-custody (COC) forms.

The total recoverable Se fraction for *LC\_DCEF\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL* (Laboratory ID = 2212302-16) arrived in a broken container and most of the volume was lost during shipment. Enough volume was remaining to undergo an acid digest and subsequent analysis for selenium. Since it is unknown if contamination occurred during shipment/storage, the total recoverable Se result for 2212302-16 is qualified as estimated (**J-1**) due to a broken container/leaking during shipment.

The dissolved Se fraction for *LC\_CC1\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL* (laboratory ID 2212302-17) also arrived at BAL in a broken container with no volume remaining for quantitation. Volume from the corresponding field filtered selenium speciation fraction (laboratory ID 2212302-06) was poured off into a new container to support the dissolved Se analysis. This new dissolved Se fraction (2212302-17) was preserved (pH < 2) upon receipt at BAL.

The sample fractions for total recoverable Se and dissolved Se were not preserved in the field. The samples were preserved (pH < 2) upon receipt at BAL. The preservation took place beyond the (14-calander day) preservation holding time. Consequently, all total recoverable Se and dissolved Se results are qualified ( $\mathbf{H}$ ) for preservation time violations.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL. All samples were stored according to BAL SOPs.

#### Total Recoverable Se and Dissolved Se

Each aqueous sample fraction for dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Confidential BAL Final Report 2212302

The total recoverable Se result for 2212302-16 is qualified as estimated (**J-1**) due to a broken container/leaking during shipment. All total recoverable Se and dissolved Se results are qualified (**H**) for preservation time violations.

#### Selenium Speciation

Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [Se(IV)], selenate [Se(VI)], selenocyanate [SeCN], methylseleninic acid [MeSe(IV)], selenomethionine methaneselenonic acid [MeSe(VI)], [SeMet]. selenosulfate [SeSO<sub>3</sub>]. dimethylselenoxide [DMSeO]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified in the report as [Unk Se Sp].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

In cases when either the native sample concentration was non-detectable (reported as less than or equal to the MDL) and/or the corresponding DUP result was also non-detectable, the RPD between the two values was not calculated (**N/C**).

Except for concentration qualifiers and items noted above, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL verifies that the reported results of all analyses for which the laboratory is accredited meet the requirements of the accrediting body, unless otherwise noted in the report narrative. For more information regarding accreditations please see the *Report Information* and *Batch Summary* pages. This report must be used in its entirety for interpretation of results.

Confidential BAL Final Report 2212302

Please feel free to contact us if you have any questions regarding this report.

Şincerely,

Jeremy Maute

Senior Project Manager

Jeremy@brooksapplied.com

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

#### **Report Information**

#### **General Disclaimers**

Test results are based solely upon the sample submitted to Brooks Applied Labs in the condition it was received. This report shall not be reproduced or copied, except in full, without written approval of the laboratory. Brooks Applied Labs is not responsible for the consequences arising from the use of a partial report.

#### **Laboratory Accreditation**

BAL maintains accreditation with various state and national agencies for select test methods. For a current list of BAL accreditations, please visit our website at <a href="http://www.brooksapplied.com/resources/certificates-permits/">http://www.brooksapplied.com/resources/certificates-permits/</a>. The reported analyte/matrix/method combination shall be considered outside BAL's scopes of accreditation unless otherwise identified as ISO, TNI, or ISO,TNI in the tables. It is the responsibility of the client to verify whether a specific accreditation is required for the intended data use.

ISO: ISO/IEC 17025:2017 accredited test method. Issued by ANSI National Accreditation Board (ANAB), #ADE-1447.02

TNI: NELAP accredited test method. Issued by the State of Florida Department of Health, #E87982.

ISO,TNI: Test method is accredited under both the ISO/IEC 17025:2017 and NELAP accreditations referenced above.

#### **Field Quality Control Samples**

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

#### **Common Abbreviations**

| AR  | as received                         | MS  | matrix spike                       |
|-----|-------------------------------------|-----|------------------------------------|
| BAL | Brooks Applied Labs                 | MSD | matrix spike duplicate             |
| BLK | method blank                        | ND  | non-detect                         |
| BS  | blank spike                         | NR  | non-reportable                     |
| CAL | calibration standard                | N/C | not calculated                     |
| CCB | continuing calibration blank        | PS  | post preparation spike             |
| CCV | continuing calibration verification | REC | percent recovery                   |
| COC | chain of custody record             | RPD | relative percent difference        |
| D   | dissolved fraction                  | SCV | secondary calibration verification |
| DUP | duplicate                           | SOP | standard operating procedure       |
| IBL | instrument blank                    | SRM | reference material                 |
| ICV | initial calibration verification    | T   | total fraction                     |
| MDL | method detection limit              | TR  | total recoverable fraction         |
| MRL | method reporting limit              |     |                                    |
|     |                                     |     |                                    |

#### **Definition of Data Qualifiers**

- E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
- Holding time and/or preservation requirements not met. Please see narrative for explanation.
- J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
- **J-1** Estimated value. A full explanation is presented in the narrative.
- M Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
- N Spike recovery was not within acceptance criteria. Please see narrative for explanation.
- **R** Rejected, unusable value. A full explanation is presented in the narrative.
- U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
- X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
- **Z** Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Information

| Sample                                  | Lab ID     | Report Matrix | Туре   | Sampled    | Received   |
|---|------------|---------------|--------|------------|------------|
| LC_FRB_WS_LAEMP_DRY_2022-11<br>_N       | 2212302-01 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_FRUS_WS_LAEMP_DRY_2022-<br>11_N      | 2212302-02 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>11_N      | 2212302-03 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-11<br>_NP      | 2212302-04 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_DCEF_WS_LAEMP_DRY_2022-<br>11_N      | 2212302-05 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-11<br>_NP      | 2212302-06 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_FRB_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-07 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_FRB_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-08 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_FRUS_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-09 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_FRUS_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-10 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-11 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_GRCK_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-12 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-13 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_MT1_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-14 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_DCEF_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-15 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_DCEF_WS_LAEMP_DRY_2022-<br>11_NP-NAL | 2212302-16 | WS            | Sample | 11/29/2022 | 12/15/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-17 | WS            | Sample | 11/30/2022 | 12/15/2022 |
| LC_CC1_WS_LAEMP_DRY_2022-11<br>_NP-NAL  | 2212302-18 | WS            | Sample | 11/30/2022 | 12/15/2022 |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

### **Batch Summary**

| Analyte   | <b>Lab Matrix</b> | Method       | Accred. | Prepared | <b>Analyzed</b> | Batch   | Sequence |
|-----------|-------------------|--------------|---------|----------|-----------------|---------|----------|
| DMSeO     | Water             | SOP BAL-4201 |         | 12/15/22 | 12/18/22        | B223068 | S221316  |
| MeSe(IV)  | Water             | SOP BAL-4201 |         | 12/15/22 | 12/18/22        | B223068 | S221316  |
| MeSe(VI)  | Water             | SOP BAL-4201 |         | 12/15/22 | 12/18/22        | B223068 | S221316  |
| Se        | Water             | EPA 1638 Mod |         | 12/21/22 | 12/22/22        | B223142 | S221342  |
| Se(IV)    | Water             | SOP BAL-4201 | ISO,TNI | 12/15/22 | 12/18/22        | B223068 | S221316  |
| Se(VI)    | Water             | SOP BAL-4201 | ISO,TNI | 12/15/22 | 12/18/22        | B223068 | S221316  |
| SeCN      | Water             | SOP BAL-4201 | ISO     | 12/15/22 | 12/18/22        | B223068 | S221316  |
| SeMet     | Water             | SOP BAL-4201 | ISO     | 12/15/22 | 12/18/22        | B223068 | S221316  |
| SeSO3     | Water             | SOP BAL-4201 |         | 12/15/22 | 12/18/22        | B223068 | S221316  |
| Unk Se Sp | Water             | SOP BAL-4201 |         | 12/15/22 | 12/18/22        | B223068 | S221316  |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Results

| Sample     | Analyte     | Report Matrix | Basis | Result  | Qualifier | MDL   | MRL   | Unit | Batch   | Sequence |
|------------|-------------|---------------|-------|---------|-----------|-------|-------|------|---------|----------|
| LC_FRB_WS_ | LAEMP DRY 2 | 2022-11 N     |       |         |           |       |       |      |         |          |
| 2212302-01 | DMSeO       | ws            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-01 | MeSe(IV)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-01 | MeSe(VI)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-01 | Se(IV)      | WS            | D     | 0.191   |           | 0.020 | 0.075 | μg/L | B223068 | S221316  |
| 2212302-01 | Se(VI)      | WS            | D     | 50.6    |           | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-01 | SeCN        | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B223068 | S221316  |
| 2212302-01 | SeMet       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-01 | SeSO3       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-01 | Unk Se Sp   | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B223068 | S221316  |
|            |             |               |       |         |           |       |       |      |         |          |
| LC_FRUS_WS | _LAEMP_DRY  | _2022-11_N    |       |         |           |       |       |      |         |          |
| 2212302-02 | DMSeO       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-02 | MeSe(IV)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-02 | MeSe(VI)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-02 | Se(IV)      | WS            | D     | 0.137   |           | 0.020 | 0.075 | μg/L | B223068 | S221316  |
| 2212302-02 | Se(VI)      | WS            | D     | 42.6    |           | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-02 | SeCN        | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B223068 | S221316  |
| 2212302-02 | SeMet       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-02 | SeSO3       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-02 | Unk Se Sp   | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B223068 | S221316  |
|            |             |               |       |         |           |       |       |      |         |          |
| LC_GRCK_WS | LAEMP_DRY   | _2022-11_N    |       |         |           |       |       |      |         |          |
| 2212302-03 | DMSeO       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-03 | MeSe(IV)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-03 | MeSe(VI)    | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-03 | Se(IV)      | WS            | D     | 0.031   | J         | 0.020 | 0.075 | μg/L | B223068 | S221316  |
| 2212302-03 | Se(VI)      | WS            | D     | 2.28    |           | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-03 | SeCN        | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L | B223068 | S221316  |
| 2212302-03 | SeMet       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L | B223068 | S221316  |
| 2212302-03 | SeSO3       | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L | B223068 | S221316  |
| 2212302-03 | Unk Se Sp   | WS            | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L | B223068 | S221316  |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Results

| Sample      | Analyte           | Report Matrix        | Basis | Result  | Qualifier | MDL   | MRL   | Unit         | Batch   | Sequence |
|-------------|-------------------|----------------------|-------|---------|-----------|-------|-------|--------------|---------|----------|
| LC_MT1_WS_I | LAEMP_DRY_2       | 2022-11_NP           |       |         |           |       |       |              |         |          |
| 2212302-04  | DMSeO             | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-04  | MeSe(IV)          | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-04  | MeSe(VI)          | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-04  | Se(IV)            | WS                   | D     | ≤ 0.020 | U         | 0.020 | 0.075 | μg/L         | B223068 | S221316  |
| 2212302-04  | Se(VI)            | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-04  | SeCN              | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L         | B223068 | S221316  |
| 2212302-04  | SeMet             | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-04  | SeSO3             | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-04  | Unk Se Sp         | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L         | B223068 | S221316  |
| LC DCEF WS  | I AFMP DRY        | 2022-11 N            |       |         |           |       |       |              |         |          |
| 2212302-05  | DMSeO             | _ <b>W</b> S         | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-05  | MeSe(IV)          | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-05  | MeSe(VI)          | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-05  | Se(IV)            | WS                   | D     | ≤ 0.020 | Ü         | 0.020 | 0.075 | μg/L         | B223068 | S221316  |
| 2212302-05  | Se(VI)            | WS                   | D     | 1.39    | •         | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-05  | SeCN              | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L         | B223068 | S221316  |
| 2212302-05  | SeMet             | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-05  | SeSO3             | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-05  | Unk Se Sp         | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L         | B223068 | S221316  |
| LC_CC1_WS_I | IAEMP DRV :       | 2022-11 NP           |       |         |           |       |       |              |         |          |
| 2212302-06  | DMSeO             | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-06  | MeSe(IV)          | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L<br>μg/L | B223068 | S221316  |
| 2212302-06  | MeSe(VI)          | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-06  | Se(IV)            | WS                   | D     | 0.176   | O         | 0.020 | 0.025 | μg/L<br>μg/L | B223068 | S221316  |
| 2212302-06  | Se(VI)            | WS                   | D     | 48.2    |           | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-06  | SeCN              | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.050 | μg/L         | B223068 | S221316  |
| 2212302-06  | SeMet             | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.025 | μg/L         | B223068 | S221316  |
| 2212302-06  | SeSO3             | WS                   | D     | ≤ 0.010 | Ü         | 0.010 | 0.055 | μg/L         | B223068 | S221316  |
| 2212302-06  | Unk Se Sp         | WS                   | D     | ≤ 0.010 | U         | 0.010 | 0.075 | μg/L         | B223068 | S221316  |
| IC EDD We   | I AEMD DDY        | 2022-11_NP-NAL       |       |         |           |       |       |              |         |          |
|             | LAEWP_DR1_/<br>Se | 2022-11_NP-NAL<br>WS | D     | 46.1    | Н         | 0.165 | 0.528 | ua/l         | B223142 | S221342  |
| 2212302-07  | Se                | VVO                  | U     | 40.1    | 17        | 0.100 | 0.320 | μg/L         | D223142 | 3221342  |
| LC FRB WS   | LAEMP DRY         | 2022-11 NP-NAL       |       |         |           |       |       |              |         |          |
| 2212302-08  | Se                | WS                   | TR    | 45.6    | Н         | 0.165 | 0.528 | μg/L         | B223142 | S221342  |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Sample Results

| Sample                              | Analyte    | Report Matrix    | Basis | Result  | Qualifier | MDL   | MRL   | Unit | Batch   | Sequence |  |
|-------------------------------------|------------|------------------|-------|---------|-----------|-------|-------|------|---------|----------|--|
| LC FRUS WS                          | LAEMP DRY  | _2022-11_NP-NAL  |       |         |           |       |       |      |         |          |  |
| 2212302-09                          | Se         | WS               | D     | 41.9    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_FRUS_WS_                         | LAEMP_DRY  | _2022-11_NP-NAL  |       |         |           |       |       |      |         |          |  |
| 2212302-10                          | Se         | WS               | TR    | 39.5    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC GRCK WS LAEMP DRY 2022-11 NP-NAL |            |                  |       |         |           |       |       |      |         |          |  |
| 2212302-11                          | Se         | WS               | D     | 2.43    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_GRCK_WS                          | _LAEMP_DRY | Y_2022-11_NP-NAL |       |         |           |       |       |      |         |          |  |
| 2212302-12                          | Se         | WS               | TR    | 2.04    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_MT1_WS_L                         | AEMP_DRY_  | 2022-11_NP-NAL   |       |         |           |       |       |      |         |          |  |
| 2212302-13                          | Se         | WS               | D     | ≤ 0.165 | ΗU        | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_MT1_WS_L                         | AEMP_DRY_  | 2022-11_NP-NAL   |       |         |           |       |       |      |         |          |  |
| 2212302-14                          | Se         | WS               | TR    | ≤ 0.165 | ΗU        | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_DCEF_WS_                         | LAEMP_DRY  |                  |       |         |           |       |       |      |         |          |  |
| 2212302-15                          | Se         | WS               | D     | 1.23    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_DCEF_WS_                         | LAEMP_DRY  |                  |       |         |           |       |       |      |         |          |  |
| 2212302-16                          | Se         | WS               | TR    | 1.39    | H J-1     | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_CC1_WS_L                         | AEMP_DRY_  | 2022-11_NP-NAL   |       |         |           |       |       |      |         |          |  |
| 2212302-17                          | Se         | WS               | D     | 45.8    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |
| LC_CC1_WS_L                         | AEMP_DRY_  | 2022-11_NP-NAL   |       |         |           |       |       |      |         |          |  |
| 2212302-18                          | Se         | WS               | TR    | 47.4    | Н         | 0.165 | 0.528 | μg/L | B223142 | S221342  |  |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B223068 Lab Matrix: Water Method: SOP BAL-4201

| Sample       | Analyte                   | Native     | Spike | Result | Units | REC & Limits | RPD & Limits |
|--------------|---------------------------|------------|-------|--------|-------|--------------|--------------|
| B223068-BS1  | Blank Spike, (2236035)    |            | - P   |        |       |              |              |
|              | MeSe(IV)                  |            | 5.095 | 5.608  | μg/L  | 110% 75-125  |              |
|              | Se(IV)                    |            | 5.000 | 4.946  | μg/L  | 99% 75-125   |              |
|              | Se(VI)                    |            | 5.000 | 4.638  | μg/L  | 93% 75-125   |              |
|              | SeCN                      |            | 5.015 | 4.822  | μg/L  | 96% 75-125   |              |
|              | SeMet                     |            | 4.982 | 5.088  | μg/L  | 102% 75-125  |              |
| B223068-DUP8 | Duplicate, (2212302-01)   |            |       |        |       |              |              |
|              | DMSeO                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | MeSe(IV)                  | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | MeSe(VI)                  | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Se(IV)                    | 0.191      |       | 0.194  | μg/L  |              | 2% 25        |
|              | Se(VI)                    | 50.57      |       | 49.65  | μg/L  |              | 2% 25        |
|              | SeCN                      | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeMet                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | SeSO3                     | ND         |       | ND     | μg/L  |              | N/C 25       |
|              | Unk Se Sp                 | ND         |       | ND     | μg/L  |              | N/C 25       |
| B223068-MS8  | Matrix Spike, (2212302-0  | 1)         |       |        |       |              |              |
|              | Se(IV)                    | 0.191      | 4.900 | 5.224  | μg/L  | 103% 75-125  |              |
|              | Se(VI)                    | 50.57      | 5.100 | 55.91  | μg/L  | NR 75-125    |              |
|              | SeCN                      | ND         | 1.962 | 1.952  | μg/L  | 100% 75-125  |              |
|              | SeMet                     | ND         | 1.977 | 2.070  | μg/L  | 105% 75-125  |              |
| B223068-MSD8 | Matrix Spike Duplicate, ( | 2212302-01 | )     |        |       |              |              |
|              | Se(IV)                    | 0.191      | 4.900 | 5.215  | μg/L  | 103% 75-125  | 0.2% 25      |
|              | Se(VI)                    | 50.57      | 5.100 | 55.59  | μg/L  | NR 75-125    | N/C 25       |
|              | SeCN                      | ND         | 1.962 | 1.922  | μg/L  | 98% 75-125   | 2% 25        |
|              | SeMet                     | ND         | 1.977 | 2.023  | μg/L  | 102% 75-125  | 2% 25        |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B223142 Lab Matrix: Water Method: EPA 1638 Mod

| Sample       | Analyte                               | Native       | Spike | Result | Units | REC & Limits | RPD & Limits |
|--------------|---------------------------------------|--------------|-------|--------|-------|--------------|--------------|
| B223142-BS1  | Blank Spike, (2137006)<br>Se          |              | 200.0 | 179.2  | μg/L  | 90% 75-125   |              |
| B223142-BS2  | Blank Spike, (2137006)<br>Se          |              | 200.0 | 181.7  | μg/L  | 91% 75-125   |              |
| B223142-BS3  | Blank Spike, (2137006)<br>Se          |              | 200.0 | 177.3  | μg/L  | 89% 75-125   |              |
| B223142-SRM1 | Reference Material (212801<br>Se      | 9, T221)     | 3.800 | 3.405  | μg/L  | 90% 75-125   |              |
| B223142-SRM2 | Reference Material (212801<br>Se      | 9, T221)     | 3.800 | 3.355  | μg/L  | 88% 75-125   |              |
| B223142-SRM3 | Reference Material (212801<br>Se      | 9, T221)     | 3.800 | 3.288  | μg/L  | 87% 75-125   |              |
| B223142-DUP5 | <b>Duplicate, (2212302-08)</b><br>Se  | 45.60        |       | 45.64  | μg/L  |              | 0.08% 20     |
| B223142-MS5  | Matrix Spike, (2212302-08)<br>Se      | 45.60        | 220.0 | 239.2  | μg/L  | 88% 75-125   |              |
| B223142-MSD5 | Matrix Spike Duplicate, (22<br>Se     | <b>45.60</b> | 220.0 | 250.7  | μg/L  | 93% 75-125   | 5% 20        |
| B223142-DUP6 | <b>Duplicate</b> , (2212302-18)<br>Se | 47.45        |       | 46.65  | μg/L  |              | 2% 20        |
| B223142-MS6  | Matrix Spike, (2212302-18)<br>Se      | 47.45        | 220.0 | 242.5  | μg/L  | 89% 75-125   |              |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Accuracy & Precision Summary

Batch: B223142 Lab Matrix: Water Method: EPA 1638 Mod

| Sample       | Analyte                 | Native       | Spike | Result | Units | <b>REC &amp; Limits</b> | <b>RPD &amp; Limits</b> |
|--------------|-------------------------|--------------|-------|--------|-------|-------------------------|-------------------------|
| B223142-MSD6 | Matrix Spike Duplicate, | (2212302-18) |       |        |       |                         |                         |
|              | Se                      | 47.45        | 220.0 | 236.6  | ua/L  | 86% 75-125              | 2% 20                   |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

#### Method Blanks & Reporting Limits

Batch: B223068 Matrix: Water

Method: SOP BAL-4201 Analyte: DMSeO

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | ua/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005

Analyte: MeSe(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.002 Limit: 0.005 MRL: 0.005



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

#### Method Blanks & Reporting Limits

Analyte: Se(IV)

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

Average: 0.000 MDL: 0.004 Limit: 0.015 MRL: 0.015

Analyte: Se(VI)

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: SeCN

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |
|              |        |       |

 Average: 0.000
 MDL: 0.002

 Limit: 0.010
 MRL: 0.010

Analyte: SeMet

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | ua/l  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.005
 MRL: 0.005



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Analyte: SeSO3

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.011
 MRL: 0.011

Analyte: Unk Se Sp

| Sample       | Result | Units |
|--------------|--------|-------|
| B223068-BLK1 | 0.00   | μg/L  |
| B223068-BLK2 | 0.00   | μg/L  |
| B223068-BLK3 | 0.00   | μg/L  |
| B223068-BLK4 | 0.00   | μg/L  |

 Average: 0.000
 MDL: 0.002

 Limit: 0.015
 MRL: 0.015

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## Method Blanks & Reporting Limits

Batch: B223142 Matrix: Water

Method: EPA 1638 Mod

Analyte: Se

| Sample       | Result | Units |
|--------------|--------|-------|
| B223142-BLK1 | 0.041  | μg/L  |
| B223142-BLK2 | 0.039  | μg/L  |
| B223142-BLK3 | 0.070  | μg/L  |
| B223142-BLK4 | 0.011  | μg/L  |

 Average: 0.040
 MDL: 0.150

 Limit: 0.480
 MRL: 0.480



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

2212302

## Sample Containers

|     | I <b>D:</b> 2212302-01<br>ple: LC_FRB_WS_LAEMP_DI | RY_2022-11_N  |     | Report Matrix: WS<br>Sample Type: Sample + Sum |       |    | cted: 11/30/2022<br>ved: 12/15/2022 |
|-----|---|---------------|-----|--|-------|----|-------------------------------------|
| Des | Container   | Size          | Lot | Preservation                                   | P-Lot | рН | Ship. Cont.                         |
| Α   | Cent Tube Se-Sp                                   | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| В   | XTRA_VOL  | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| С   | XTRA_VOL  | 125 mL        | na  | none   | na    | na | Cooler 6 -<br>2212302               |
|     | ID: 2212302-02                                    |               |     | Report Matrix: WS                              |       |    | cted: 11/29/2022                    |
|     | ple: LC_FRUS_WS_LAEMP_I                           |               |     | Sample Type: Sample + Sum                      |       |    | ved: 12/15/2022                     |
| Des | Container   | Size          | Lot | Preservation                                   | P-Lot | рН | Ship. Cont.                         |
| Α   | Cent Tube Se-Sp                                   | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| В   | XTRA_VOL  | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| С   | XTRA_VOL  | 125 mL        | na  | none   | na    | na | Cooler 6 -<br>2212302               |
|     | ID: 2212302-03<br>ple: LC_GRCK_WS_LAEMP_          | DRY_2022-11_N |     | Report Matrix: WS Sample Type: Sample + Sum    |       |    | cted: 11/30/2022<br>ved: 12/15/2022 |
| Des | Container   | Size          | Lot | Preservation                                   | P-Lot | рН | Ship. Cont.                         |
| Α   | Cent Tube Se-Sp                                   | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| В   | XTRA_VOL  | 15 mL         | na  | none   | na    | na | Cooler 6 -<br>2212302               |
| С   | XTRA_VOL  | 125 mL        | na  | none   | na    | na | Cooler 6 -                          |



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

## **Sample Containers**

|      | <b>D</b> : 2212302-04<br>ple: LC_MT1_WS_LAEMP_DF              | RY 2022-11 NP         |     | Report Matrix: WS<br>Sample Type: Sample + Sum           |         |    | ted: 11/30/2022<br>ved: 12/15/2022                 |
|------|---|-----------------------|-----|--|---------|----|--|
| -    | Container   | Size                  | Lot | Preservation   | P-Lot   | pH | Ship. Cont.  |
| Α    | Cent Tube Se-Sp   | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| В    | XTRA_VOL  | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| С    | XTRA_VOL  | 125 mL                | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
|      | D: 2212302-05   | NDV 2022 44 N         |     | Report Matrix: WS  |         |    | eted: 11/29/2022                                   |
| -    | ple: LC_DCEF_WS_LAEMP_[ Container                             | Size                  | Lot | Sample Type: Sample + Sum Preservation                   | P-Lot   | pH | ved: 12/15/2022<br>Ship. Cont.                     |
| A    | Cent Tube Se-Sp   | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| В    | XTRA_VOL  | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| С    | XTRA_VOL  | 125 mL                | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| Samı | D: 2212302-06 ple: LC_CC1_WS_LAEMP_DF                         | RY_2022-11_NP<br>Size | Lot | Report Matrix: WS Sample Type: Sample + Sum Preservation | P-Lot   |    | cted: 11/30/2022<br>ved: 12/15/2022<br>Ship. Cont. |
| A    | Cent Tube Se-Sp   | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| В    | XTRA_VOL  | 15 mL                 | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| С    | XTRA_VOL  | 125 mL                | na  | none   | na      | na | Cooler 6 -<br>2212302                              |
| Samı | <b>D:</b> 2212302-07<br><b>ple:</b><br>FRB_WS_LAEMP_DRY_2022- | 11_NP-NAL             |     | Report Matrix: WS<br>Sample Type: Sample + Sum           |         |    | eted: 11/30/2022<br>ved: 12/15/2022                |
| _    | Container   | Size                  | Lot | Preservation   | P-Lot   | рН | Ship. Cont.  |
| Α    | zClient-Provided - TM   | 40 mL                 | na  | 10 % HNO3 (BAL)  | 2244016 | <2 | Cooler 6 -<br>2212302                              |

**Project ID:** TRL-VC2101 **PM:** Jeremy Maute



BAL Final Report 2212302
Client PM: Nicole Zathey
Client Project: Line Creek Operation

2212302

#### Sample Containers

 Lab ID: 2212302-08
 Report Matrix: WS
 Collected: 11/30/2022

 Sample:
 Sample Type: Sample + Sum
 Received: 12/15/2022

LC\_FRB\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

LC\_FRUS\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

Des ContainerSizeLotPreservationP-LotpHShip. Cont.A zClient-Provided - TM40 mLna10 % HNO3 (BAL)2244016<2</td>Cooler 6 -<br/>2212302

 Lab ID: 2212302-09
 Report Matrix: WS
 Collected: 11/29/2022

 Sample:
 Sample Type: Sample + Sum
 Received: 12/15/2022

Sample: Sample Type: Sample + Sum Received: 12/15
LC\_FRUS\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

Des ContainerSizeLotPreservationP-LotpHShip. Cont.A zClient-Provided - TM40 mLna10 % HNO3 (BAL)2244016<2</td>Cooler 6 -

**Lab ID:** 2212302-10 **Report Matrix:** WS **Collected:** 11/29/2022

Sample: Sample Type: Sample + Sum Received: 12/15/2022

DesContainerSizeLotPreservationP-LotpHShip. Cont.AzClient-Provided - TM40 mLna10 % HNO3 (BAL)2244016<2</td>Cooler 6 -

A zClient-Provided - TM 40 mL na 10 % HNO3 (BAL) 2244016 <2 Cooler 6 - 2212302

 Lab ID: 2212302-11
 Report Matrix: WS
 Collected: 11/30/2022

Sample: Sample Type: Sample + Sum Received: 12/15/2022 LC\_GRCK\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

Des ContainerSizeLotPreservationP-LotpHShip. Cont.A zClient-Provided - TM40 mLna10 % HNO3 (BAL)2244016<2</td>Cooler 6 -

2212302

 Lab ID: 2212302-12
 Report Matrix: WS
 Collected: 11/30/2022

Sample: Sample Type: Sample + Sum Received: 12/15/2022 LC GRCK WS LAEMP DRY 2022-11 NP-NAL

Des ContainerSizeLotPreservationP-LotpHShip. Cont.A zClient-Provided - TM40 mLna10 % HNO3 (BAL)2244016<2</td>Cooler 6 -

2212302

Project ID: TRL-VC2101 PM: Jeremy Maute



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

#### Sample Containers

Lab ID: 2212302-13 Report Matrix: WS Collected: 11/30/2022 Sample: Received: 12/15/2022 Sample Type: Sample + Sum LC MT1 WS LAEMP DRY 2022-11 NP-NAL **Des Container** Lot **Preservation** P-Lot рH Ship. Cont. Cooler 6 zClient-Provided - TM 40 mL na 10 % HNO3 (BAL) 2244016 <2 2212302 Lab ID: 2212302-14 Report Matrix: WS Collected: 11/30/2022 Received: 12/15/2022 Sample: Sample Type: Sample + Sum LC\_MT1\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL рΗ **Des Container** Size **Preservation** P-Lot Lot Ship. Cont. zClient-Provided - TM 40 ml 10 % HNO3 (BAL) 2244016 <2 Cooler 6 na 2212302 Lab ID: 2212302-15 Report Matrix: WS Collected: 11/29/2022 Sample: Sample Type: Sample + Sum Received: 12/15/2022 LC\_DCEF\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL **Preservation** P-Lot Ship. Cont. **Des Container** Size Lot pΗ 40 mL <2 zClient-Provided - TM na 10 % HNO3 (BAL) 2244016 Cooler 6 -2212302 Lab ID: 2212302-16 Report Matrix: WS Collected: 11/29/2022 Sample: Sample Type: Sample + Sum Received: 12/15/2022 LC\_DCEF\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

**Des Container** Size Lot **Preservation** P-Lot pН Ship. Cont.

zClient-Provided - TM 40 mL 10 % HNO3 (BAL) 2244016 <2 na Cooler 6 -2212302

Lab ID: 2212302-17 Collected: 11/30/2022 Report Matrix: WS

Sample: Sample Type: Sample + Sum Received: 12/15/2022 LC CC1 WS LAEMP DRY 2022-11 NP-NAL

**Des Container** Size Lot **Preservation** P-Lot pН Ship. Cont. zClient-Provided - TM 40 mL 10 % HNO3 (BAL) <2 Cooler 6 -2244016 na

2212302

**Project ID**: TRL-VC2101 **PM**: Jeremy Maute



BAL Final Report 2212302 Client PM: Nicole Zathey Client Project: Line Creek Operation

#### Sample Containers

**Lab ID:** 2212302-18

Sample:

LC\_CC1\_WS\_LAEMP\_DRY\_2022-11\_NP-NAL

Des Container Size

A zClient-Provided - TM

40 mL

Report Matrix: WS

Sample Type: Sample + Sum

Lot Preservation
na 10 % HNO3 (BAL)

P-Lot 2244016 pH Ship. Cont. <2 Cooler 6 -

Custody seals present? No

Collected: 11/30/2022 Received: 12/15/2022

> Cooler 6 -2212302

#### **Shipping Containers**

Cooler 6 - 2212302

**Received:** December 15, 2022 7:08 **Tracking No:** RWHV 97355 via Courier

Coolant Type: Blue Ice Temperature: -2.5 °C Description: Styrofoam Cooler Damaged in transit? No Returned to client? No Comments: R-IR-2

nsit? No Custody seals intact? No COC present? Yes

Teck

| TECK                                | COC ID:  |                |                             | RY_2022-       |         | TURNA      | ROUN    | DΤ          | IME:                 |             |             | Regul                 |           |         |                    | RUSH       | N/A           |              |             | Теры      |
|-------------------------------------|--|----------------|-----------------------------|----------------|---------|------------|---------|-------------|----------------------|-------------|-------------|-----------------------|-----------|---------|--------------------|------------|---------------|--------------|-------------|-----------|
|                                     | PROJECT/CLIENT I   | INFO           | RD                          | OOKS           |         |            |         | L           | ABORA                | TORY        |             | regu                  |           |         |                    | OTHE       | RINFO         |              |             |           |
| Facility Name / Job# I              |  |                |                             |                |         | Lab        | Name    | Вто         | oks App              | lied Lab    | s           |                       | Re        | port Fo | rmat / D           | istributio | on            | Excel        | PDF         | EDD       |
| Project Manager 1                   |  |                |                             |                |         | Lab (      | Contact | Ben         | Woznia               | ık          |             |                       | Ema       | ul 1:   | and the street     | and a      | 1             | X            | X           | X         |
|                                     | icoln Zathey@teck.com  |                |                             |                |         |            | Email   | Ber         | @broo                | ksappli     | ed.com      |                       | Éma       | ail 2:  | teckcoal           | dequisonli | ne.com        |              |             | X         |
| Address 1                           |  |                |                             |                |         | A          | ddress  | 188         | 04 Nortl             | n Creek     | Parkway     |                       | Ema       | ail 3:  |                    | .Results@  | 6 0 0 0       | X            | X           | X         |
|                                     | 15km North Hwy 43  |                |                             |                |         |            |         | Suit        | te 100               |             |             |                       | Ema       | ail 4:  | Hennet Perner@     |            |               | X            | X           | X         |
| City                                | Sparwe   | nod            |                             | Province BC    |         |            | City    | _           |                      |             | Province    | WA                    |           | ail 5:  | equestleb@leck     |            |               | V            | v           | v         |
| Postal Code                         | VOB 2  |                |                             | Country Can:   | ada     | Posta      | al Code | _           |                      |             | Country     | United                |           | umber   | - Aguna canograeca | son.       | VPOOL         | 817033       | 10          | ^         |
| Phone Number                        |  |                |                             | Country Cum    |         | Phone N    |         | -           |                      | 158         | Country     | Omtou                 | 1011      | umoei   |                    | -          | 71000         | 01,000       |             |           |
| 1 Hone Ivanioes                     |  | DETAILS        |                             |                |         | 7 110110 1 | (dineti | (33         | 7,722 0              |             | LYSIS RE    | OUESTI                | D         |         |                    | E          | Hered - Fr Pa | eld, Lr Lake | FL: Field & | Lab. N: N |
|                                     | 572 \$115.5 525  |                |                             |                |         |            |         |             | 10//. A              |             |             |                       | N. V.     |         | J. J.              |            |               | 1            |             |           |
|                                     |  | 1 1            |                             |                |         |            |         | Ě           | F                    | N           | N           | P-B                   |           | 100     | Manual Street      | CRES       |               |              |             |           |
|                                     |  |                |                             |                |         |            |         | A.          |                      |             |             |                       |           |         |                    |            |               | 1            | THE         |           |
|                                     |  |                |                             |                |         |            |         | ESER        |                      |             |             | ALEXANDE              |           |         |                    |            |               | 1 .          | 100         | 100       |
|                                     |  |                | (o)                         |                |         |            |         | 188         |                      |             |             | 100                   |           | 100     |                    |            |               |              | 188         | The same  |
| 1                                   |  |                | Hazardous Material (Yes/No) |                |         |            |         |             |                      |             |             |                       |           |         |                    |            |               |              |             |           |
|                                     |  |                | رخ                          |                |         | 1          |         | 1 3         | g .                  |             |             | 1                     |           |         |                    |            |               |              |             |           |
|                                     |  | 1              | iai                         |                |         |            |         |             | atio                 |             |             |                       |           |         |                    |            |               |              | 1           |           |
|                                     |  |                | ter                         |                |         |            |         | SIS         | Brooks_Se_Speciation |             |             |                       |           |         |                    | A.         |               |              |             |           |
|                                     |  |                | Ψa                          |                |         |            |         | KIDE        | Sp                   | Α.          | ⊢.          |                       |           |         |                    |            |               |              |             |           |
|                                     |  |                | ns]                         |                |         |            |         | 3           | e e                  | او          | او ا        |                       |           |         |                    |            |               |              |             |           |
|                                     |  |                | දි                          |                |         | G=Grab     |         |             | 92                   | Brooks_Se_D | Brooks_Se_T |                       |           |         | 1                  | 1          |               |              |             |           |
|                                     | Sample Location  | Field          | zar                         |                | Time    | C=Com      | # Of    |             | 0k                   | ) ok        | 00k         |                       |           |         | 11                 |            |               |              | 1           |           |
| Sample ID                           | (sys_loc_code)   | Matrix         | Ha                          | Date           | (24hr)  | p          | Cont.   |             | M.                   | P.          | P. B.       |                       |           |         |                    |            |               |              |             |           |
| DCEF_WS_LAEMP_DRY_2022-             | LC_DCEF  | ws             |                             | 2022/11/29     | 10:30   | G          | 2       |             | 1                    | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| NP-NAL                              | LC_DCEF  | 77.5           |                             | 2022/11/29     | 10:30   | G          | -       |             |                      | 1           | , A         | -                     |           | -       | -                  | -          | -             | -            | -           | +         |
| C_FRB_WS_LAEMP_DRY_2022-<br>N       | LC_FRB   | ws             |                             | 2022/11/30     | 10:30   | G          | 1       |             | 1                    |             |             |                       |           |         |                    |            |               | 1            | 1           |           |
| C_FRB_WS_LAEMP_DRY_2022-            | LC_FRB   | ws             | Ε.,                         | 2022/11/30     | 10:30   | G          | 2       |             |                      | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| NP-NAL<br>C_FRUS_WS_LAEMP_DRY_2022- | LC_FRUS  | ws             |                             | 2022/11/29     | 13:30   | G          | 1       |             | 1                    |             |             |                       |           |         |                    |            |               | 1            | 1           | 1         |
| N .<br>C_FRUS_WS_LAEMP_DRY_2022-    |  | _              |                             | 2022/11/2>     | 15,50   | -          | -       | -           |                      | 1           | -           | -                     | -         | -       | -                  | -          | -             | +            | +           | _         |
| C_FRUS_WS_LAEMF_DRY_2022-           | LC_FRUS  | ws             |                             | 2022/11/29     | 13:30   | G          | 2       |             |                      | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| C_GRCK_WS_LAEMP_DRY_2022-<br>N      | LC_GRCK  | ws             |                             | 2022/11/30     | 9:20    | G          | 1       |             | 1                    |             |             |                       |           |         |                    |            |               |              |             |           |
| C_GRCK_WS_LAEMP_DRY_2022-           | LC_GRCK  | ws             | LIE                         | 2022/11/30     | 9:20    | G          | 2       | 1           |                      | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| NP-NAL<br>C_MT1_WS_LAEMP_DRY_2022-  |  |                |                             |                | -       | +          | 1       |             |                      | <u> </u>    | <b>-</b>    |                       | -         | +       |                    | +          | +             |              |             | +-        |
| NP                                  | LC_MT1   | WS             |                             | 2022/11/30     | 10:30   | G          | 1       |             | 1                    |             |             |                       | -         | _       |                    |            | 1             |              | _           | _         |
| C_MT1_WS_LAEMP_DRY_2022-<br>NP-NAL  | LC_MT1   | ws             | I SY                        | 2022/11/30     | 10:30   | G          | 2       | 1           |                      | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| C_CC1_WS_LAEMP_DRY_2022-<br>NP      | LC_CC1   | ws             |                             | 2022/11/30     | 10:30   | G          | 1       |             | 1                    |             |             |                       |           |         |                    |            |               |              |             |           |
| C_CC1_WS_LAEMP_DRY_2022-<br>NP-NAL  | LC_CC1   | ws             |                             | 2022/11/30     | 10:30   | G          | 2       |             |                      | 1           | 1           |                       |           |         |                    |            |               |              |             |           |
| ADDITIONAL COMMENT                  | S/SPECIAL INSTRUCT   | IONS           |                             | RELINQUISHI    | D BY/AI | FILIATIO   | N       |             | DATE                 | TIME        | AC          | CEPTER                | BY/AF     | FILIA   | TION               |            |               | DATE/T       | IME         |           |
|                                     |  |                |                             | Alex           | m       | · CL       | 44.10   | 4           | 6-D                  |             | E           | 26/                   | 13.4      | 1 -     |                    | 17         | 1157          | 22           | 7.0         | 18        |
|                                     |  |                |                             | /              |         |            | 14-4    | 1           | 0 0                  |             |             | - U.                  |           |         |                    | 1          |               |              | /           |           |
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|                                     |  |                |                             |                |         |            |         | 1           |                      |             | 1           |                       |           |         |                    |            |               |              |             |           |
|                                     |  |                |                             |                |         |            |         |             |                      |             |             |                       |           |         |                    |            |               |              |             |           |
| SERVICE REQUEST (re                 | ish - subject to availabili  | ity)           |                             |                |         |            |         |             |                      |             |             |                       |           | W       |                    |            |               |              |             |           |
|                                     | The second secon | ar (default) X |                             | Camalanta N    |         | 1.         |         |             |                      |             |             | 3.7                   | ahila #   | _a      | _                  |            |               |              |             |           |
| Priority (2                         | 2-3 business days) - 50%   |                |                             | Sampler's Na   | me      | AU         | SK /    | 15          | e Cl                 | 311-41      | - de        | Mobile # 780-293-6750 |           |         |                    |            |               |              |             |           |
|                                     | 1 Business Day) - 100%   |                |                             | Complete Sic-  | atura   |            | 1       | The same of | 3                    |             |             | Do                    | e/Time    |         |                    |            |               |              |             |           |
| For Emergency <1 Day,               |  |                |                             | Sampler's Sign | ature   | 1          | 15      | Lane        |                      |             |             | Dai                   | c/ 1 line | 6       | -De                | -20        | 22            |              |             |           |
| ror Emergency <1 Day,               | ASAP OF WEEKENG - C  | ontact ALS     | 1                           |                |         | 1 (        | _       |             |                      |             |             |                       |           | 10      |                    |            |               |              |             |           |

Teck

| ICCIX                      | COC ID:                    |                 |                             | RY_ZUZZ-       |          | TURNA      | ROUN    | DΤ   | IME:   |             |             | Regul    |        | RUSH: N/A |                      |           |                 |                |             |             |
|----------------------------|----------------------------|-----------------|-----------------------------|----------------|----------|------------|---------|------|--|-------------|-------------|----------|--------|-----------|----------------------|-----------|-----------------|----------------|-------------|-------------|
|                            | PROJECT/CLIENT             | INFO            | RD                          | OOKS           |          | (1)        |         |      | ABORA  | TORY        |             | Kegui    | ar     |           |                      | 1         | R INFO          | <u></u>        |             |             |
| Facility Name / Job#       |                            |                 |                             |                |          | Lat        | Name    | Bro  | oks App  | lied Lab    | S           |          | Re     | ort Fo    | mat / D              | istributi | on              | Excel          | PDF         | EDD         |
| Project Manager            |                            |                 |                             |                |          | Lab (      | Contact | Ber  | Woznia   | ık          |             |          | Ema    |           |                      |           |                 | X              | X           | X           |
|                            | Nicole Zather/Citeck Scott |                 |                             |                |          |            | Email   | Ber  | n@broo   | ksapplie    | ed.com      |          | Ema    | ıil 2:    | teckcoal(            | equisonli | ne.com          |                |             | X           |
| Address                    | Box 2003                   |                 |                             |                |          | A          | Address | 188  | 04 Nortl   | h Creek     | Parkway     |          | Ema    | iil 3:    |                      | .Results@ |                 | X              | X           | X           |
|                            | 15km North Hwy 43          |                 |                             |                |          |            |         | Sui  | te 100   |             |             |          | Ema    | til 4:    | Harcat, Parracibi    | BCK GORT  | Mr.             | X              | X           | X           |
| City                       | Sparv                      | ood .           |                             | Province BC    |          |            | City    | Bot  | hell   |             | Province    | WA       | Ema    | iil 5:    | ecuns clab (Black, c | om        |                 | X              | X           | X           |
| Postal Code                | V0B                        | 2G0             |                             | Country Can    | ada      | Posta      | al Code | 980  | 11   |             | Country     | United 5 | PO n   | ımber     | VPO                  |           | VPO00           | 0817033        |             |             |
| Phone Number               | 1-250-425-8478             |                 |                             | - 1            |          | Phone N    | Vumber  | (20  | 6) 753-6   | 158         |             |          |        |           |                      |           |                 |                |             |             |
|                            | SAMPL                      | E DETAILS       |                             | -              | ,        |            |         |      |  | ANA         | LYSIS REC   | QUESTI   | D      |           | ,                    | F         | ittered - Fr Fi | ield, L.: Lab, | FL: Field a | Lab, N: Non |
|                            |                            |                 |                             |                |          |            |         | #    | F  | N           | N           |          | 100    | 10.00     | NE.                  | 100       | MAL.            |                |             |             |
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|                            |                            |                 |                             |                |          |            |         | W.   |  |             |             |          |        | 1.30      |                      | TIX.      |                 |                |             | 1           |
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|                            |                            |                 | ု ဗိ                        |                |          |            |         | E.   |  |             |             |          | - T    |           |                      |           |                 |                |             |             |
|                            |                            |                 | Hazardous Material (Yes/No) |                |          |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 |                             |                |          |            |         |      | 00   |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 | ria                         |                |          |            |         | 1742 | iati   |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 | late                        |                |          |            |         | Sec. | bec  |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 | S Z                         |                |          |            |         | NAL  | \(\oldsymbol{O}_{\old |             | L L         |          |        |           |                      |           | 1               |                |             |             |
|                            |                            |                 | log                         |                |          | G=Grab     |         |      | Ø,   | Brooks_Se_D | Brooks_Se_T |          |        |           |                      | 1         |                 | 1              |             |             |
|                            | Sample Location            | Field           | zaro                        |                | Time     | C=Com      |         |      | SK   | oks         | oks         |          | 1      |           |                      | 1         |                 | 1              |             |             |
| Sample ID                  | (sys_loc_code)             | Matrix          | Haz                         | Date           | (24hr)   | р          | Cont    |      | Brooks_Se_Speciation   | Bro         | Bro         |          |        |           |                      |           |                 |                |             |             |
| LC_DCEF_WS_LAEMP_DRY_2022- | LC_DCEF                    | ws              |                             | 2022/11/29     | 10:30    | G          | 1       |      | 1  |             |             |          |        |           |                      |           |                 |                |             |             |
| 11 N                       |                            | ,,,,            |                             |                | 10.00    | -          | <u></u> |      |  |             | -           |          | 1      | -         |                      |           |                 |                | +           | +           |
|                            | _                          |                 | N. A. C.                    |                |          |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 |                             |                |          |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
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|                            |                            |                 |                             | 4              | -        |            |         |      |  |             |             | -        |        |           | -                    | _         | 1               | _              |             |             |
|                            |                            |                 |                             | -              |          |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
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|                            |                            |                 |                             |                |          |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
|                            |                            |                 |                             |                | Vi       |            |         |      |  |             |             |          |        |           |                      |           |                 |                |             |             |
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| ADDITIONAL COMMENT         | TO/ODE/CIAL INCTIDUO       | TIME            |                             | RELINQUISH     | ED DV/A  | TELL LATER | ON      |      | DATE   | TIME        | AFF         | EPTED    | DVIAE  | ER LAS    | TON                  |           | 1               | DATE/I         | TATE        |             |
| ADDITIONAL COMMENT         | DISPECIAL INSTRUC          | 110/15          |                             | KELISQUISH     | CH BY/AI | PILIATI    |         | -    | DATE   | THATE       |             |          |        | EHLIA     | TON                  | 1-0       | 1572            | 2              | >           | _           |
|                            |                            |                 |                             |                |          |            |         | +    |  | -           | ERL         | 1004     |        |           |                      | 14        | 17/1            | - ,            | -108        |             |
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| - 11,00                    | 200                        |                 |                             |                |          |            |         | L    |  |             |             |          |        |           |                      |           |                 |                |             |             |
| SERVICE REQUEST (r         |                            |                 |                             |                |          |            |         |      |  |             |             | upo .    |        |           |                      |           |                 |                |             |             |
|                            | Regu                       | lar (default) X |                             | Sampler's Na   | ame      |            |         |      |  |             |             | Mo       | bile#  |           |                      |           |                 |                |             |             |
|                            | 2-3 business days) - 50°   |                 | -                           |                |          | +          |         |      |  |             |             | -        |        | -         |                      |           |                 |                |             |             |
|                            | (1 Business Day) - 100     |                 | -                           | Sampler's Sign | ature    |            |         |      |  |             |             | Dat      | e/Time |           |                      |           |                 |                |             |             |
| For Emergency <1 Day,      | , ASAP or weekend - (      | ontact ALS      |                             |                |          |            |         |      | _  |             |             |          |        | 1         |                      |           |                 |                |             |             |

BAL Final Report 2212302

| Creek Operation ole Zathey athey@tock.com 2 2003 m North Hwy 43 Sparwoo V0B 20  | od   |   | 2022-11_BRO   | OKS  | Lab  |   | LAB                           | ORATO   |              |                                       | Reg                       |                               | ort For      |                               | RUSH:        | RINFO      | Excel        | PDF                          | EDD        |
|---|--|---|---|--|--|---|-------------------------------|---|--------------|---------------------------------------|---------------------------|-------------------------------|--------------|-------------------------------|--------------|------------|--------------|------------------------------|------------|
| c Creek Operation cole Zathey ather@fack.com 2003 m North Hwy 43 Sparwoo V0B 20 | od   | 4   |   |  |  |   |                               |   |              |                                       |                           | Rer                           | ort For      | mat / Dis                     |              |            | Excel        | PDF                          | EDD        |
| ole Zathey athey@tek.com 2003 m North Hwy 43 Sparwoo V0B 20                     |  | _4  |   |  |  |   | Brooks A                      | applied La  | abs          |                                       |                           | Ret                           | ort For      | mat / Dis                     | tribution    |            | Excel        | PDF                          | EDD        |
| ather@teck.com  2003  m North Hwy 43  Sparwoo  V0B 20                           |  | -5  |   |  | Lab C  | Lab Name Brooks Applied Labs  Lab Contact Ben Wozniak |                               |   |              |                                       | Report Format / Distribut |                               |              |                               |              |            |              |                              |            |
| 2003<br>m North Hwy 43<br>Sparwoo<br>V0B 20                                     |  | -4  |   |  |  |   |                               |   |              |                                       |                           | Ema                           |              | -                             | co.          |            | X            | X                            | X          |
| m North Hwy 43<br>Sparwoo<br>V0B 20   |  |   |   |  |  |   |                               | ooksapp   |              |                                       |                           | Ema                           | il 2:        | teckcoal@                     | equisonlin   | e.com      |              |                              | X          |
| Sparwoo<br>V0B 2C   |  |   |   |  | Α  | ddress  | 18804 N                       | orth Cree   | k Parkw      | ay                                    |                           | Ema                           | il 3:        | Teck.Lab.                     | Results@te   | ck.com     | X            | X                            | X          |
| V0B 20  |  |   |   |  |  |   | Suite 100                     | )   |              |                                       |                           | Ema                           | il 4:        | Name Provide                  | £ 100)       |            | X            | X                            | X          |
|   |  |   | Province BC   |  |  | City 1  | Bothell                       |   |              | Province                              | WA                        | Ema                           | il 5:        | Aller Modern II               | alwig :      |            | X            | X                            | X          |
| 50-425-8478   | 30   |   | Country Cana  | nda  | Posta  | l Code  | 98011                         |   |              | Country                               | US                        | PO nu                         | ımber        |                               |              | VPO00      | 817033       |                              |            |
|   |  |   | · ·   |  | Phone N  | lumber (  | (206) 75                      | 3-6158  |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
|   | DETAIL   | S   |   | ANALYSIS REQUESTED Filtered - F. Freid, L. Lab, FL.  |  |   |                               |   | FL: Field &  | Lab, N. Nem                           |                           |                               |              |                               |              |            |              |                              |            |
|   |  |   |   |  |  |   | FIRE                          | F   | N            | N                                     |                           |                               |              |                               | 474          |            |              |                              |            |
|   |  |   |   |  |  |   | J.                            | 1   |              |                                       |                           |                               |              |                               |              |            |              | Web.                         |            |
|   |  | (No)  |   |  |  |   | PRESERV                       |   |              |                                       |                           |                               |              |                               |              |            |              |                              | N-11       |
| ample Location  | Field<br>Matrix  | Hazardous Material (Yes   | Date  | Time (24hr)  | G=Grab<br>C=Com                                  | # Of<br>Cont.   | ANALYSIS                      | Brooks_Se_Speciation  | Brooks_Se_D  | Brooks_Se_T                           |                           |                               |              |                               |              |            |              |                              |            |
| LC_FRB  | ws   | n   | 2022/11/30  | 10:30  | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| LC_FRUS   | ws   | n   | 2022/11/29  | 13:30  | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| LC_GRCK   | ws   | n   | 2022/11/30  | 9:20   | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| LC_MT1  | ws   | n   | 2022/11/30  | 10:30  | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| LC_DCEF   | ws   | n   | 2022/11/29  | 10:30  | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| LC_CC1  | ws   | n   | 2022/11/30  | 10:30  | G  | 1   |                               | 1   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| CIAL INSTRUCT   | FIONS  |   |   |  |  | N .   | _                             |   |              |                                       |                           |                               | FILIA        | TION                          | 101          | I de la    | ATE/I        | IME                          | 1          |
|   |  |   | Alex I  | McClymo  | ont  |   | Dec                           | ember 9   | , 2022       | HM                                    | 13H                       | <u>ا</u>                      |              |                               | 12/          | 15/22      | . G          | 7:Q                          | 1          |
|   |  |   |   |  |  |   |                               |   |              |                                       |                           |                               |              |                               |              |            |              |                              |            |
| subject to availabil  | ity)   |   |   |  |  |   | -                             |   |              |                                       |                           |                               |              |                               | -            |            | T            |                              |            |
|   |  |   |   |  |  |   | 41 3-                         | C)  | . 4          |                                       | 3.5                       | 1 11 "                        |              |                               | _            | 00.000     | CEEC         |                              |            |
|   |  | 1   | Sampler's Na  | me   |  | 1   | Alex Mo                       | cClymor   | nt           |                                       | Mo                        | obile # 780-293-6750          |              |                               |              |            |              |                              |            |
| ss Day) - 100% sui  | rcharge  | -   | Sampler's Signa   | ature  | - W  | 2   |                               |   |              |                                       | Dat                       | e/Time                        |              |                               | Dec          | ember !    | 9, 2022      |                              |            |
| arr   | mple Location ys_loc_code) LC_FRB LC_FRUS LC_GRCK LC_MT1 LC_DCEF LC_CC1 CIAL INSTRUCT  abject to availabil Regular (ess days) - 50% sur s Day) - 100% su | mple Location   Field   Matrix   LC_FRB   WS   LC_FRUS   WS   LC_MT1   WS   LC_CC1   WS   CIAL INSTRUCTIONS | mple Location Field Matrix LC_FRB WS n LC_FRUS WS n LC_GRCK WS n LC_DCEF WS n LC_CC1 WS n CIAL INSTRUCTIONS  abject to availability) Regular (default) X ss days) - 50% surcharge s Day) - 100% surcharge | mple Location Field SAMPLE DETAILS  mple Location Field SAMPLE DETAILS  mple Location Field Matrix H Date  LC_FRB WS n 2022/11/30  LC_FRUS WS n 2022/11/29  LC_GRCK WS n 2022/11/30  LC_MT1 WS n 2022/11/30  LC_DCEF WS n 2022/11/30  LC_CC1 WS n 2022/11/30  CIAL INSTRUCTIONS  RELINQUISHE  Alex I | SAMPLE DETAILS   SAMPLE DETAILS   SAMPLE DETAILS | SAMPLE DETAILS   Phone N                              | Phone Number   SAMPLE DETAILS | Phone Number   (206) 75   SAMPLE DETAILS   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) 75   Phone Number   (206) | Phone Number | Phone Number   (206) 753-6158   ANALY | Phone Number              | Phone Number   (206) 753-6158 | Phone Number | Phone Number   2006) 753-6158 | Phone Number | O-425-8478 | Phone Number | Phone Number   Coco 753-6158 | O-425-8478 |

# 250-425-7447 24 Hour Hot Shot Service

Sparwood, BC Terrace, BC Red Deer, AB

Vancouver, BC Calgary, AB Montreal, QC

Prince George, BC **Edmonton, AB** Spokane, WA

Elkford, BC Ft. McMurray, AB Shelby, MT

Tumbler Ridge, BC Hinton, AB Gillette, WY

| CONTRACTOR DE LA CONTRA |  |   | ATE DOC 13123   |  |  |  |
|--|--|---|---|--|--|--|
| BILL OF LADING #   | PURCHASE ORDER   | NUMBER  |   |  |  |  |
| SHIPPER (FROM)   | CONSIGNEE (TO)   | Books A.  | solved India  |  |  |  |
| STREET   | STREET   | To lake C   | to like NE  |  |  |  |
| CITY/PROVINCE  | POSTAL CODE CITY/PROVINCE  |   | POSTAL CODE   |  |  |  |
| SPECIAL INSTRUCTIONS   |  |   | FREIGHT CHARGES   |  |  |  |
| PACKAGES DESCRIPTION OF  | ARTICLES AND SPECIAL MARKS   | WEIGHT<br>(Subject to Correction)   | SHIPPER TO CHECK  OPREPAID OCOLLECT                       |  |  |  |
| 1 Cooks Link   | Samuel L   | 70 lbs  | If not neicated, shipping will automatically move collect |  |  |  |
| 原图ST 型物性的 30mm系统   |  | A SECRET SOLES  |   |  |  |  |
|  |  |   | WAITING   |  |  |  |
|  |  |   | XPU   |  |  |  |
|  |  |   | CHARGES   |  |  |  |
|  |  |   | FSC   |  |  |  |
| NIT#   | DECLARED V LUATION: Maximum liability of carrier \$2.00 per lb. (\$4.41 per  |   | US  |  |  |  |
|  | kilogram) unless declared valuation states otherwise   | \$  | SUB TOTAL   |  |  |  |
| RIVER'S SIGNATURE - PICK UP E PICK UP TIME   | DRIVER'S SIGNATURE - DELIVERY BY   | FINISH TIME   | GST.  |  |  |  |
| OTICE OF CLAIM: (a) No camer is lable for loss claimed in the good of any good under the Bill of Lac operior loss claiming or other is given in M/Ring to the implicating camer or the debivering camer of the claiming of the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the camer in the given in the given in the camer in the given in the giv | ing unless notice therefor setting our particulars of the origin destination and date of shipm<br>within strity (601 days after the delivery of this goods, our line case of failure to make deliver<br>the date of a hipment to gother with a copy of the paid freight bill<br>the consigned at the said destination, subject to the rates and classific<br>sharedown and accepted failure of the property of the consigned of the property of the property of<br>originary and accepted failure and the saught Printed or written including conditions at<br>the periodicion of the property of the printed or the printe | ent of the goods and the estimated amount claims, within nine f9 months from the date of shipment claims of package unknown, marked, consigned and attoo. In effect on the date of ahipment service to be performed heraunder shall be subjected as deceived to the standard Biff of Lading, in power an auch conditions. | TOTAL \$  |  |  |  |
| IIPPER IIVI  | CONSIGNEE PRINT  | CONSIGNEE   |   |  |  |  |
| IIPPER<br>GN   | CONSIGNEE<br>SIGN  |   | TIME  |  |  |  |
| WHITE: Office YELLOW Carrier PINK: Con   | ignee GOLDENROAD: Shipper GST # 80   | 64540398RT0001  | NUMBER OF PIECES RECEIVED                                 |  |  |  |
| 1 = morte:   | THE PERSON OF THE PROPERTY.  |   |   |  |  |  |

Cooler ID: (00 ler 6

COC (YN)

Temperature: -2.5

IR: R-1R-2

**Coolant Type:** 

Blue Ice

Notes:

**Sampling Locations:** 

Sample Types:

**Container Types:** 

Opened By: FRL

**Ambient** 

T/D

SP

Date: 12/15/22

Revision 004

Effective 7/29/20

**BENTHIC COMMUNITY** 

**Cordillera Report 220144** 



#### Project: 22-19 (LCO Dry Creek LAEMP)

Minnow Environmental (BC) Taxonomist: Scott Finlayson

 $\underline{scottfinlayson@cordilleraconsulting.ca}$ 

250-494-7553

| Site:   | 2022                  | 2022                  | 2022                  | 2022                  | 2022                      |
|---|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|
|   |                       |                       |                       |                       | LC_DCDS_BIC-05_2022-05_NP |
| Sample Collection Date:<br>CC#:                                       | 10-May-22<br>CC230046 | 10-May-22<br>CC230047 | 10-May-22<br>CC230048 | 10-May-22<br>CC230049 | 10-May-22<br>CC230050     |
| Sieve Size:   | 400                   | 400                   | 400                   | 400                   | 400                       |
| Subsample %:  | 5                     | 6                     | 11                    | 5                     | 5                         |
| Phylum: Arthropoda  | 0                     | 0                     | 0                     | 0                     | 0                         |
| Subphylum: Hexapoda<br>  Class: Insecta                               | 0<br>0                | 0<br>0                | 0<br>0                | 0<br>0                | 0                         |
| Order: Ephemeroptera  | 0                     | 0                     | 0                     | 0                     | 0                         |
| Family: Ameletidae  | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Ameletus</u>   | 0                     | 2                     | 2                     | 0                     | 2                         |
| Family: Baetidae  | 0<br>4 ND             | 0<br>4                | 0<br>1 ND             | 0<br>6 ND             | 0<br>8                    |
| <u>Baetis</u><br><u>Baetis rhodani qroup</u>                          | 2                     | 0                     | 1 10                  | 3                     | 2                         |
| <u>Baetis bicaudatus</u>  | 0                     | 0                     | 1                     | 0                     | 0                         |
| Family: Caenidae  | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Caenis</u><br>  Family: Ephemerellidae                             | 0<br>14               | 0<br>23               | 1<br>19 ND            | 0<br>11 ND            | 0<br>18                   |
| Drunella  | 0                     | 0                     | 2                     | 11 ND                 | 6                         |
| <u>Drunella doddsii</u>   | 0                     | 0                     | 2                     | 0                     | 2                         |
| <u>Ephemerella</u>  | 1                     | 3                     | 0                     | 0                     | 0                         |
| Family: Heptageniidae   | 26                    | 18                    | 45                    | 68                    | 67                        |
| Order: Plecoptera   | 1                     | 0                     | 0                     | 0                     | 0                         |
| Family: Chloroperlidae  | 0                     | 0                     | 6                     | 0                     | 0                         |
| <u>Sweltsa</u>  | 8                     | 3                     | 2                     | 5                     | 6                         |
| Family: Nemouridae  | 6<br>193              | 4<br>97               | 4<br>89 ND            | 4<br>91 ND            | 2<br>52 ND                |
| <u>Zapada</u><br>Zapada oregonensis group                             | 193                   | 97<br>2               | 10                    | 3 J                   | 52 ND<br>4                |
| Zapada cinctipes  | 1                     | 0                     | 0                     | 1                     | 0                         |
| Family: Peltoperlidae   | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Yoraperla</u><br>L. Family: Parladidae                             | 1<br>0                | 0<br>5                | 0<br>5 ND             | 0<br>6 ND             | 0<br>6 ND                 |
| Family: Perlodidae<br>  <u>Isoperla</u>                               | 0<br>5                | 0                     | 5 ND<br>0             | 6 ND                  | 6 ND                      |
| <u>Koqotus</u>  | 1                     | 0                     | 2                     | 1                     | 1                         |
| <u>Megarcys</u>   | 5                     | 1                     | 1                     | 1                     | 3                         |
| Family: Taeniopterygidae  | 0<br>1                | 0<br>4                | 0<br>3                | 0<br>0                | 0<br>3                    |
| <u>Taenionema</u>   | 1                     | 4                     | 3                     | Ü                     | 3                         |
| Order: Trichoptera  | 0                     | 0                     | 0                     | 0                     | 0                         |
| Family: Glossosomatidae   | 0                     | 0                     | 0                     | 0                     | 0                         |
| Glossosoma   Family: Hydropsychidae                                   | 0<br>6                | 2<br>0                | 0<br>0                | 0                     | 1<br>0                    |
| Arctopsyche   | 20                    | 10                    | 15                    | 7                     | 20                        |
| Family: Limnephilidae   | 0                     | 0                     | 0                     | 0                     | 0                         |
| Ecclisomyia   | 0                     | 2                     | 0                     | 5                     | 1                         |
| Family: Rhyacophilidae<br>  Rhyacophila                               | 0<br>42               | 0<br>40               | 0<br>30 ND            | 0<br>39               | 0<br>50                   |
| Rhyacophila betteni group   | 1                     | 0                     | 1                     | 0                     | 0                         |
| Rhyacophila brunnea/vemna group                                       | 2                     | 1                     | 1                     | 1                     | 1                         |
| <u>Rhyacophila hyalinata qroup</u><br><u>Rhyacophila vofixa qroup</u> | 5<br>2                | 0<br>3                | 0<br>2                | 0<br>0                | 0                         |
| Rhyacophila narvae  | 2                     | 2                     | 3                     | 0                     | 1                         |
| Family: Thremmatidae  | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Oligophlebodes</u>   | 9                     | 7                     | 5                     | 4                     | 5                         |
| Family: Uenoidae<br><u>Neothremma</u>                                 | 0<br>0                | 0<br>2                | 0<br>0                | 0<br>0                | 0<br>0                    |
|   | -                     | _                     | •                     | -                     |                           |
| Order: Coleoptera<br>  Family: Staphylinidae                          | 0<br>0                | 0<br>0                | 0<br>0                | 0<br>1                | 0<br>0                    |
| i i diiniy. Stapriyimuae  | 0                     | U                     | <u> </u>              | ±                     | J                         |
| Order: Diptera  | 0                     | 0                     | 0                     | 0                     | 0                         |
| Family: Chironomidae<br>  Subfamily: Chironominae                     | 4 ND<br>0             | 11 ND<br>0            | 4 ND<br>0             | 17<br>0               | 16<br>0                   |
| Tribe: Chironomini  | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Polypedilum</u>  | 0                     | 0                     | 0                     | 0                     | 1                         |
| Tribe: Tanytarsini  | 1                     | 4<br>0                | 22<br>3               | 8<br>2                | 9 ND                      |
| <u>Micropsectra</u><br>  Subfamily: Diamesinae                        | 0                     | 0                     | 0                     | 0                     | 0                         |
| Tribe: Diamesini  | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Diamesa</u>  | 0                     | 0                     | 0                     | 1                     | 0                         |
| <u>Paqastia</u>   Subfamily: Orthocladiinae                           | 4<br>0                | 33<br>0               | 5<br>0                | 2<br>0                | 5<br>0                    |
| <u>Brillia</u>  | 2                     | 2                     | 3                     | 0                     | 5                         |
| Cricotopus (Nostococladius)   | 3                     | 1                     | 0                     | 0                     | 0                         |
| <u>Eukiefferiella</u><br>Krenosmittia                                 | 17<br>0               | 52<br>0               | 17<br>0               | 15<br>1               | 26<br>0                   |
| <u>Krenosmittia</u><br>Limnophyes                                     | 0                     | 0<br>1                | 1                     | 1<br>0                | 0                         |
| <u>Orthocladius complex</u>   | 30                    | 0                     | 43                    | 55                    | 17                        |
| Rheocricotopus  | 0                     | 0                     | 1                     | 0                     | 0                         |
| <u>Tvetenia</u><br>  Family: Empididae                                | 4<br>0                | 1<br>0                | 2                     | 2<br>0                | 2                         |
| Chelifera/ Metachela  | 5                     | 6                     | 1                     | 0                     | 0                         |
| Family: Psychodidae   | 0                     | 0                     | 0                     | 0                     | 0                         |
| Pericoma/Telmatoscopus  | 3                     | 5                     | 5                     | 0                     | 2                         |
| Family: Simuliidae<br><u>Simulium</u>                                 | 0                     | 0<br>3                | 0                     | 1<br>0                | 2<br>0                    |
| Family: Tipulidae   | 0                     | 0                     | 0                     | 0                     | 0                         |
| <u>Dicranota</u>  | 2                     | 1                     | 0                     | 2                     | 0                         |



Project: 22-19 (LCO Dry Creek LAEMP)

Minnow Environmental (BC)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| Sia                            | 2022      | 2022      | 2022      | 2022                        | 2022      |
|--------------------------------|-----------|-----------|-----------|-----------------------------|-----------|
| Site:                          | 2022      | 2022      | 2022      |                             | 2022      |
|                                |           |           |           | IPLC_DCDS_BIC-04_2022-05_NF |           |
| Sample Collection Date:        | 10-May-22 | 10-May-22 | 10-May-22 | 10-May-22                   | 10-May-22 |
| CC#:                           | CC230046  | CC230047  | CC230048  | CC230049                    | CC230050  |
| Sieve Size:                    | 400       | 400       | 400       | 400                         | 400       |
| Subsample %:                   | 5         | 6         | 11        | 5                           | 5         |
|                                |           |           |           |                             |           |
| Phylum: Mollusca               | 0         | 0         | 0         | 0                           | 0         |
| Class: Gastropoda              | 0         | 0         | 0         | 0                           | 0         |
| Order: Basommatophora          | 0         | 0         | 0         | 0                           | 0         |
| Family: Lymnaeidae             | 0         | 1         | 0         | 0                           | 0         |
|                                |           |           |           |                             |           |
| Phylum: Annelida               | 0         | 0         | 0         | 0                           | 0         |
| Subphylum: Clitellata          | 0         | 0         | 0         | 0                           | 0         |
| Class: Oligochaeta             | 0         | 0         | 0         | 0                           | 0         |
| Order: Tubificida              | 0         | 0         | 0         | 0                           | 0         |
| Family: Enchytraeidae          | 0         | 0         | 0         | 0                           | 0         |
| <u>Enchytraeus</u>             | 0         | 0         | 1         | 0                           | 0         |
| Totals:                        | 435       | 356       | 361       | 364                         | 351       |
|                                |           |           |           |                             |           |
| Taxa present but not included: |           |           |           |                             |           |
| Phylum: Arthropoda             | 0         | 0         | 0         | 0                           | 0         |
| Subphylum: Crustacea           | 0         | 0         | 0         | 0                           | 0         |
| Class: Ostracoda               | 1         | 1         | 1         | 1                           | 1         |
| Class: Branchiopoda            | 0         | 0         | 0         | 0                           | 0         |
| Order: Cladocera               | 1         | 0         | 0         | 0                           | 0         |
|                                |           |           |           |                             |           |
| Phylum: Platyhelminthes        | 0         | 0         | 0         | 0                           | 0         |
| Class: Turbellaria             | 1         | 1         | 1         | 1                           | 1         |
| Totals:                        | 3         | 2         | 2         | 2                           | 2         |

ND designation of a taxa represents a non-distinct taxa. This adjusts where the associated taxa fall in the metrics for this sample because the individuals are likely represented by Genus or Species level identifications.

#### Methods and QC Report 2022

Project ID: LCO Dry Creek (22-19)

Client: Minnow Environmental



P: 250.494.7553

F: 250.494.7562

Prepared by:

Cordillera Consulting Inc. Summerland, BC © 2022

#### **Table of Contents**

| Sample Reception                             | 3  |
|--|----|
| Sample Sorting                               | 3  |
| Sorting Quality Control - Sorting Efficiency | 4  |
| Sorting Quality Control - Sub-Sampling QC    | 5  |
| Taxonomic Effort                             | 8  |
| Taxonomists                                  | 8  |
| Taxonomic QC                                 | 9  |
| Error Summary                                | 10 |
| Error Rationale                              | 10 |
| References                                   | 11 |
| Taxonomic Keys                               | 12 |

#### **Sample Reception**

On May 20, 2022, Cordillera Consulting received 5 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 |
|---------------------------|----------|-----------|-------|-----------|
| LC_DCDS_BIC-01_2022-05_NP | CC230046 | 5/10/2022 | 400μΜ | 2         |
| LC_DCDS_BIC-02_2022-05_NP | CC230047 | 5/10/2022 | 400μΜ | 1         |
| LC_DCDS_BIC-03_2022-05_NP | CC230048 | 5/10/2022 | 400μΜ | 1         |
| LC_DCDS_BIC-04_2022-05_NP | CC230049 | 5/10/2022 | 400μΜ | 1         |
| LC_DCDS_BIC-05_2022-05_NP | CC230050 | 5/10/2022 | 400μΜ | 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 300<sup>th</sup> 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 50<sup>th</sup> 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 |
| LC_DCDS_BIC-01_2022-05_NP | 10-May-22 | CC230046 | 5%                  | 435             |
| LC_DCDS_BIC-02_2022-05_NP | 10-May-22 | CC230047 | 6%                  | 356             |
| LC_DCDS_BIC-03_2022-05_NP | 10-May-22 | CC230048 | 11%                 | 361             |
| LC_DCDS_BIC-04_2022-05_NP | 10-May-22 | CC230049 | 5%                  | 364             |
| LC_DCDS_BIC-05_2022-05_NP | 10-May-22 | CC230050 | 5%                  | 351             |

#### **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<br>Sample | Percent<br>Efficiency |
|--|--------|----|----------------------|-----------------------|
| Site - QC, Sample - QC 1, CC# - CC220750, Pc | ercent |    |                      |                       |
| sampled = 100%, Sieve size = 250             |        |    |                      |                       |
| Plecoptera                                   |        | 2  |                      |                       |
| Trichoptera                                  |        | 1  |                      |                       |
| Chironomidae                                 |        | 3  |                      |                       |
|  | Total: | 6  | 147                  | 96%                   |
| Site - QC, Sample - QC 2, CC# - CC220753, Pc | ercent |    |                      |                       |
| sampled = 100%, Sieve size = 250             |        |    |                      |                       |
| Oligochaeta                                  |        | 1  |                      |                       |
| Trombidiformes                               |        | 1  |                      |                       |
|  | Total: | 2  | 180                  | 99%                   |
|  |        |    |                      |                       |
| Site - QC, Sample - QC 3, CC# - CC220765, Pc | ercent |    |                      |                       |
| sampled = 100%, Sieve size = 250             |        |    |                      |                       |
| Trombidiformes                               |        | 15 |                      |                       |
| Oligochaeta                                  |        | 2  |                      |                       |
| Chironomidae                                 |        | 1  |                      |                       |
|  | Total: | 18 | 343                  | 95%                   |

# **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 subsample 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 |         |         |         |         |         |         |         | So      | orter   | Actua   | Pred    | cision  | Acc     | uracy   |         |         |         |         |        |          |            |     |             |          |           |
|------------|------------------------------|---------|------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|----------|------------|-----|-------------|----------|-----------|
| CC#        | Sample Name                  | 1       | 2                      | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | 11      | 12      | 13      | 14      | 15      | 16      | 17      | 18      | 19      | 20      | Ву     | Tim<br>e | l<br>Total |     | cent<br>nge | Min      | Max       |
| 23005<br>0 | LC_DCDS_BIC05_2022-<br>05_NP | 34<br>9 | 30<br>0                | 31<br>4 | 30<br>0 | 30<br>1 | 31<br>7 | 30<br>2 | 30<br>0 | 30<br>8 | 29<br>0 | 29<br>0 | 30<br>8 | 30<br>1 | 30<br>2 | 31<br>4 | 29<br>8 | 33<br>3 | 32<br>8 | 32<br>7 | 33<br>0 | M<br>P | 960      | 6212       | 0.0 | 16.91       | 0.8<br>4 | 12.3<br>6 |

#### **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<sup>1</sup>, SAFIT<sup>2</sup>, and PNAMP<sup>3</sup> 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 reenumeration 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:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ or\ ganisms\ counted\ in\ audit}*(100)$$

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<br>index |
|--|-----------------|---------|------------|------------|--------------------------------------|
| Site - 2022, Sample - LC_DCDS_BIC-03_2022- |                 |         |            |            |                                      |
| 05_NP, CC# - CC230048, Percent sampled =   |                 |         |            |            |                                      |
| 11%, Sieve size = 400                      | 362             | 0.00    | 0.13831259 | 0.55248619 | 0.00414938                           |

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

#### **Error Rationale**

| Site - 2022, Sample -<br>LC_DCDS_BIC-03_2022-<br>05_NP, CC# - CC230048,<br>Percent sampled = 11%,<br>Sieve size = 400 | Laboratory Count | QC Audit Count | Agreement | Misidentification | Questionable Taxonomic<br>Resolution | Enumeration | Insufficient Taxonomic<br>Resolution | Comments |
|---|------------------|----------------|-----------|-------------------|--------------------------------------|-------------|--------------------------------------|----------|
| Ameletus  | 2                | 2              |           |                   |                                      |             |                                      |          |
| Arctopsyche   | 15               | 14             | No        |                   |                                      | Χ           |                                      |          |
| Baetis  | 1                | 1              |           |                   |                                      |             |                                      |          |
| Baetis bicaudatus   | 1                | 1              |           |                   |                                      |             |                                      |          |
| Baetis rhodani group  | 1                | 1              |           |                   |                                      |             |                                      |          |
| Brillia   | 3                | 3              |           |                   |                                      |             |                                      |          |
| Caenis  | 1                | 1              |           |                   |                                      |             |                                      |          |

| Chelifera/ Metachela           | 1                  | 1    |      |      |   |   |   |  |
|--------------------------------|--------------------|------|------|------|---|---|---|--|
| Chironomidae                   | 4                  | 4    |      |      |   |   |   |  |
| Chloroperlidae                 | 6                  | 6    |      |      |   |   |   |  |
| Drunella                       | 2                  | 2    |      |      |   |   |   |  |
| Drunella doddsii               | 2                  | 2    |      |      |   |   |   |  |
| Enchytraeus                    | 1                  | 1    |      |      |   |   |   |  |
| Ephemerellidae                 | 19                 | 19   |      |      |   |   |   |  |
| Eukiefferiella                 | 17                 | 17   |      |      |   |   |   |  |
| Heptageniidae                  | 45                 | 45   |      |      |   |   |   |  |
| Kogotus                        | 2                  | 2    |      |      |   |   |   |  |
| Limnophyes                     | 1                  | 1    |      |      |   |   |   |  |
| Megarcys                       | 1                  | 1    |      |      |   |   |   |  |
| Micropsectra                   | 3                  | 3    |      |      |   |   |   |  |
| Nemouridae                     | 4                  | 4    |      |      |   |   |   |  |
| Oligophlebodes                 | 5                  | 5    |      |      |   |   |   |  |
| Orthocladius complex           | 43                 | 44   | No   |      |   | Х |   |  |
| Pagastia                       | 5                  | 5    |      |      |   |   |   |  |
| Pericoma/Telmatoscopus         | 5                  | 5    |      |      |   |   |   |  |
| Perlodidae                     | 5                  | 5    |      |      |   |   |   |  |
| Rheocricotopus                 | 1                  | 1    |      |      |   |   |   |  |
| Rhyacophila                    | 30                 | 30   |      |      |   |   |   |  |
| Rhyacophila betteni group      | 1                  | 1    |      |      |   |   |   |  |
| Rhyacophila                    |                    |      |      |      |   |   |   |  |
| brunnea/vemna group            | 1                  | 1    |      |      |   |   |   |  |
| Rhyacophila narvae             | 3                  | 3    |      |      |   |   |   |  |
| Rhyacophila vofixa group       | 2                  | 2    |      |      |   |   |   |  |
| Sweltsa                        | 2                  | 2    |      |      |   |   |   |  |
| Taenionema                     | 3                  | 3    |      |      |   |   |   |  |
| Tanytarsini                    | 22                 | 22   |      |      |   |   |   |  |
| Tvetenia                       | 2                  | 2    |      |      |   |   |   |  |
| Zapada                         | 89                 | 90   | No   |      |   | Х |   |  |
| Zapada oregonensis group       | 10                 | 10   |      |      |   |   |   |  |
|                                |                    |      |      |      |   |   |   |  |
|                                |                    |      |      |      |   |   |   |  |
| Total:                         | 361                | 362  |      |      |   |   |   |  |
|                                |                    |      |      |      | 0 | 3 | 0 |  |
| % Total Misidentification Rate | misidentifications | x100 | 0.00 | Pass |   |   |   |  |
| =                              | total number       | =    |      |      |   |   |   |  |

# References

#### **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).

http://www.safit.org/Docs/SAFIT\_Taxonomic\_Literature\_Database\_1\_March\_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North American Riffle Beetles (Coleoptera: Dryopidea: Elmidae). Entomological News 89 (1&2): 1-13

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida. http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and Diagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera: Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman, R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly. 2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4<sup>th</sup>. Kendall/Hunt, Dubuque, IA

<sup>&</sup>lt;sup>1</sup> 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

<sup>&</sup>lt;sup>2</sup> Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu. 2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of Iarval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2<sup>nd</sup> ed. University of Toronto Press. Toronto Ontario.

**BENTHIC COMMUNITY** 

Cordillera Report 230020



Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

| Taxonomist: Scott Finlayson            |
|--|
| scottfinlayson@cordilleraconsulting.ca |
| 250 404 7552                           |

| 250-494-7553   |                   |          |           |    |          |    |           |      |
|--|-------------------|----------|-----------|----|----------|----|-----------|------|
| Site:  | 2022              |          | 2022      |    | 2022     |    | 2022      |      |
|  | LC_DC1_BIC-1_2022 | -09-12_N |           |    |          |    |           |      |
| Sample Collection Date:  | 12-Sep-22         |          | 12-Sep-22 |    | 12-Sep-2 |    | 14-Sep-2  |      |
| CC#:   | CC231037          |          | CC231038  | 3  | CC23103  | 9  | CC23104   | .0   |
| Sieve Size:<br>Subsample %:  | 400<br>5          |          | 400<br>10 |    | 400<br>5 |    | 400<br>14 |      |
| Phylum: Arthropoda   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Order: Collembola  | 0                 |          | 0         |    | 0        |    | 0         |      |
| 1 0.00   | · ·               |          | Ū         |    |          |    | ŭ         |      |
| Subphylum: Hexapoda  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Class: Insecta   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Order: Ephemeroptera   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Ameletidae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Ameletus</u>  | 0                 |          | 1         |    | 0        |    | 0         |      |
| Family: Baetidae   | 9                 | ND       | 5         | ND | 5        | ND | 0         |      |
| <u>Baetis</u>  | 1                 | ND       | 2         |    | 3        |    | 0         |      |
| <u>Baetis fuscatus gr.</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Baetis rhodani group   | 29<br>2           |          | 28<br>0   |    | 26<br>0  |    | 4<br>0    |      |
| Baetis bicaudatus Family: Ephemerellidae                                   | 15                |          | 15        |    | 17       |    | 18        |      |
| Drunella   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Drunella grandis group</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Drunella coloradensis  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Drunella doddsii   | 16                |          | 12        |    | 11       |    | 6         |      |
| Family: Heptageniidae  | 21                |          | 15        |    | 14       |    | 3         |      |
| <u>Cinyamula</u>   | 22                |          | 27        |    | 27       |    | 5         |      |
| <u>Epeorus</u>   | 0                 |          | 0         |    | 1        |    | 0         |      |
| <u>Rhithrogena</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Siphlonuridae  | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Siphlonurus</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Order: Placenters  | 0                 | ND       | 7         | ND | 2        | ND | 1         | ND   |
| Order: Plecoptera<br>  Family: Capniidae                                   | 9                 | טא       | 2<br>0    | ND | 2        | ND | 1<br>0    | טאו  |
| Mesocapnia   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Chloroperlidae   | 0                 |          | 0         |    | 0        |    | 3         |      |
| <u>Haploperla</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Plumiperla</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Sweltsa</u>   | 3                 |          | 0         |    | 3        |    | 2         |      |
| <u>Utaperla</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Leuctridae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Paraleuctra</u>   | 0                 | NB       | 0         | ND | 0        |    | 0         | NB   |
| Family: Nemouridae<br>Malenka  | 2<br>0            | ND       | 1<br>0    | ND | 1<br>0   | ND | 1<br>0    | ND   |
| Visoka cataractae  | 1                 |          | 0         |    | 0        |    | 0         |      |
| Zapada   | 30                | ND       | 11        | ND | 21       |    | 31        |      |
| Zapada oregonensis group   | 67                | ND       | 42        | ND | 61       |    | 25        |      |
| Zapada cinctipes   | 4                 |          | 2         |    | 0        |    | 0         |      |
| Zapada columbiana  | 18                |          | 7         |    | 12       |    | 15        |      |
| Family: Peltoperlidae  | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Yoraperla</u>   | 0                 |          | 0         |    | 0        |    | 1         |      |
| Family: Perlidae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Hesperoperla</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Perlodidae   | 1                 |          | 4         |    | 1        |    | 2         |      |
| <u>Isoperla</u>  | 0<br>3            |          | 0<br>1    |    | 0<br>1   |    | 0<br>0    |      |
| <u>Koqotus</u><br><u>Megarcys</u>  | 3                 |          | 0         |    | 3        |    | 1         |      |
| <u>Setvena</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Taeniopterygidae   | 4                 |          | 4         |    | 4        |    | 3         |      |
|  |                   |          |           |    |          |    |           |      |
| Order: Trichoptera   | 33                | ND       | 12        |    | 38       |    | 20        | ND   |
| Family: Brachycentridae  | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Brachycentrus</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Micrasema  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Glossosomatidae  | 0                 |          | 0         |    | 0        |    | 1         |      |
| Glossosoma   Family: Hydropsychidae  | 0<br>7            |          | 0<br>3    |    | 0<br>4   |    | 0<br>23   |      |
| Parapsyche   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Parapsyche elsis   | 6                 |          | 1         |    | 2        |    | 3         |      |
| Family: Leptoceridae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Family: Limnephilidae  | 2                 |          | 1         |    | 0        |    | 4         |      |
| <u>Clostoeca disjuncta</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Dicosmoecus</u>   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Ecclisomyia</u>   | 0                 |          | 0         |    | 0        |    | 1         |      |
| Family: Rhyacophilidae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Rhyacophila  | 0                 |          | 0         |    | 1        | ND | 4         |      |
| <u>Rhyacophila betteni qroup</u><br><u>Rhyacophila brunnea/vemna qroup</u> | 0<br>2            |          | 0<br>1    |    | 0<br>4   |    | 6<br>0    |      |
| Rhyacophila hyalinata group  | 0                 |          | 1         |    | 1        |    | 0         |      |
| Rhyacophila vetina complex   | 0                 |          | 0         |    | 0        |    | 0         |      |
| Rhyacophila vofixa group   | 0                 |          | 0         |    | 0        |    | 1         |      |
| Rhyacophila atrata complex   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Rhyacophila narvae</u>  | 3                 |          | 1         |    | 4        |    | 0         |      |
| Family: Thremmatidae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Oligophlebodes</u>  | 5                 |          | 0         |    | 3        |    | 36        |      |
| Family: Uenoidae   | 0                 |          | 0         |    | 0        |    | 0         |      |
| <u>Neothremma</u>  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Order: Coleoptera  | 0                 |          | 0         |    | 0        |    | 0         |      |
| Order: Coleoptera<br>  Family: Elmidae                                     | 0                 |          | 0<br>0    |    | 0        |    | 0<br>1    | ND   |
| ,,   | · ·               |          | Ŭ         |    | - U      |    | -         | .,,, |

| 250-494-7553                                |                           |                           |                           |                           |
|---|---------------------------|---------------------------|---------------------------|---------------------------|
| Site:                                       | 2022                      | 2022                      | 2022                      | 2022                      |
| Sample:                                     | LC_DC1_BIC-1_2022-09-12_N | LC_DC1_BIC-2_2022-09-12_N | LC_DC1_BIC-3_2022-09-12_N | LC_DC2_BIC-1_2022-09-14_N |
| Sample Collection Date:                     | 12-Sep-22                 | 12-Sep-22                 | 12-Sep-22                 | 14-Sep-22                 |
| CC#:  | CC231037                  | CC231038                  | CC231039                  | CC231040                  |
| Sieve Size:                                 | 400                       | 400                       | 400                       | 400                       |
| Subsample %:                                | 5                         | 10                        | 5                         | 14                        |
| <u>Heterlimnius</u>                         | 0                         | 0                         | 1                         | 1                         |
| Family: Staphylinidae                       | 0                         | 0                         | 0                         | _<br>1                    |
| ,,,   |                           | ū                         | · ·                       | _                         |
| Order: Diptera                              | 0                         | 0                         | 0                         | 0                         |
| Family: Ceratopogonidae                     | 0                         | 0                         | 0                         | 0                         |
| Mallochohelea                               | 0                         | 0                         | 0                         | 0                         |
| Family: Chironomidae                        | 25 ND                     |                           |                           |                           |
|   |                           |                           |                           | 19 ND<br>0                |
| Subfamily: Chironominae                     | 0                         | 0                         | 0                         |                           |
| Tribe: Tanytarsini                          | 0                         | 2                         | 1                         | 0                         |
| <u>Micropsectra</u>                         | 0                         | 1                         | 1                         | 1                         |
| <u>Stempellinella</u>                       | 0                         | 0                         | 0                         | 0                         |
| Subfamily: Diamesinae                       | 0                         | 0                         | 0                         | 0                         |
| Tribe: Diamesini                            | 0                         | 0                         | 0                         | 0                         |
| <u>Diamesa</u>                              | 29                        | 9                         | 33                        | 4                         |
| <u>Pagastia</u>                             | 38                        | 19                        | 35                        | 4                         |
| <u>Pseudodiamesa</u>                        | 1                         | 1                         | 0                         | 2                         |
| Subfamily: Orthocladiinae                   | 1                         | 0                         | 0                         | 0                         |
| <u>Brillia</u>                              | 0                         | 0                         | 0                         | 0                         |
| Corynoneura                                 | 0                         | 0                         | 0                         | 0                         |
| Cricotopus (Nostococladius)                 | 0                         | 0                         | 1                         | 0                         |
| <u>Diplocladius cultriger</u>               | 0                         | 0                         | 0                         | 0                         |
| <u>Eukiefferiella</u>                       | 35                        | 4                         | 45                        | 5                         |
| <u>Hydrobaenus</u>                          | 10                        | 20                        | 7                         | 19                        |
| <u>Limnophyes</u>                           | 0                         | 0                         | 0                         | 0                         |
| Metriocnemus                                | 0                         | 0                         | 0                         | 0                         |
| <u>Orthocladius complex</u>                 | 60                        | 26                        | 44                        | 7                         |
|   | 0                         | 0                         | 0                         | 0                         |
| Parametriocnemus  Pararthogladius           |                           |                           |                           |                           |
| Parorthocladius  Phaesricatorus             | 2                         | 1<br>5                    | 2<br>5                    | 0                         |
| Rheocricotopus                              | 2                         |                           |                           | 1                         |
| Tvetenia                                    | 14                        | 10                        | 9                         | 4                         |
| Subfamily: Tanypodinae                      | 0                         | 0                         | 0                         | 0                         |
| Krenopelopia                                | 0                         | 1                         | 0                         | 0                         |
| Tribe: Pentaneurini                         | 0                         | 0                         | 0                         | 0                         |
| <u>Telmatopelopia</u>                       | 0                         | 0                         | 0                         | 0                         |
| <u>Thienemannimyia group</u>                | 0                         | 0                         | 0                         | 0                         |
| Family: Empididae                           | 1                         | 1                         | 0                         | 0                         |
| Chelifera/ Metachela                        | 1                         | 0                         | 0                         | 3                         |
| Clinocerinae Unknown Genus A                | 0                         | 0                         | 0                         | 0                         |
| <u>Neoplasta</u>                            | 0                         | 1                         | 1                         | 3                         |
| <u>Oreogeton</u>                            | 0                         | 0                         | 0                         | 0                         |
| <u>Trichoclinocera</u>                      | 0                         | 0                         | 0                         | 0                         |
| Family: Pelecorhynchidae                    | 0                         | 0                         | 0                         | 0                         |
| <u>Glutops</u>                              | 0                         | 0                         | 0                         | 0                         |
| Family: Psychodidae                         | 0                         | 0                         | 0                         | 0                         |
| Pericoma/Telmatoscopus                      | 77                        | 25                        | 15                        | 27                        |
| Family: Simuliidae                          | 0                         | 0                         | 0                         | 0                         |
| <u>Prosimulium</u>                          | 0                         | 0                         | 0                         | 0                         |
| <u>Prosimulium/Helodon</u>                  | 0                         | 0                         | 0                         | 1                         |
| Simulium                                    | 0                         | 0                         | 2                         | 1                         |
| Family: Tipulidae                           | 0                         | 0                         | 0                         | 0                         |
| <u>Antocha</u>                              | 0                         | 0                         | 0                         | 0                         |
| <u>Dicranota</u>                            | 0                         | 0                         | 0                         | 0                         |
| <u>Molophilus</u>                           | 0                         | 0                         | 0                         | 0                         |
| <u>Pedicia</u>                              | 0                         | 0                         | 0                         | 0                         |
| <u>rearcia</u><br><u>Tricyphona</u>         | 1                         | 0                         | 0                         | 0                         |
|   |                           | ū                         | · ·                       | ·                         |
| Subphylum: Chelicerata                      | 0                         | 0                         | 0                         | 0                         |
| Class: Arachnida                            | 0                         | 0                         | 0                         | 0                         |
| Crass: Arachnida<br>  Order: Trombidiformes | 0                         | 0                         | 0                         | 0                         |
| Family: Feltriidae                          | 0                         | 0                         | 0                         | 0                         |
| Feltria                                     | 0                         | 0                         | 1                         | 0                         |
| Family: Hydryphantidae                      | 0                         | 0                         | 0                         | 0                         |
| Albertathyas                                | 0                         | 0                         | 0                         | 0                         |
| Family: Hygrobatidae                        | 0                         | 0                         | 0                         | 0                         |
|   | 0                         | 0                         | 0                         | 0                         |
| <u>Atractides</u><br><u>Hygrobates</u>      | 0                         | 0                         | 0                         | 0                         |
| <u>Hygrobates</u><br>  Family: Lebertiidae  | 0                         |                           | 0                         | 0                         |
|   |                           | 0                         |                           |                           |
| Lebertia                                    | 0                         | 0                         | 0                         | 0                         |
| Family: Sperchontidae                       | 0                         | 0                         | 0                         | 0                         |
| <u>Sperchon</u>                             | 1                         | 0                         | 0                         | 0                         |
| Family: Torrenticolidae                     | 0                         | 0                         | 0                         | 0                         |
| <u>Testudacarus</u>                         | 0                         | 0                         | 0                         | 0                         |
| Louis Contract                              | •                         | 2                         |                           | •                         |
| Order: Sarcoptiformes                       | 0                         | 0                         | 0                         | 0                         |
| Order: Oribatida                            | 0                         | 0                         | 0                         | 0                         |
| Family: Hydrozetidae                        | 1                         | 0                         | 0                         | 0                         |
|   |                           |                           |                           |                           |
| Phylum: Mollusca                            | 0                         | 0                         | 0                         | 0                         |
| Class: Gastropoda                           | 0                         | 0                         | 0                         | 1                         |
|   |                           |                           |                           |                           |
| Phylum: Annelida                            | 0                         | 0                         | 0                         | 0                         |
| Subphylum: Clitellata                       | 0                         | 0                         | 0                         | 0                         |
| Class: Oligochaeta                          | 0                         | 0                         | 0                         | 0                         |
| Order: Lumbriculida                         | 0                         | 0                         | 0                         | 0                         |
| Family: Lumbriculidae                       | 0                         | 0                         | 0                         | 0                         |
| <u>Rhynchelmis</u>                          | 0                         | 0                         | 0                         | 0                         |
|   |                           | -<br>-                    |                           | -<br>-                    |
| Order: Tubificida                           | 0                         | 0                         | 0                         | 0                         |
| •   | -                         | -                         |                           | -                         |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca 250-494-7553

Totals:

3

| Site   2022    | 250-494-7555                            |                           |                           |                           |                           |
|--|---|---------------------------|---------------------------|---------------------------|---------------------------|
| Sample Collection Date:   12-Sep-22   12-Sep-22   12-Sep-22   14-Sep-22   14-Sep-22   12-Sep-22   14-Sep-22   14 |   |                           |                           |                           |                           |
| CC231037   CC231038   CC231039   CC231040     Sieve Size:  | Sample:                                 | LC_DC1_BIC-1_2022-09-12_N | LC_DC1_BIC-2_2022-09-12_N | LC_DC1_BIC-3_2022-09-12_N | LC_DC2_BIC-1_2022-09-14_N |
| Family: Enchytraeidae  | Sample Collection Date:                 | 12-Sep-22                 | 12-Sep-22                 | 12-Sep-22                 | 14-Sep-22                 |
| Family: Enchytraeidae  | CC#:                                    | CC231037                  | CC231038                  | CC231039                  | CC231040                  |
| Family: Enchytraeidae  |   | 400                       | 400                       | 400                       | 400                       |
| Family: Naididae   0   | Subsample %:                            | 5                         | 10                        | 5                         | 14                        |
| Nois   Stylario locustris   0  | Family: Enchytraeidae                   | 0                         | 1                         | 0                         | 3                         |
| Stylario locustris   | Family: Naididae                        | 0                         | 0                         | 0                         | 0                         |
| Subfamily: Tubificinae with hair chaeta  | <u>Nais</u>                             | 0                         | 0                         | 0                         | 0                         |
| Totals:   617   339   513   329  | <u>Stylaria lacustris</u>               | 0                         | 0                         | 0                         | 1                         |
| Taxa present but not included:   | Subfamily: Tubificinae with hair chaeta | 0                         | 0                         | 0                         | 0                         |
| Phylum: Arthropoda   | Totals:                                 | 617                       | 339                       | 513                       | 329                       |
| Subphylum: Hexapoda         0  |   |                           |                           |                           |                           |
| Class: Insecta   |   |                           |                           |                           |                           |
| Order: Diptera   |   |                           |                           |                           |                           |
| Family: Cecidomyiidae  | •                                       |                           |                           |                           |                           |
| Order: Homoptera   | •                                       |                           |                           |                           |                           |
| Family: Cicadellidae   | Family: Cecidomyiidae                   | 0                         | 1                         | 0                         | 0                         |
| Family: Cicadellidae   | L Order: Hemontera                      | 0                         | 0                         | 0                         | 0                         |
| Order: Psocodea  | •                                       |                           |                           |                           |                           |
| Subphylum: Crustacea       0       0       0       0           Class: Ostracoda       1       1       1       1         Phylum: Annelida       0       0       0       0         Subphylum: Clitellata       0       0       0       0           Class: Oligochaeta       0       0       0       0           Order: Tubificida       0       0       0       0           Family: Lumbricidae       0       0       0       0         Phylum: Nemata       1       1       1       1       1         Phylum: Platyhelminthes       0       0       0       0       0   | railily. Cicadellidae                   | 0                         | O                         | O                         | Ü                         |
| Class: Ostracoda   | Order: Psocodea                         | 0                         | 0                         | 0                         | 0                         |
| Class: Ostracoda   | Subphylum: Crustacea                    | 0                         | 0                         | 0                         | 0                         |
| Phylum: Annelida         0   |   |                           |                           |                           |                           |
| Subphylum: Clitellata         0         0         0         0             Class: Oligochaeta         0         0         0         0             Order: Tubificida         0         0         0         0             Family: Lumbricidae         0         0         0         0           Phylum: Nemata         1         1         1         1           Phylum: Platyhelminthes         0         0         0         0  | •                                       |                           |                           |                           |                           |
| Class: Oligochaeta   | Phylum: Annelida                        | 0                         | 0                         | 0                         | 0                         |
| Order: Tubificida  | Subphylum: Clitellata                   | 0                         | 0                         | 0                         | 0                         |
| Family: Lumbricidae         0         0         0         0           Phylum: Nemata         1         1         1         1           Phylum: Platyhelminthes         0         0         0         0   | Class: Oligochaeta                      | 0                         | 0                         | 0                         | 0                         |
| Phylum: Nemata 1 1 1 1 1 1 Phylum: Platyhelminthes 0 0 0 0   | Order: Tubificida                       | 0                         | 0                         | 0                         | 0                         |
| Phylum: Nemata 1 1 1 1 1 1 Phylum: Platyhelminthes 0 0 0 0   | Family: Lumbricidae                     | 0                         | 0                         | 0                         | 0                         |
| Phylum: Platyhelminthes 0 0 0  |   |                           |                           |                           |                           |
| Phylum: Platyhelminthes 0 0 0 0  | Phylum: Nemata                          | 1                         | 1                         | 1                         | 1                         |
|  |   | 0                         | 0                         | 0                         | 0                         |
|  |   | 1                         | 1                         | 1                         | 1                         |

4

3



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC) Taxonomist: Scott Finlayson scottfinlayson@cordilleraconsulting.ca 250-494-7553

| Family: Elmidae

| 250-494-7553  |                 |                       |                       |                           |
|---|-----------------|-----------------------|-----------------------|---------------------------|
| Site:   |                 | 2022                  | 2022                  | 2022                      |
|   |                 |                       |                       | LC_DC3_BIC-2_2022-09-13_N |
| Sample Collection Date:<br>CC#:                               | 14-Sep-22       | 14-Sep-22<br>CC231042 | 13-Sep-22<br>CC231043 | 13-Sep-22<br>CC231044     |
| Sieve Size:   | CC231041<br>400 | 400                   | 400                   | 400                       |
| Subsample %:  | 15              | 8                     | 5                     | 8                         |
| Phylum: Arthropoda  | 0               | 0                     | 0                     | 0                         |
| Order: Collembola   | 0               | 0                     | 1                     | 0                         |
| Colorbodono Hanna da  | 0               |                       | 0                     | 0                         |
| Subphylum: Hexapoda<br>  Class: Insecta                       | 0<br>0          | 0                     | 0<br>0                | 0<br>0                    |
| Order: Ephemeroptera  | 0               | 0                     | 0                     | 0                         |
| Family: Ameletidae  | 0               | 0                     | 0                     | 0                         |
| <u>Ameletus</u>   | 0               | 0                     | 0                     | 0                         |
| Family: Baetidae  | 3               | 0                     | 0                     | 0                         |
| <u>Baetis</u><br><u>Baetis fuscatus qr.</u>                   | 0<br>0          | 0                     | 0<br>0                | 0<br>0                    |
| Baetis rhodani group  | 12              | 4                     | 0                     | 0                         |
| Baetis bicaudatus   | 0               | 0                     | 0                     | 0                         |
| Family: Ephemerellidae  | 27              | 17                    | 0                     | 0                         |
| <u>Drunella</u>   | 0               | 0                     | 0                     | 0                         |
| <u>Drunella grandis group</u><br><u>Drunella coloradensis</u> | 0<br>0          | 0                     | 0<br>0                | 0<br>0                    |
| Drunella doddsii  | 5               | 3                     | 0                     | 0                         |
| Family: Heptageniidae   | 10              | 4                     | 0                     | 0                         |
| <u>Cinygmula</u>  | 6               | 7                     | 7                     | 0                         |
| <u>Epeorus</u>  | 0               | 2                     | 0                     | 0                         |
| Rhithrogena   | 0               | 0                     | 0                     | 0                         |
| Family: Siphlonuridae<br>Siphlonurus                          | 0<br>0          | 0                     | 0<br>0                | 0<br>0                    |
| <u></u>   |                 | Ŭ                     |                       | Ĭ                         |
| Order: Plecoptera   | 2 ND            | 4 ND                  | 0                     | 0                         |
| Family: Capniidae   | 0               | 0                     | 8                     | 3                         |
| Mesocapnia  | 0               | 0                     | 0                     | 0                         |
| Family: Chloroperlidae<br><u>Haploperla</u>                   | 2<br>0          | 5<br>0                | 2<br>0                | 3<br>0                    |
| <u>Plumiperla</u>   | 0               | 0                     | 0                     | 0                         |
| <u>Sweltsa</u>  | 2               | 4                     | 1                     | 1                         |
| <u>Utaperla</u>   | 0               | 0                     | 0                     | 0                         |
| Family: Leuctridae  | 0               | 0                     | 1                     | 0                         |
| <u>Paraleuctra</u><br>  Family: Nemouridae                    | 0<br>3 ND       | 0<br>4 ND             | 0<br>0                | 0<br>0                    |
| Malenka   | 0               | 0                     | 0                     | 0                         |
| Visoka cataractae   | 0               | 0                     | 0                     | 0                         |
| <u>Zapada</u>   | 21 ND           | 27 ND                 | 1 ND                  | 1                         |
| Zapada oregonensis group                                      | 34              | 21                    | 19                    | 15                        |
| Zapada cinctipes<br>Zapada columbiana                         | 3<br>17         | 2<br>20               | 0<br>30               | 0<br>43                   |
| Family: Peltoperlidae   | 0               | 0                     | 0                     | 0                         |
| <u>Yoraperla</u>  | 0               | 0                     | 1                     | 3                         |
| Family: Perlidae  | 0               | 0                     | 0                     | 0                         |
| <u>Hesperoperla</u><br>  Family: Perlodidae                   | 0<br>5          | 0                     | 0<br>0                | 0<br>1                    |
| Isoperla  | 0               | 0                     | 0                     | 0                         |
| <u>Koqotus</u>  | 0               | 3                     | 0                     | 0                         |
| <u>Megarcys</u>   | 1               | 5                     | 2                     | 5                         |
| <u>Setvena</u>  | 0               | 0                     | 0                     | 0                         |
| Family: Taeniopterygidae                                      | 2               | 3                     | 0                     | 0                         |
| Order: Trichoptera  | 11              | 2 ND                  | 1 ND                  | 1 ND                      |
| Family: Brachycentridae                                       | 0               | 0                     | 0                     | 0                         |
| <u>Brachycentrus</u>  | 0               | 0                     | 0                     | 0                         |
| Micrasema   | 0               | 0                     | 0                     | 0                         |
| Family: Glossosomatidae<br>Glossosoma                         | 0<br>0          | 0                     | 0<br>0                | 0<br>0                    |
| Family: Hydropsychidae  | 45              | 71                    | 0                     | 0                         |
| <u>Parapsyche</u>   | 0               | 0                     | 0                     | 0                         |
| Parapsyche elsis  | 2               | 7                     | 0                     | 0                         |
| Family: Leptoceridae  | 0               | 0                     | 0                     | 0                         |
| Family: Limnephilidae<br><u>Clostoeca disjuncta</u>           | 0<br>0          | 1 0                   | 2<br>0                | 0<br>0                    |
| <u>Dicosmoecus</u>  | 0               | 0                     | 0                     | 0                         |
| Ecclisomyia   | 1               | 0                     | 2                     | 1                         |
| Family: Rhyacophilidae  | 0               | 0                     | 0                     | 0                         |
| Rhyacophila   | 1               | 1                     | 2                     | 5                         |
| Rhyacophila betteni group Rhyacophila brunnea/vemna group     | 5<br>1          | 7<br>2                | 0<br>6                | 0<br>3                    |
| Rhyacophila hyalinata group                                   | 1               | 2                     | 0                     | 5<br>1                    |
| Rhyacophila vetina complex                                    | 0               | 0                     | 0                     | 0                         |
| Rhyacophila vofixa group                                      | 0               | 0                     | 0                     | 3                         |
| Rhyacophila atrata complex                                    | 0               | 0                     | 0                     | 0                         |
| Rhyacophila narvae<br>  Family: Thremmatidae                  | 0<br>0          | 2                     | 0<br>0                | 1<br>0                    |
| Oligophlebodes  | 45              | 7                     | 0                     | 0                         |
| Family: Uenoidae  | 0               | 0                     | 0                     | 0                         |
| <u>Neothremma</u>   | 0               | 0                     | 0                     | 0                         |
| L Ouden Celescoters   | 0               | 2                     | 0                     | 2                         |
| Order: Coleoptera<br>  Family: Elmidae                        | 0               | 0                     | 0<br>0                | 0<br>0                    |

0

| 250-494-7553                          | 2022                  | 2022                      | 2022      | 2022                  |
|---------------------------------------|-----------------------|---------------------------|-----------|-----------------------|
| Site:                                 | 2022                  | 2022                      | 2022      | 2022                  |
| Sample Collection Date:               |                       | LC_DC2_BIC-3_2022-09-14_N | 13-Sep-22 |                       |
| CC#:                                  | 14-Sep-22<br>CC231041 | 14-Sep-22<br>CC231042     | CC231043  | 13-Sep-22<br>CC231044 |
| Sieve Size:                           | 400                   | 400                       | 400       | 400                   |
| Subsample %:                          | 15                    | 8                         | 5         | 8                     |
| Heterlimnius                          | 0                     | 0                         | 0         | 0                     |
| Family: Staphylinidae                 | 0                     | 0                         | 0         | 0                     |
| Tulliny. Staphymilade                 | o o                   | ŭ                         | 0         | O .                   |
| Order: Diptera                        | 0                     | 0                         | 0         | 0                     |
| Family: Ceratopogonidae               | 0                     | 0                         | 0         | 0                     |
| Mallochohelea                         | 0                     | 0                         | 0         | 0                     |
| Family: Chironomidae                  | 17 ND                 | 11 ND                     | 38 ND     | 17 ND                 |
| Subfamily: Chironominae               | 0                     | 0                         | 0         | 0                     |
| Tribe: Tanytarsini                    | 0                     | 0                         | 0         | 0                     |
| •                                     | 1                     |                           | 0         | 0                     |
| Micropsectra                          |                       | 1                         |           |                       |
| Stempellinella                        | 0                     | 0                         | 0         | 0                     |
| Subfamily: Diamesinae                 | 0                     | 0                         | 0         | 0                     |
| Tribe: Diamesini                      | 0                     | 0                         | 0         | 0                     |
| <u>Diamesa</u>                        | 1                     | 9                         | 2         | 1                     |
| <u>Pagastia</u>                       | 3                     | 2                         | 64        | 61                    |
| Pseudodiamesa                         | 2                     | 0                         | 52        | 10                    |
| Subfamily: Orthocladiinae             | 0                     | 0                         | 0         | 0                     |
| <u>Brillia</u>                        | 0                     | 0                         | 0         | 0                     |
| Corynoneura                           | 0                     | 0                         | 0         | 0                     |
| Cricotopus (Nostococladius)           | 0                     | 0                         | 0         | 0                     |
| <u>Diplocladius cultriger</u>         | 0                     | 0                         | 0         | 0                     |
| Eukiefferiella                        | 6                     | 8                         | 95        | 38                    |
| <u>Hydrobaenus</u><br>Limpophyes      | 0                     | 12                        | 26        | 3                     |
| <u>Limnophyes</u>                     | 0                     | 0                         | 0         | 1                     |
| Metriocnemus Orthogladius complex     | 0                     | 0                         | 0         | 0                     |
| Orthocladius complex                  | 16                    | 17                        | 199       | 96                    |
| Parametriocnemus  Describe a la disco | 0                     | 0                         | 0         | 0                     |
| Parorthocladius  Phonography          | 3                     | 3                         | 12        | 7                     |
| <u>Rheocricotopus</u>                 | 0                     | 0                         | 0         | 0                     |
| <u>Tvetenia</u>                       | 0                     | 2                         | 2         | 2                     |
| Subfamily: Tanypodinae                | 0                     | 0                         | 0         | 0                     |
| <u>Krenopelopia</u>                   | 0                     | 0                         | 0         | 0                     |
| Tribe: Pentaneurini                   | 0                     | 0                         | 0         | 0                     |
| <u>Telmatopelopia</u>                 | 0                     | 0                         | 0         | 0                     |
| <u>Thienemannimyia group</u>          | 0                     | 0                         | 0         | 0                     |
| Family: Empididae                     | 0                     | 0                         | 2         | 0                     |
| <u>Chelifera/ Metachela</u>           | 1                     | 2                         | 0         | 0                     |
| Clinocerinae Unknown Genus A          | 0                     | 0                         | 0         | 0                     |
| <u>Neoplasta</u>                      | 1                     | 4                         | 0         | 0                     |
| <u>Oreogeton</u>                      | 0                     | 0                         | 2         | 0                     |
| <u>Trichoclinocera</u>                | 0                     | 0                         | 5         | 2                     |
| Family: Pelecorhynchidae              | 0                     | 0                         | 0         | 0                     |
| <u>Glutops</u>                        | 0                     | 0                         | 0         | 0                     |
| Family: Psychodidae                   | 0                     | 0                         | 0         | 0                     |
| Pericoma/Telmatoscopus                | 14                    | 19                        | 19        | 4                     |
| Family: Simuliidae                    | 0                     | 0                         | 0         | 0                     |
| <u>Prosimulium</u>                    | 0                     | 0                         | 0         | 0                     |
| <u>Prosimulium/Helodon</u>            | 0                     | 3                         | 0         | 0                     |
| <u>Simulium</u>                       | 0                     | 0                         | 0         | 0                     |
| Family: Tipulidae                     | 0                     | 0                         | 0         | 0                     |
| <u>Antocha</u>                        | 0                     | 0                         | 0         | 0                     |
| <u>Dicranota</u>                      | 0                     | 1                         | 3         | 2                     |
| <u>Molophilus</u>                     | 0                     | 0                         | 0         | 0                     |
| <u>Pedicia</u>                        | 0                     | 0                         | 0         | 0                     |
| <u>Tricyphona</u>                     | 0                     | 0                         | 0         | 0                     |
|                                       |                       |                           |           |                       |
| Subphylum: Chelicerata                | 0                     | 0                         | 0         | 0                     |
| Class: Arachnida                      | 0                     | 0                         | 0         | 0                     |
| Order: Trombidiformes                 | 0                     | 0                         | 0         | 0                     |
| Family: Feltriidae                    | 0                     | 0                         | 0         | 0                     |
| <u>Feltria</u>                        | 0                     | 0                         | 2         | 0                     |
| Family: Hydryphantidae                | 0                     | 0                         | 0         | 0                     |
| Albertathyas                          | 0                     | 0                         | 0         | 2                     |
| Family: Hygrobatidae                  | 0                     | 0                         | 0         | 0                     |
| Atractides                            | 0                     | 0                         | 1         | 0                     |
| <u>Hygrobates</u>                     | 0                     | 0                         | 0         | 0                     |
| Family: Lebertiidae                   | 0                     | 0                         | 0         | 0                     |
| <u>Lebertia</u>                       | 1                     | 0                         | 10        | 7                     |
| Family: Sperchontidae                 | 0                     | 0                         | 0         | 0                     |
| Sperchon                              | 0                     | 0                         | 0         | 0                     |
| Family: Torrenticolidae               | 0                     | 0                         | 0         | 0                     |
| <u>Testudacarus</u>                   | 0                     | 0                         | 0         | 0                     |
| Order: Sarcontiformes                 | 0                     | 0                         | 0         | 0                     |
| Order: Sarcoptiformes                 | 0                     | 0                         | 0         | 0                     |
| Order: Oribatida                      | 0                     | 0                         | 1         | 0                     |
| Family: Hydrozetidae                  | 0                     | 0                         | 0         | 0                     |
| Dhuluma 86-U                          | 2                     | 2                         | 0         | 0                     |
| Phylum: Mollusca                      | 0                     | 0                         | 0         | 0                     |
| Class: Gastropoda                     | 0                     | 0                         | 0         | 0                     |
|                                       |                       |                           |           |                       |
| Phylum: Annelida                      | 0                     | 0                         | 0         | 0                     |
| Subphylum: Clitellata                 | 0                     | 0                         | 0         | 0                     |
| Class: Oligochaeta                    | 0                     | 0                         | 0         | 0                     |
| Order: Lumbriculida                   | 0                     | 0                         | 0         | 0                     |
| Family: Lumbriculidae                 | 0                     | 0                         | 0         | 0                     |
| <u>Rhynchelmis</u>                    | 0                     | 0                         | 0         | 0                     |
|                                       |                       |                           |           |                       |
| Order: Tubificida                     | 0                     | 0                         | 0         | 0                     |
|                                       |                       |                           |           |                       |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                            |                           |                           |                           |                           |
|---|---------------------------|---------------------------|---------------------------|---------------------------|
| Site:                                   | 2022                      | 2022                      | 2022                      | 2022                      |
| Sample:                                 | LC_DC2_BIC-2_2022-09-14_N | LC_DC2_BIC-3_2022-09-14_N | LC_DC3_BIC-1_2022-09-13_N | LC_DC3_BIC-2_2022-09-13_N |
| Sample Collection Date:                 | 14-Sep-22                 | 14-Sep-22                 | 13-Sep-22                 | 13-Sep-22                 |
| CC#:                                    | CC231041                  | CC231042                  | CC231043                  | CC231044                  |
| Sieve Size:                             | 400                       | 400                       | 400                       | 400                       |
| Subsample %:                            | 15                        | 8                         | 5                         | 8                         |
| Family: Enchytraeidae                   | 2                         | 2                         | 1                         | 0                         |
| Family: Naididae                        | 0                         | 0                         | 0                         | 0                         |
| <u>Nais</u>                             | 0                         | 0                         | 0                         | 0                         |
| Stylaria lacustris                      | 0                         | 0                         | 0                         | 0                         |
| Subfamily: Tubificinae with hair chaeta | 0                         | 0                         | 0                         | 0                         |
| Totals:                                 | 335                       | 335                       | 622                       | 343                       |
| Taxa present but not included:          |                           |                           |                           |                           |
| Phylum: Arthropoda                      | 0                         | 0                         | 0                         | 0                         |
| Subphylum: Hexapoda                     | 0                         | 0                         | 0                         | 0                         |
| Class: Insecta                          | 0                         | 0                         | 0                         | 0                         |
| Order: Diptera                          | 0                         | 0                         | 0                         | 0                         |
| Family: Cecidomyiidae                   | 0                         | 0                         | 0                         | 0                         |
|   |                           | -                         |                           |                           |
| Order: Homoptera                        | 0                         | 0                         | 0                         | 0                         |
| Family: Cicadellidae                    | 0                         | 0                         | 0                         | 1                         |
| Order: Psocodea                         | 0                         | 0                         | 0                         | 0                         |
| Subphylum: Crustacea                    | 0                         | 0                         | 0                         | 0                         |
| Class: Ostracoda                        | 1                         | 1                         | 1                         | 1                         |
|   |                           |                           |                           |                           |
| Phylum: Annelida                        | 0                         | 0                         | 0                         | 0                         |
| Subphylum: Clitellata                   | 0                         | 0                         | 0                         | 0                         |
| Class: Oligochaeta                      | 0                         | 0                         | 0                         | 0                         |
| Order: Tubificida                       | 0                         | 0                         | 0                         | 0                         |
| Family: Lumbricidae                     | 0                         | 1                         | 0                         | 0                         |
|   |                           |                           |                           |                           |
| Phylum: Nemata                          | 1                         | 1                         | 0                         | 1                         |
| Phylum: Platyhelminthes                 | 0                         | 0                         | 0                         | 0                         |
| Class: Turbellaria                      | 1                         | 1                         | 1                         | 1                         |
| Totals:                                 | 3                         | 4                         | 2                         | 4                         |



#### Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC) Taxonomist: Scott Finlayson $\underline{scottfinlays on@cordiller a consulting.ca}$

| 250 | 1-4 | 94. | .75 | 53 |
|-----|-----|-----|-----|----|

| Site:                           | 2022      | 2022<br>LC DC/L BIC-1 2022-09-12 N | 2022      |
|---------------------------------|-----------|------------------------------------|-----------|
|                                 |           | LC_DC4_BIC-1_2022-09-12_N          |           |
| Sample Collection Date:         | 13-Sep-22 | 12-Sep-22                          | 12-Sep-22 |
| CC#:                            | CC231045  | CC231046                           | CC231047  |
| Sieve Size:                     | 400       | 400                                | 400       |
| Subsample %:                    | 5         | 7                                  | 5         |
| Phylum: Arthropoda              | 0         | 0                                  | 0         |
| Order: Collembola               | 0         | 0                                  | 0         |
| wheels were Harran and          | 0         | 0                                  | 0         |
| ubphylum: Hexapoda              | 0         | 0                                  | 0         |
| Class: Insecta                  | 0         | 0                                  | 0         |
| Order: Ephemeroptera            | 0         | 0                                  | 0         |
| Family: Ameletidae              | 0         | 0                                  | 0         |
| Ameletus                        | 0         | 2                                  | 2         |
| Family: Baetidae                | 0         | 2                                  | 0         |
| <u>Baetis</u>                   | 0         | 0                                  | 2 ND      |
| Baetis fuscatus gr.             | 0         | 0                                  | 0         |
| Baetis rhodani group            | 0         | 12                                 | 28        |
| Baetis bicaudatus               | 0         | 0                                  | 0         |
| Family: Ephemerellidae          | 1         | 24                                 | 17        |
| <u>Orunella</u>                 | 0         | 0                                  | 0         |
| <u>Orunella grandis group</u>   | 0         | 0                                  | 0         |
| <u>Orunella coloradensis</u>    | 0         | 1                                  | 0         |
| <u> Drunella doddsii</u>        | 0         | 11                                 | 11        |
| Family: Heptageniidae           | 0         | 45                                 | 26        |
| <u>Cinygmula</u>                | 0         | 12                                 | 33        |
| <u>peorus</u>                   | 0         | 0                                  | 0         |
| Rhithrogena                     | 0         | 0                                  | 0         |
| Family: Siphlonuridae           | 0         | 0                                  | 0         |
| <u>iphlonurus</u>               | 0         | 0                                  | 0         |
|                                 |           |                                    |           |
| Order: Plecoptera               | 0         | 1 ND                               | 3         |
| Family: Capniidae               | 31        | 0                                  | 1         |
| <u>Mesocapnia</u>               | 0         | 0                                  | 0         |
| Family: Chloroperlidae          | 4         | 6                                  | 2         |
| <u>laploperla</u>               | 0         | 0                                  | 0         |
| <u>Plumiperla</u>               | 1         | 0                                  | 0         |
| <u>weltsa</u>                   | 1         | 4                                  | 7         |
| <u>Itaperla</u>                 | 0         | 0                                  | 0         |
| Family: Leuctridae              | 0         | 0                                  | 0         |
| <u>Paraleuctra</u>              | 0         | 0                                  | 0         |
| Family: Nemouridae              | 1 ND      | 1 ND                               | 1 ND      |
| <u>Malenka</u>                  | 1         | 0                                  | 0         |
| <u> ⁄isoka cataractae</u>       | 0         | 0                                  | 0         |
| <u>'apada</u>                   | 2 ND      | 4                                  | 2 ND      |
| apada oregonensis group         | 11        | 51                                 | 69        |
| 'apada cinctipes                | 0         | 0                                  | 1         |
| <u>'apada columbiana</u>        | 72        | 8                                  | 25        |
| Family: Peltoperlidae           | 0         | 0                                  | 0         |
| <u>ʻoraperla</u>                | 0         | 0                                  | 2         |
| Family: Perlidae                | 0         | 0                                  | 0         |
| <u>lesperoperla</u>             | 0         | 0                                  | 0         |
| Family: Perlodidae              | 0         | 3                                  | 5         |
| <u>soperla</u>                  | 0         | 0                                  | 0         |
| <u>Cogotus</u>                  | 0         | 3                                  | 2         |
| <u>Megarcys</u>                 | 7         | 5                                  | 15        |
| <u>etvena</u>                   | 0         | 0                                  | 0         |
| Family: Taeniopterygidae        | 0         | 3                                  | 0         |
|                                 |           |                                    |           |
| Order: Trichoptera              | 0         | 14                                 | 14 ND     |
| Family: Brachycentridae         | 0         | 0                                  | 0         |
| Brachycentrus                   | 0         | 0                                  | 0         |
| <u> Micrasema</u>               | 0         | 0                                  | 0         |
| Family: Glossosomatidae         | 0         | 0                                  | 0         |
| <u>Glossosoma</u>               | 0         | 1                                  | 0         |
| Family: Hydropsychidae          | 0         | 4                                  | 0         |
| <u>Parapsyche</u>               | 0         | 1 ND                               | 0         |
| Parapsyche elsis                | 0         | 9                                  | 3         |
| Family: Leptoceridae            | 0         | 0                                  | 0         |
| Family: Limnephilidae           | 2         | 8                                  | 13        |
| Clostoeca disjuncta             | 0         | 0                                  | 0         |
| Dicosmoecus                     | 0         | 1                                  | 0         |
| <u> Ccclisomyia</u>             | 0         | 0                                  | 1         |
| Family: Rhyacophilidae          | 0         | 0                                  | 0         |
| Rhyacophila                     | 3         | 1                                  | 0         |
| Rhyacophila betteni group       | 0         | 0                                  | 1         |
| Rhyacophila brunnea/vemna group | 2         | 2                                  | 1         |
| Rhyacophila hyalinata group     | 0         | 1                                  | 2         |
| Rhyacophila vetina complex      | 0         | 0                                  | 0         |
| Rhyacophila vofixa group        | 1         | 1                                  | 2         |
| Rhyacophila atrata complex      | 0         | 1                                  | 1         |
| Rhyacophila narvae              | 0         | 5                                  | 11        |
| Family: Thremmatidae            | 0         | 0                                  | 0         |
| Pligophlebodes                  | 0         | 0                                  | 2         |
| Family: Uenoidae                |           | 0                                  |           |
| LAUDIV. DEUDIDAE                | 0         |                                    | 0         |
|                                 | 0         | Λ                                  | 0         |
| <u>leothremma</u>               | 0         | 0                                  | 0         |
|                                 | 0         | 0                                  | 0         |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                        |                           |                            |           |
|-------------------------------------|---------------------------|----------------------------|-----------|
| Site:                               | 2022                      | 2022                       | 2022      |
| Sample                              | LC_DC3_BIC-3_2022-09-13_N | IC DC/L BIC-1 2022-00-12 N |           |
|                                     |                           |                            |           |
| Sample Collection Date:             | 13-Sep-22                 | 12-Sep-22                  | 12-Sep-22 |
| CC#:                                | CC231045                  | CC231046                   | CC231047  |
| Sieve Size:                         | 400                       | 400                        | 400       |
|                                     |                           |                            |           |
| Subsample %:                        | 5                         | 7                          | 5         |
| <u>Heterlimnius</u>                 | 0                         | 0                          | 0         |
| Family: Staphylinidae               | 0                         | 0                          | 0         |
| i anniy. Staphyiinidae              | 0                         | O                          | O         |
|                                     |                           |                            |           |
| Order: Diptera                      | 0                         | 0                          | 0         |
| Family: Ceratopogonidae             | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Mallochohelea</u>                | 0                         | 0                          | 0         |
| Family: Chironomidae                | 12 ND                     | 16 ND                      | 14 ND     |
| Subfamily: Chironominae             | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Tribe: Tanytarsini                  | 0                         | 1                          | 0         |
| <u>Micropsectra</u>                 | 0                         | 0                          | 0         |
| <u>Stempellinella</u>               | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Subfamily: Diamesinae               | 0                         | 0                          | 0         |
| Tribe: Diamesini                    | 0                         | 0                          | 0         |
| Diamesa                             | 2                         | 1                          | 0         |
|                                     |                           |                            |           |
| <u>Pagastia</u>                     | 28                        | 25                         | 12        |
| <u>Pseudodiamesa</u>                | 33                        | 0                          | 1         |
| Subfamily: Orthocladiinae           | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Brillia</u>                      | 1                         | 0                          | 0         |
| <u>Corynoneura</u>                  | 0                         | 0                          | 0         |
| Cricotopus (Nostococladius)         | 0                         | 0                          | 0         |
|                                     | 0                         | 0                          | 0         |
| <u>Diplocladius cultriger</u>       |                           |                            |           |
| <u>Eukiefferiella</u>               | 22                        | 7                          | 3         |
| <u>Hydrobaenus</u>                  | 6                         | 2                          | 2         |
| <u>Limnophyes</u>                   | 1                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Metriocnemus</u>                 | 0                         | 0                          | 0         |
| <u>Orthocladius complex</u>         | 84                        | 12                         | 7         |
|                                     | 0                         | 0                          | 0         |
| <u>Parametriocnemus</u>             |                           |                            |           |
| <u>Parorthocladius</u>              | 9                         | 1                          | 0         |
| <u>Rheocricotopus</u>               | 0                         | 4                          | 6         |
| Tvetenia                            | 5                         | 1                          | 5         |
|                                     |                           |                            |           |
| Subfamily: Tanypodinae              | 0                         | 0                          | 0         |
| <u>Krenopelopia</u>                 | 0                         | 0                          | 0         |
| Tribe: Pentaneurini                 | 0                         | 0                          | 0         |
| •                                   |                           |                            | 0         |
| <u>Telmatopelopia</u>               | 0                         | 0                          | 0         |
| Thienemannimyia group               | 0                         | 0                          | 0         |
| Family: Empididae                   | 0                         | 0                          | 1         |
|                                     |                           |                            |           |
| <u>Chelifera/ Metachela</u>         | 0                         | 1                          | 0         |
| <u>Clinocerinae Unknown Genus A</u> | 0                         | 2                          | 0         |
| Neoplasta                           | 0                         | 2                          | 0         |
|                                     |                           |                            |           |
| <u>Oreogeton</u>                    | 1                         | 0                          | 0         |
| <u>Trichoclinocera</u>              | 5                         | 0                          | 0         |
| Family: Pelecorhynchidae            | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Glutops</u>                      | 0                         | 4                          | 1         |
| Family: Psychodidae                 | 0                         | 0                          | 0         |
| Pericoma/Telmatoscopus              | 12                        | 7                          | 0         |
|                                     |                           |                            |           |
| Family: Simuliidae                  | 0                         | 0                          | 0         |
| <u>Prosimulium</u>                  | 1                         | 0                          | 0         |
| <u>Prosimulium/Helodon</u>          | 0                         | 0                          | 0         |
|                                     | 0                         |                            |           |
| <u>Simulium</u>                     |                           | 0                          | 2         |
| Family: Tipulidae                   | 0                         | 0                          | 0         |
| <u>Antocha</u>                      | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Dicranota</u>                    | 5                         | 0                          | 1         |
| <u>Molophilus</u>                   | 1                         | 0                          | 0         |
| Pedicia                             | 0                         | 0                          | 0         |
| <u>Tricyphona</u>                   | 0                         | 0                          | 0         |
| тпсурнопи_                          | U                         | U                          | U         |
|                                     |                           |                            |           |
| Subphylum: Chelicerata              | 0                         | 0                          | 0         |
| Class: Arachnida                    | 0                         | 0                          | 0         |
| •                                   |                           |                            |           |
| Order: Trombidiformes               | 0                         | 0                          | 0         |
| Family: Feltriidae                  | 0                         | 0                          | 0         |
| Feltria                             | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Family: Hydryphantidae              | 0                         | 0                          | 0         |
| <u>Albertathyas</u>                 | 3                         | 0                          | 0         |
| Family: Hygrobatidae                | 0                         | 0                          | 0         |
| <u>Atractides</u>                   | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| <u>Hygrobates</u>                   | 0                         | 0                          | 0         |
| Family: Lebertiidae                 | 0                         | 0                          | 0         |
|                                     |                           | 0                          | 0         |
| <u>Lebertia</u>                     | 4                         |                            |           |
| Family: Sperchontidae               | 0                         | 0                          | 0         |
| Sperchon                            | 0                         | 0                          | 0         |
| Family: Torrenticolidae             | 0                         | 0                          | 0         |
| -                                   |                           |                            |           |
| <u>Testudacarus</u>                 | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Order: Sarcoptiformes               | 0                         | 0                          | 0         |
| •                                   |                           |                            |           |
| Order: Oribatida                    | 1                         | 0                          | 0         |
| Family: Hydrozetidae                | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Dhadaaa 84 U                        | 2                         | 2                          | 0         |
| Phylum: Mollusca                    | 0                         | 0                          | 0         |
| Class: Gastropoda                   | 0                         | 0                          | 0         |
|                                     |                           | -                          |           |
| n                                   |                           | _                          |           |
| Phylum: Annelida                    | 0                         | 0                          | 0         |
| Subphylum: Clitellata               | 0                         | 0                          | 0         |
| Class: Oligochaeta                  | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
| Order: Lumbriculida                 | 0                         | 0                          | 0         |
| Family: Lumbriculidae               | 0                         | 0                          | 0         |
| Rhynchelmis                         | 0                         | 0                          | 0         |
| mynenenns                           | U                         | U                          | U         |
|                                     |                           |                            |           |
| Order: Tubificida                   | 0                         | 0                          | 0         |
|                                     |                           |                            |           |
|                                     |                           |                            |           |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca 250-494-7553

| 230-494-7333                            |                           |                           |                           |
|---|---------------------------|---------------------------|---------------------------|
| Site:                                   | 2022                      | 2022                      | 2022                      |
| Sample:                                 | LC_DC3_BIC-3_2022-09-13_N | LC_DC4_BIC-1_2022-09-12_N | LC_DC4_BIC-2_2022-09-12_N |
| Sample Collection Date:                 | 13-Sep-22                 | 12-Sep-22                 | 12-Sep-22                 |
| CC#:                                    | CC231045                  | CC231046                  | CC231047                  |
| Sieve Size:                             | 400                       | 400                       | 400                       |
| Subsample %:                            | 5                         | 7                         | 5                         |
| Family: Enchytraeidae                   | 0                         | 1                         | 0                         |
| Family: Naididae                        | 0                         | 0                         | 0                         |
| <u>Nais</u>                             | 0                         | 0                         | 0                         |
| Stylaria lacustris                      | 0                         | 0                         | 0                         |
| Subfamily: Tubificinae with hair chaeta | 0                         | 0                         | 0                         |
| Totals:                                 | 376                       | 334                       | 360                       |
|   |                           |                           |                           |

#### Taxa present but not included:

| Phylum: Arthropoda      | 0 | 0 | 0 |  |
|-------------------------|---|---|---|--|
| Subphylum: Hexapoda     | 0 | 0 | 0 |  |
| Class: Insecta          | 0 | 0 | 0 |  |
| Order: Diptera          | 0 | 0 | 0 |  |
| Family: Cecidomyiidae   | 0 | 0 | 0 |  |
|                         |   |   |   |  |
| Order: Homoptera        | 0 | 0 | 0 |  |
| Family: Cicadellidae    | 0 | 0 | 0 |  |
|                         |   |   |   |  |
| Order: Psocodea         | 0 | 0 | 0 |  |
|                         |   |   |   |  |
| Subphylum: Crustacea    | 0 | 0 | 0 |  |
| Class: Ostracoda        | 1 | 1 | 1 |  |
|                         |   |   |   |  |
| Phylum: Annelida        | 0 | 0 | 0 |  |
| Subphylum: Clitellata   | 0 | 0 | 0 |  |
| Class: Oligochaeta      | 0 | 0 | 0 |  |
| Order: Tubificida       | 0 | 0 | 0 |  |
| Family: Lumbricidae     | 0 | 0 | 0 |  |
|                         |   |   |   |  |
| Phylum: Nemata          | 1 | 1 | 0 |  |
| Phylum: Platyhelminthes | 0 | 0 | 0 |  |
| Class: Turbellaria      | 1 | 1 | 1 |  |
| Totals:                 | 3 | 3 | 2 |  |



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

Taxonomist: Scott Finlayson scottfinlayson@cordilleraconsulting.ca

250-494-7553

| 250-494-7553                    |                           |                            |                            |
|---------------------------------|---------------------------|----------------------------|----------------------------|
| Site:                           | 2022                      | 2022                       | 2022                       |
| Sample:                         | LC_DC4_BIC-3_2022-09-12_N | LC_DCDS_BIC-1_2022-09-13_N | LC_DCDS_BIC-2_2022-09-13_N |
| Sample Collection Date:         | 12-Sep-22                 | 13-Sep-22                  | 13-Sep-22                  |
| CC#:                            | CC231048                  | CC231049                   | CC231050                   |
| Sieve Size:                     | 400                       | 400                        | 400                        |
| Subsample %:                    | 13                        | 15                         | 8                          |
| Phylum: Arthropoda              | 0                         | 0                          | 0                          |
| Order: Collembola               | 0                         | 0                          | 0                          |
| Order: Collettibola             | 0                         | O .                        | O                          |
| Colorbodoros Harranda           | 2                         | 0                          | 0                          |
| Subphylum: Hexapoda             | 0                         | 0                          | 0                          |
| Class: Insecta                  | 0                         | 0                          | 0                          |
| Order: Ephemeroptera            | 0                         | 0                          | 0                          |
| Family: Ameletidae              | 0                         | 0                          | 0                          |
| <u>Ameletus</u>                 | 0                         | 0                          | 0                          |
| Family: Baetidae                | 1 ND                      | 1                          | 0                          |
| <u>Baetis</u>                   | 1 ND                      | 0                          | 0                          |
| Baetis fuscatus gr.             | 0                         | 0                          | 0                          |
| Baetis rhodani group            | 19                        | 2                          | 3                          |
| Baetis bicaudatus               | 1                         | 0                          | 0                          |
| Family: Ephemerellidae          | 22                        | 16                         | 19                         |
| <u>Drunella</u>                 | 0                         | 0                          | 0                          |
| <u>Drunella grandis group</u>   | 0                         | 0                          | 0                          |
| Drunella coloradensis           | 1                         | 1                          | 1                          |
|                                 |                           |                            |                            |
| <u>Drunella doddsii</u>         | 4                         | 5                          | 1                          |
| Family: Heptageniidae           | 19                        | 2                          | 0                          |
| <u>Cinygmula</u>                | 18                        | 6                          | 3                          |
| <u>Epeorus</u>                  | 0                         | 0                          | 1                          |
| Rhithrogena                     | 0                         | 0                          | 0                          |
| Family: Siphlonuridae           | 0                         | 0                          | 0                          |
| <u>Siphlonurus</u>              | 0                         | 0                          | 0                          |
|                                 |                           |                            |                            |
| Order: Plecoptera               | 0                         | 0                          | 1 ND                       |
| Family: Capniidae               | 0                         | 2                          | 0                          |
| Mesocapnia                      | 0                         | 0                          | 0                          |
| Family: Chloroperlidae          | 1                         | 0                          | 0                          |
| <u>Haploperla</u>               | 0                         | 0                          | 0                          |
| <u>Plumiperla</u>               | 0                         | 0                          | 0                          |
| <u>Sweltsa</u>                  | 6                         | 2                          | 2                          |
| <u>Swertsu</u><br>Utaperla      | 1                         | 0                          | 0                          |
| ' <u></u>                       |                           | 0                          |                            |
| Family: Leuctridae              | 0                         |                            | 0                          |
| <u>Paraleuctra</u>              | 0                         | 0                          | 0                          |
| Family: Nemouridae              | 1                         | 1 ND                       | 0                          |
| <u>Malenka</u>                  | 0                         | 0                          | 0                          |
| <u>Visoka cataractae</u>        | 0                         | 1                          | 0                          |
| <u>Zapada</u>                   | 0                         | 4                          | 4                          |
| Zapada oregonensis group        | 64                        | 41                         | 24                         |
| Zapada cinctipes                | 0                         | 0                          | 0                          |
| Zapada columbiana               | 5                         | 47                         | 40                         |
| Family: Peltoperlidae           | 0                         | 0                          | 0                          |
| <u>Yoraperla</u>                | 1                         | 0                          | 1                          |
| Family: Perlidae                | 0                         | 0                          | 0                          |
| <u>Hesperoperla</u>             | 0                         | 0                          | 0                          |
| Family: Perlodidae              | 5                         | 7                          | 9                          |
| Isoperla                        | 0                         | 0                          | 0                          |
| <u>Kogotus</u>                  | 3                         | 0                          | 0                          |
| <u>Negarcys</u>                 | 19                        | 5                          | 10                         |
| <u>Setvena</u>                  | 0                         | 0                          | 0                          |
| Family: Taeniopterygidae        | 1                         | 1                          | 1                          |
| Talling. Taemopteryglade        | 1                         | 1                          | <u> </u>                   |
| Order: Trichenters              | 20                        | 0                          | 14 ND                      |
| Order: Trichoptera              |                           | 0                          |                            |
| Family: Brachycentridae         | 0                         | 0                          | 0                          |
| Brachycentrus<br>Microscoma     | 0                         | 0                          | 0                          |
| Micrasema                       | 0                         | 0                          | 0                          |
| Family: Glossosomatidae         | 0                         | 0                          | 0                          |
| <u>Glossosoma</u>               | 0                         | 0                          | 0                          |
| Family: Hydropsychidae          | 0                         | 20                         | 21                         |
| <u>Parapsyche</u>               | 0                         | 0                          | 0                          |
| Parapsyche elsis                | 3                         | 6                          | 0                          |
| Family: Leptoceridae            | 0                         | 0                          | 0                          |
| Family: Limnephilidae           | 13                        | 3                          | 5                          |
| <u>Clostoeca disjuncta</u>      | 0                         | 0                          | 0                          |
| <u>Dicosmoecus</u>              | 0                         | 0                          | 0                          |
| <u>Ecclisomyia</u>              | 1                         | 0                          | 3                          |
| Family: Rhyacophilidae          | 0                         | 0                          | 0                          |
| <u>Rhyacophila</u>              | 0                         | 9                          | 2                          |
| Rhyacophila betteni group       | 1                         | 3                          | 4                          |
| Rhyacophila brunnea/vemna group | 2                         | 6                          | 2                          |
| Rhyacophila hyalinata group     | 1                         | 1                          | 0                          |
| Rhyacophila vetina complex      | 0                         | 0                          | 0                          |
| Rhyacophila vofixa group        | 1                         | 3                          | 1                          |
|                                 |                           |                            |                            |
| Rhyacophila atrata complex      | 1                         | 0                          | 0                          |
| Rhyacophila narvae              | 5                         | 10                         | 6                          |
| Family: Thremmatidae            | 0                         | 0                          | 0                          |
| <u>Oligophlebodes</u>           | 0                         | 6                          | 16                         |
| Family: Uenoidae                | 0                         | 0                          | 0                          |
| <u>Neothremma</u>               | 0                         | 0                          | 0                          |
|                                 |                           |                            |                            |
| Order: Coleoptera               | 0                         | 0                          | 0                          |
| Family: Elmidae                 | 0                         | 0                          | 0                          |
|                                 |                           |                            |                            |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                          |                           |                                       |                            |
|---------------------------------------|---------------------------|---------------------------------------|----------------------------|
| Site:                                 | 2022                      | 2022                                  | 2022                       |
| Sample:                               | LC_DC4_BIC-3_2022-09-12_N | LC_DCDS_BIC-1_2022-09-13_N            | LC_DCDS_BIC-2_2022-09-13_N |
|                                       |                           |                                       |                            |
| Sample Collection Date:               | 12-Sep-22                 | 13-Sep-22                             | 13-Sep-22                  |
| CC#:                                  | CC231048                  | CC231049                              | CC231050                   |
| Sieve Size:                           | 400                       | 400                                   | 400                        |
|                                       |                           |                                       |                            |
| Subsample %:                          | 13                        | 15                                    | 8                          |
| Heterlimnius                          | 0                         | 0                                     | 0                          |
|                                       | 0                         | 0                                     | 0                          |
| Family: Staphylinidae                 | U                         | U                                     | U                          |
|                                       |                           |                                       |                            |
| Order: Diptera                        | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Ceratopogonidae               | 0                         | 0                                     | 0                          |
| <u>Mallochohelea</u>                  | 0                         | 0                                     | 0                          |
| Family: Chironomidae                  | 11 ND                     | 15 ND                                 | 18 ND                      |
|                                       |                           |                                       |                            |
| Subfamily: Chironominae               | 0                         | 0                                     | 0                          |
| Tribe: Tanytarsini                    | 0                         | 0                                     | 0                          |
|                                       | 0                         | 0                                     | 1                          |
| <u>Micropsectra</u>                   |                           |                                       |                            |
| <u>Stempellinella</u>                 | 1                         | 0                                     | 0                          |
| Subfamily: Diamesinae                 | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Tribe: Diamesini                      | 0                         | 0                                     | 0                          |
| <u>Diamesa</u>                        | 2                         | 16                                    | 6                          |
| Pagastia                              | 41                        | 7                                     | 6                          |
| <u> </u>                              |                           |                                       |                            |
| <u>Pseudodiamesa</u>                  | 0                         | 8                                     | 9                          |
| Subfamily: Orthocladiinae             | 0                         | 0                                     | 0                          |
| Brillia                               | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Corynoneura</u>                    | 0                         | 0                                     | 1                          |
| Cricotopus (Nostococladius)           | 0                         | 0                                     | 0                          |
| <u>Diplocladius cultriger</u>         | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Eukiefferiella</u>                 | 10                        | 5                                     | 8                          |
| <u>Hydrobaenus</u>                    | 28                        | 2                                     | 8                          |
| <u>Limnophyes</u>                     | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Metriocnemus</u>                   | 0                         | 0                                     | 0                          |
| <u>Orthocladius complex</u>           | 25                        | 40                                    | 48                         |
| <u>Parametriocnemus</u>               | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Parorthocladius</u>                | 8                         | 3                                     | 2                          |
| <u>Rheocricotopus</u>                 | 1                         | 1                                     | 1                          |
| Tvetenia                              | 1                         | 3                                     | 8                          |
| <u> </u>                              |                           |                                       |                            |
| Subfamily: Tanypodinae                | 0                         | 0                                     | 0                          |
| <u>Krenopelopia</u>                   | 0                         | 0                                     | 0                          |
|                                       | 0                         |                                       |                            |
| Tribe: Pentaneurini                   |                           | 0                                     | 0                          |
| <u>Telmatopelopia</u>                 | 0                         | 0                                     | 0                          |
| Thienemannimyia group                 | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Empididae                     | 2                         | 0                                     | 0                          |
| <u>Chelifera/ Metachela</u>           | 3                         | 10                                    | 0                          |
| Clinocerinae Unknown Genus A          | 1                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Neoplasta</u>                      | 1                         | 1                                     | 1                          |
| <u>Oreogeton</u>                      | 0                         | 0                                     | 1                          |
| <u>Trichoclinocera</u>                | 1                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Pelecorhynchidae              | 0                         | 0                                     | 0                          |
| Glutops                               | 1                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Psychodidae                   | 0                         | 0                                     | 0                          |
| Pericoma/Telmatoscopus                | 6                         | 5                                     | 4                          |
| Family: Simuliidae                    | 1                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Prosimulium</u>                    | 0                         | 0                                     | 0                          |
| <u>Prosimulium/Helodon</u>            | 0                         | 0                                     | 0                          |
| Simulium                              | 0                         | 1                                     | 2                          |
|                                       |                           |                                       |                            |
| Family: Tipulidae                     | 0                         | 0                                     | 0                          |
| <u>Antocha</u>                        | 0                         | 0                                     | 0                          |
| <u>Dicranota</u>                      | 0                         | 2                                     | 2                          |
| · · · · · · · · · · · · · · · · · · · |                           |                                       |                            |
| <u>Molophilus</u>                     | 0                         | 0                                     | 0                          |
| <u>Pedicia</u>                        | 0                         | 0                                     | 0                          |
| <u>Tricyphona</u>                     | 0                         | 0                                     | 0                          |
| псурнони                              | ·                         | · ·                                   | v                          |
|                                       |                           |                                       |                            |
| Subphylum: Chelicerata                | 0                         | 0                                     | 0                          |
| Class: Arachnida                      | 0                         | 0                                     | 0                          |
| •                                     |                           |                                       |                            |
| Order: Trombidiformes                 | 0                         | 0                                     | 0                          |
| Family: Feltriidae                    | 0                         | 0                                     | 0                          |
| <u>Feltria</u>                        | 0                         | 1                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Hydryphantidae                | 0                         | 0                                     | 0                          |
| <u>Albertathyas</u>                   | 0                         | 0                                     | 0                          |
| Family: Hygrobatidae                  | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Atractides</u>                     | 0                         | 0                                     | 0                          |
| <u>Hygrobates</u>                     | 0                         | 0                                     | 0                          |
| Family: Lebertiidae                   | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Lebertia</u>                       | 0                         | 0                                     | 0                          |
| Family: Sperchontidae                 | 0                         | 0                                     | 0                          |
| <u>Sperchon</u>                       | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Family: Torrenticolidae               | 0                         | 0                                     | 0                          |
| <u>Testudacarus</u>                   | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Order: Careentiferness                | 0                         | 0                                     | 0                          |
| Order: Sarcoptiformes                 | 0                         | 0                                     | 0                          |
| Order: Oribatida                      | 0                         | 0                                     | 0                          |
| Family: Hydrozetidae                  | 0                         | 0                                     | 0                          |
| , ranny. Hydrozendae                  | · ·                       | <u> </u>                              | J                          |
|                                       |                           |                                       |                            |
| Phylum: Mollusca                      | 0                         | 0                                     | 0                          |
| Class: Gastropoda                     | 0                         | 1                                     | 0                          |
| ,                                     | ~                         | -                                     | Ĭ                          |
|                                       |                           |                                       |                            |
| Phylum: Annelida                      | 0                         | 0                                     | 0                          |
| Subphylum: Clitellata                 | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Class: Oligochaeta                    | 0                         | 0                                     | 0                          |
| Order: Lumbriculida                   | 0                         | 0                                     | 0                          |
| Family: Lumbriculidae                 | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| <u>Rhynchelmis</u>                    | 0                         | 0                                     | 0                          |
|                                       |                           |                                       |                            |
| Order: Tubificida                     | 0                         | 0                                     | 0                          |
| 1 ( wannered                          | <u>-</u>                  | · · · · · · · · · · · · · · · · · · · | ·                          |
|                                       |                           |                                       |                            |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250 .5 . 7555                           |                           |                            |                            |
|---|---------------------------|----------------------------|----------------------------|
| Site:                                   | 2022                      | 2022                       | 2022                       |
| Sample:                                 | LC_DC4_BIC-3_2022-09-12_N | LC_DCDS_BIC-1_2022-09-13_N | LC_DCDS_BIC-2_2022-09-13_N |
| Sample Collection Date:                 | 12-Sep-22                 | 13-Sep-22                  | 13-Sep-22                  |
| CC#:                                    | CC231048                  | CC231049                   | CC231050                   |
| Sieve Size:                             | 400                       | 400                        | 400                        |
| Subsample %:                            | 13                        | 15                         | 8                          |
| Family: Enchytraeidae                   | 0                         | 0                          | 0                          |
| Family: Naididae                        | 0                         | 0                          | 0                          |
| Nais                                    | 0                         | 0                          | 0                          |
| Stylaria lacustris                      | 0                         | 0                          | 0                          |
| Subfamily: Tubificinae with hair chaeta | 0                         | 0                          | 0                          |
| Totals:                                 | 385                       | 332                        | 320                        |
|   |                           |                            |                            |
| Taxa present but not included:          |                           |                            |                            |
| Taxa present but not included.          |                           |                            |                            |
| Phylum: Arthropoda                      | 0                         | 0                          | 0                          |
| Subphylum: Hexapoda                     | 0                         | 0                          | 0                          |
| Class: Insecta                          | 0                         | 0                          | 0                          |
| Order: Diptera                          | 0                         | 0                          | 0                          |
| Family: Cecidomyiidae                   | 0                         | 0                          | 0                          |
| 1                                       | · ·                       |                            | Ů                          |
| Order: Homoptera                        | 0                         | 0                          | 0                          |
| Family: Cicadellidae                    | 0                         | 0                          | 0                          |
| ,                                       | · ·                       |                            | Ů                          |
| Order: Psocodea                         | 0                         | 0                          | 0                          |
| 1 0.00                                  | · ·                       |                            | Ů                          |
| Subphylum: Crustacea                    | 0                         | 0                          | 0                          |
| Class: Ostracoda                        | 1                         | 1                          | 1                          |
| 1                                       | -                         |                            | -                          |
| Phylum: Annelida                        | 0                         | 0                          | 0                          |
| Subphylum: Clitellata                   | 0                         | 0                          | 0                          |
| Class: Oligochaeta                      | 0                         | 0                          | 0                          |
| Order: Tubificida                       | 0                         | 0                          | 0                          |
| Family: Lumbricidae                     | 0                         | 0                          | 0                          |
| 1                                       | •                         | <u> </u>                   | ,                          |
| Phylum: Nemata                          | 1                         | 1                          | 1                          |
| Phylum: Platyhelminthes                 | 0                         | 0                          | 0                          |
| Class: Turbellaria                      | 1                         | 1                          | 1                          |
| Totals:                                 | 3                         | 3                          | 3                          |
| Totais.                                 | •                         | •                          | J                          |



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| 250-494-7553                                    |           |                            |                            |
|---|-----------|----------------------------|----------------------------|
| Site:   | 2022      | 2022                       | 2022                       |
| Sample:   |           | LC_DCDS_BIC-4_2022-09-13_N | LC_DCDS_BIC-5_2022-09-13_N |
| Sample Collection Date:                         | 13-Sep-22 | 13-Sep-22                  | 13-Sep-22                  |
| CC#:  |           | CC231052                   | CC231053                   |
| Sieve Size:                                     |           | 400                        | 400                        |
| Subsample %:                                    | 16        | 8                          | 12                         |
| Phylum: Arthropoda                              | 0         | 0                          | 0                          |
| Order: Collembola                               | 0         | 1                          | 0                          |
|   |           |                            |                            |
| Subphylum: Hexapoda                             | 0         | 0                          | 0                          |
| Class: Insecta                                  | 0         | 0                          | 0                          |
| Order: Ephemeroptera                            | 0         | 0                          | 0                          |
| Family: Ameletidae                              | 0         | 0                          | 0                          |
| <u>Ameletus</u>                                 | 0         | 0                          | 0                          |
| Family: Baetidae                                | 0         | 2 ND                       | 0                          |
| <u>Baetis</u>                                   | 1         | 2                          | 1                          |
| Baetis fuscatus gr.                             | 0         | 0                          | 0                          |
| Baetis rhodani group                            | 1         | 2                          | 2                          |
| <u>Baetis bicaudatus</u>                        | 0         | 0                          | 0                          |
| Family: Ephemerellidae                          | 40        | 31                         | 58                         |
| <u>Drunella</u>                                 | 0         | 0                          | 0                          |
| <u>Drunella grandis group</u>                   | 0         | 0                          | 0                          |
| <u>Drunella coloradensis</u>                    | 0         | 0                          | 0                          |
| <u>Drunella doddsii</u>                         | 7         | 4                          | 3                          |
| Family: Heptageniidae                           | 3         | 2                          | 2                          |
| <u>Cinyamula</u>                                | 4         | 5                          | 11                         |
| <u>Epeorus</u>                                  | 0         | 1                          | 0                          |
| Rhithrogena                                     | 0         | 0                          | 0                          |
| Family: Siphlonuridae                           | 0         | 0                          | 0                          |
| <u>Siphlonurus</u>                              | 0         | 0                          | 0                          |
| L Oudow Discours                                | 1         |                            | 0                          |
| Order: Plecoptera                               | 1 ND      | 1 ND                       | 0                          |
| Family: Capniidae                               | 4<br>0    | 2<br>0                     | 3<br>0                     |
| Mesocapnia                                      | 5         |                            |                            |
| Family: Chloroperlidae                          | 0         | 4<br>0                     | 3<br>0                     |
| <u>Haploperla</u><br>Plumiperla                 | 0         | 0                          | 0                          |
| <u>Sweltsa</u>                                  | 5         | 3                          | 4                          |
| <u>Swertsu</u><br>Utaperla                      | 0         | 0                          | 0                          |
| Family: Leuctridae                              | 0         | 0                          | 0                          |
| Paraleuctra                                     | 0         | 0                          | 0                          |
| Family: Nemouridae                              | 2 ND      | 1 ND                       | 0                          |
| Malenka   | 0         | 0                          | 0                          |
| Visoka cataractae                               | 1         | 0                          | 0                          |
| <u>Zapada</u>                                   | 1         | 7 ND                       | 1 ND                       |
| Zapada oregonensis group                        | 16        | 14                         | 9                          |
| Zapada cinctipes                                | 0         | 1                          | 0                          |
| Zapada columbiana                               | 30        | 28                         | 16                         |
| Family: Peltoperlidae                           | 0         | 0                          | 0                          |
| <u>Yoraperla</u>                                | 0         | 0                          | 0                          |
| Family: Perlidae                                | 0         | 0                          | 0                          |
| <u>Hesperoperla</u>                             | 0         | 0                          | 0                          |
| Family: Perlodidae                              | 18        | 16                         | 6                          |
| <u>Isoperla</u>                                 | 0         | 0                          | 0                          |
| <u>Kogotus</u>                                  | 0         | 2                          | 2                          |
| <u>Megarcys</u>                                 | 6         | 5                          | 4                          |
| <u>Setvena</u>                                  | 0         | 0                          | 0                          |
| Family: Taeniopterygidae                        | 1         | 3                          | 0                          |
| 1.0.1   |           | 40                         |                            |
| Order: Trichoptera                              | 7 ND      | 19 ND                      | 8 ND                       |
| Family: Brachycentridae                         | 0         | 0                          | 0                          |
| Brachycentrus Microscoma                        | 0         | 0                          | 0                          |
| Micrasema                                       | 0         | 0                          | 0                          |
| Family: Glossosomatidae                         | 0         | 1<br>0                     | 0<br>0                     |
| Glossosoma   Family: Hydropsychidae             | 20        | 0<br>31                    | 13                         |
| Parapsyche                                      | 0         | 0                          | 0                          |
| <u>Parapsyche</u><br><u>Parapsyche elsis</u>    | 1         | 0                          | 0                          |
| Family: Leptoceridae                            | 1         | 0                          | 0                          |
| Family: Leptoceridae<br>  Family: Limnephilidae | 1         | 1                          | 4                          |
| Clostoeca disjuncta                             | 0         | 0                          | 1                          |
| <u>Dicosmoecus</u>                              | 0         | 0                          | 0                          |
| Ecclisomyia                                     | 0         | 1                          | 1                          |
| Family: Rhyacophilidae                          | 0         | 0                          | 0                          |
| Rhyacophila                                     | 0         | 1                          | 3                          |
| Rhyacophila betteni group                       | 2         | 3                          | 4                          |
| Rhyacophila brunnea/vemna group                 | 3         | 1                          | 1                          |
| Rhyacophila hyalinata group                     | 2         | 0                          | 0                          |
| Rhyacophila vetina complex                      | 0         | 0                          | 0                          |
| Rhyacophila vofixa group                        | 2         | 2                          | 2                          |
| Rhyacophila atrata complex                      | 0         | 0                          | 0                          |
| <u>Rhyacophila narvae</u>                       | 8         | 1                          | 8                          |
| Family: Thremmatidae                            | 0         | 0                          | 0                          |
| <u>Oligophlebodes</u>                           | 11        | 19                         | 3                          |
| Family: Uenoidae                                | 0         | 0                          | 0                          |
| <u>Neothremma</u>                               | 0         | 0                          | 0                          |
|   |           |                            |                            |
| Order: Coleoptera                               | 0         | 0                          | 0                          |
| Family: Elmidae                                 | 0         | 0                          | 0                          |
|   |           |                            |                            |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                 |                            |                            |                            |
|------------------------------|----------------------------|----------------------------|----------------------------|
| Site:                        |                            | 2022                       | 2022                       |
| Sample:                      | LC_DCDS_BIC-3_2022-09-13_N | LC_DCDS_BIC-4_2022-09-13_N | LC_DCDS_BIC-5_2022-09-13_N |
| Sample Collection Date:      | 13-Sep-22                  | 13-Sep-22                  | 13-Sep-22                  |
| CC#:                         |                            | CC231052                   | CC231053                   |
| Sieve Size:                  |                            | 400                        |                            |
|                              |                            |                            | 400                        |
| Subsample %:                 | 16                         | 8                          | 12                         |
| <u>Heterlimnius</u>          | 0                          | 0                          | 0                          |
| Family: Staphylinidae        | 1                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Order: Dinters               | 0                          | 0                          | 0                          |
| Order: Diptera               | 0                          |                            | 0                          |
| Family: Ceratopogonidae      | 0                          | 0                          | 0                          |
| <u>Mallochohelea</u>         | 0                          | 0                          | 0                          |
| Family: Chironomidae         | 16 ND                      | 15 ND                      | 9                          |
| Subfamily: Chironominae      | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Tribe: Tanytarsini           | 0                          | 2                          | 0                          |
| <u>Micropsectra</u>          | 2                          | 3                          | 7                          |
| <u>Stempellinella</u>        | 0                          | 0                          | 0                          |
| Subfamily: Diamesinae        | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Tribe: Diamesini             | 0                          | 0                          | 0                          |
| <u>Diamesa</u>               | 6                          | 4                          | 0                          |
| <u>Pagastia</u>              | 7                          | 7                          | 7                          |
| <u>Pseudodiamesa</u>         | 10                         | 21                         | 44                         |
| Subfamily: Orthocladiinae    | 0                          | 0                          | 1                          |
|                              |                            |                            |                            |
| <u>Brillia</u>               | 0                          | 0                          | 0                          |
| <u>Corynoneura</u>           | 0                          | 1                          | 0                          |
| Cricotopus (Nostococladius)  | 0                          | 0                          | 0                          |
| Diplocladius cultriger       | 0                          | 0                          | 0                          |
| Eukiefferiella               | 9                          | 12                         | 1                          |
|                              |                            |                            |                            |
| <u>Hydrobaenus</u>           | 7                          | 4                          | 18                         |
| <u>Limnophyes</u>            | 0                          | 0                          | 0                          |
| <u>Metriocnemus</u>          | 0                          | 0                          | 0                          |
| <u>Orthocladius complex</u>  | 38                         | 48                         | 54                         |
| <u>Parametriocnemus</u>      | 0                          | 0                          | 0                          |
|                              |                            | 2                          |                            |
| <u>Parorthocladius</u>       | 3                          |                            | 6                          |
| <u>Rheocricotopus</u>        | 1                          | 0                          | 0                          |
| <u>Tvetenia</u>              | 2                          | 4                          | 0                          |
| Subfamily: Tanypodinae       | 0                          | 0                          | 0                          |
| <u>Krenopelopia</u>          | 0                          | 0                          | 0                          |
| Tribe: Pentaneurini          | 0                          | 0                          | 0                          |
| •                            |                            |                            |                            |
| <u>Telmatopelopia</u>        | 0                          | 0                          | 0                          |
| <u>Thienemannimyia group</u> | 0                          | 0                          | 0                          |
| Family: Empididae            | 0                          | 0                          | 0                          |
| <u>Chelifera/ Metachela</u>  | 5                          | 0                          | 1                          |
| Clinocerinae Unknown Genus A | 0                          | 0                          | 0                          |
| <u>Neoplasta</u>             | 4                          | 1                          | 3                          |
|                              |                            |                            |                            |
| <u>Oreogeton</u>             | 0                          | 0                          | 2                          |
| <u>Trichoclinocera</u>       | 0                          | 0                          | 0                          |
| Family: Pelecorhynchidae     | 0                          | 0                          | 0                          |
| <u>Glutops</u>               | 0                          | 0                          | 0                          |
| Family: Psychodidae          | 0                          | 0                          | 0                          |
| Pericoma/Telmatoscopus       | 2                          | 2                          | 1                          |
|                              | 0                          | 0                          | 0                          |
| Family: Simuliidae           |                            |                            |                            |
| <u>Prosimulium</u>           | 0                          | 0                          | 0                          |
| <u>Prosimulium/Helodon</u>   | 0                          | 0                          | 0                          |
| <u>Simulium</u>              | 0                          | 0                          | 0                          |
| Family: Tipulidae            | 0                          | 0                          | 0                          |
| <u>Antocha</u>               | 0                          | 0                          | 0                          |
| <u>Dicranota</u>             | 1                          | 1                          | 0                          |
|                              | 0                          | 0                          | 0                          |
| <u>Molophilus</u>            |                            |                            |                            |
| <u>Pedicia</u>               | 0                          | 0                          | 0                          |
| <u>Tricyphona</u>            | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Subphylum: Chelicerata       | 0                          | 0                          | 0                          |
| Class: Arachnida             | 0                          | 0                          | 0                          |
| Order: Trombidiformes        | 0                          | 0                          | 0                          |
| •                            |                            |                            |                            |
| Family: Feltriidae           | 0                          | 0                          | 0                          |
| <u>Feltria</u>               | 0                          | 0                          | 0                          |
| Family: Hydryphantidae       | 0                          | 0                          | 0                          |
| <u>Albertathyas</u>          | 0                          | 0                          | 0                          |
| Family: Hygrobatidae         | 0                          | 0                          | 0                          |
| Atractides                   | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| <u>Hygrobates</u>            | 0                          | 0                          | 0                          |
| Family: Lebertiidae          | 0                          | 0                          | 0                          |
| <u>Lebertia</u>              | 1                          | 0                          | 0                          |
| Family: Sperchontidae        | 0                          | 0                          | 0                          |
| <u>Sperchon</u>              | 0                          | 0                          | 0                          |
| Family: Torrenticolidae      | 0                          | 0                          | 0                          |
|                              |                            | 0                          |                            |
| <u>Testudacarus</u>          | 0                          | U                          | 0                          |
|                              |                            | _                          |                            |
| Order: Sarcoptiformes        | 0                          | 0                          | 0                          |
| Order: Oribatida             | 0                          | 0                          | 0                          |
| Family: Hydrozetidae         | 0                          | 0                          | 0                          |
| . , ,                        |                            |                            |                            |
| Phylum: Mallusca             | 0                          | 0                          | 0                          |
| Phylum: Mollusca             | 0                          | 0                          | 0                          |
| Class: Gastropoda            | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Phylum: Annelida             | 0                          | 0                          | 0                          |
| Subphylum: Clitellata        | 0                          | 0                          | 0                          |
| Class: Oligochaeta           | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Order: Lumbriculida          | 0                          | 0                          | 0                          |
| Family: Lumbriculidae        | 0                          | 0                          | 0                          |
| <u>Rhynchelmis</u>           | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |
| Order: Tubificida            | 0                          | 0                          | 0                          |
|                              |                            |                            |                            |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca 250-494-7553

Totals:

| 250-494-7553                            |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
| Site:                                   | 2022                       | 2022                       | 2022                       |
| Sample:                                 | LC_DCDS_BIC-3_2022-09-13_N | LC_DCDS_BIC-4_2022-09-13_N | LC_DCDS_BIC-5_2022-09-13_N |
| Sample Collection Date:                 | 13-Sep-22                  | 13-Sep-22                  | 13-Sep-22                  |
| CC#:                                    | CC231051                   | CC231052                   | CC231053                   |
| Sieve Size:                             | 400                        | 400                        | 400                        |
| Subsample %:                            | 16                         | 8                          | 12                         |
| Family: Enchytraeidae                   | 0                          | 2                          | 0                          |
| Family: Naididae                        | 0                          | 0                          | 0                          |
| <u>Nais</u>                             | 0                          | 0                          | 0                          |
| <u>Stylaria lacustris</u>               | 0                          | 0                          | 0                          |
| Subfamily: Tubificinae with hair chaeta | 0                          | 0                          | 0                          |
| Totals:                                 | 319                        | 346                        | 327                        |
| Taxa present but not included:          |                            |                            |                            |
| Phylum: Arthropoda                      | 0                          | 0                          | 0                          |
| Subphylum: Hexapoda                     | 0                          | 0                          | 0                          |
| Class: Insecta                          | 0                          | 0                          | 0                          |
| Order: Diptera                          | 0                          | 0                          | 0                          |
| Family: Cecidomyiidae                   | 0                          | 1                          | 0                          |
|   |                            |                            |                            |
| Order: Homoptera                        | 0                          | 0                          | 0                          |
| Family: Cicadellidae                    | 0                          | 0                          | 0                          |
| Order: Psocodea                         | 0                          | 0                          | 0                          |
| Subphylum: Crustacea                    | 0                          | 0                          | 0                          |
| Class: Ostracoda                        | 1                          | 1                          | 1                          |
|   |                            |                            |                            |
| Phylum: Annelida                        | 0                          | 0                          | 0                          |
| Subphylum: Clitellata                   | 0                          | 0                          | 0                          |
| Class: Oligochaeta                      | 0                          | 0                          | 0                          |
| Order: Tubificida                       | 0                          | 0                          | 0                          |
| Family: Lumbricidae                     | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Phylum: Nemata                          | 1                          | 0                          | 1                          |
| Phylum: Platyhelminthes                 | 0                          | 0                          | 0                          |
| Class: Turbellaria                      | 1                          | 1                          | 1                          |
| Totals:                                 | 3                          | 2                          | 2                          |



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

Taxonomist: Scott Finlayson
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250-494-7553

| 250-494-7553  |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
| Site:   | 2022                       | 2022                       | 2022                       |
| Sample:   | LC_DCEF_BIC-1_2022-09-13_N | LC_DCEF_BIC-2_2022-09-13_N | LC_DCEF_BIC-3_2022-09-13_N |
| Sample Collection Date:                                     | 13-Sep-22                  | 13-Sep-22                  | 13-Sep-22                  |
| CC#:  | CC231054                   | CC231055                   | CC231056                   |
| Sieve Size:   | 400                        | 400                        | 400                        |
| Subsample %:  | 12                         | 15                         | 12                         |
| Phylum: Arthropoda  | 0                          | 0                          | 0                          |
| Order: Collembola   | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Subphylum: Hexapoda   | 0                          | 0                          | 0                          |
| Class: Insecta  | 0                          | 0                          | 0                          |
| Order: Ephemeroptera  | 0                          | 0                          | 0                          |
| Family: Ameletidae  | 0                          | 0                          | 0                          |
| <u>Ameletus</u>   | 4                          | 9                          | 9                          |
| Family: Baetidae  | 3 ND                       | 0                          | 0                          |
| <u>Baetis</u>   | 1                          | 0                          | 0                          |
| <u>Baetis fuscatus gr.</u>                                  | 0                          | 0                          | 0                          |
| Baetis rhodani group  | 4                          | 2                          | 0                          |
| <u>Baetis bicaudatus</u>                                    | 0                          | 0                          | 0                          |
| Family: Ephemerellidae                                      | 41                         | 28                         | 37                         |
| <u>Drunella</u>   | 0                          | 0                          | 0                          |
| <u>Drunella grandis group</u>                               | 0                          | 0                          | 0                          |
| <u>Drunella coloradensis</u>                                | 0                          | 0                          | 0                          |
| <u>Drunella doddsii</u>                                     | 3                          | 6                          | 2                          |
| Family: Heptageniidae                                       | 48                         | 41                         | 93                         |
| <u>Cinygmula</u>  | 57                         | 50                         | 59                         |
| <u>Epeorus</u>  | 6                          | 4                          | 5                          |
| Rhithrogena   | 1                          | 6                          | 2                          |
| Family: Siphlonuridae                                       | 0                          | 0                          | 0                          |
| <u>Siphlonurus</u>  | 0                          | 0                          | 0                          |
| L Oudon Diot  | 0                          | 0                          | 2                          |
| Order: Plecoptera   | 0                          | 0                          | 0                          |
| Family: Capniidae   | 3                          | 2                          | 6                          |
| Mesocapnia  | 0<br>8                     | 0<br>15                    | 0<br>19                    |
| Family: Chloroperlidae                                      |                            |                            |                            |
| Haploperla  | 0                          | 0                          | 0                          |
| <u>Plumiperla</u><br><u>Sweltsa</u>                         | 14                         | 0<br>22                    | 0<br>15                    |
| <u>Utaperla</u>   | 0                          | 0                          | 0                          |
| Family: Leuctridae  | 0                          | 0                          | 1                          |
| _   | 0                          | 0                          | 0                          |
| <u>Paraleuctra</u><br>  Family: Nemouridae                  | 0                          | 0                          | 0                          |
| Malenka   | 0                          | 1                          | 0                          |
| Visoka cataractae   | 0                          | 3                          | 4                          |
| Zapada  | 0                          | 1 ND                       | 3                          |
| Zapada oregonensis group                                    | 1                          | 2                          | 0                          |
| Zapada cinctipes  | 0                          | 0                          | 0                          |
| Zapada columbiana   | 18                         | 7                          | 0                          |
| Family: Peltoperlidae                                       | 0                          | 0                          | 0                          |
| Yoraperla   | 1                          | 2                          | 3                          |
| Family: Perlidae  | 0                          | 0                          | 0                          |
| Hesperoperla  | 0                          | 0                          | 0                          |
| Family: Perlodidae  | 9                          | 6                          | 4                          |
| <u>Isoperla</u>   | 0                          | 0                          | 0                          |
| <u>Kogotus</u>  | 0                          | 1                          | 0                          |
| <u>Megarcys</u>   | 3                          | 8                          | 5                          |
| <u>Setvena</u>  | 11                         | 2                          | 0                          |
| Family: Taeniopterygidae                                    | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Order: Trichoptera  | 14                         | 7                          | 6                          |
| Family: Brachycentridae                                     | 0                          | 0                          | 0                          |
| <u>Brachycentrus</u>  | 0                          | 0                          | 0                          |
| <u>Micrasema</u>  | 0                          | 0                          | 0                          |
| Family: Glossosomatidae                                     | 0                          | 0                          | 0                          |
| Glossosoma  | 0                          | 0                          | 0                          |
| Family: Hydropsychidae                                      | 0                          | 0                          | 0                          |
| Parapsyche  | 0                          | 0                          | 0                          |
| Parapsyche elsis  | 0                          | 0                          | 0                          |
| Family: Leptoceridae  | 0                          | 0                          | 0                          |
| Family: Limnephilidae                                       | 5                          | 1                          | 2                          |
| Clostoeca disjuncta   | 1                          | 2                          | 1                          |
| <u>Dicosmoecus</u>  | 0                          | 0                          | 0                          |
| Ecclisomyia   Family: Rhyacophilidae                        | 1<br>0                     | 1                          | 0                          |
| Rhyacophila   | 0<br>5                     | 8                          | 3                          |
| Rhyacophila betteni group                                   | 0                          | 0                          | 3<br>1                     |
| Rhyacophila betteni group Rhyacophila brunnea/vemna group   | 2                          | 0                          | 1                          |
| Rhyacophila brunnea/vemna group Rhyacophila hyalinata group | 0                          | 0                          | 0                          |
| Rhyacophila vetina complex                                  | 1                          | 0                          | 0                          |
| Rhyacophila vetina complex Rhyacophila vofixa group         | 0                          | 0                          | 0                          |
| Rhyacophila atrata complex                                  | 0                          | 0                          | 0                          |
| Rhyacophila narvae  | 0                          | 0                          | 2                          |
| Family: Thremmatidae  | 0                          | 0                          | 0                          |
| Oligophlebodes  | 0                          | 0                          | 0                          |
| Family: Uenoidae  | 0                          | 0                          | 0                          |
| Neothremma  | 0                          | 0                          | 0                          |
|   | <u> </u>                   |                            | Ŭ                          |
| Order: Coleoptera   | 0                          | 0                          | 0                          |
| Family: Elmidae   | 0                          | 0                          | 0                          |
|   | -                          |                            | <u>-</u>                   |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                                 |                            |                            |                            |
|--|----------------------------|----------------------------|----------------------------|
| Site:  | 2022                       | 2022                       | 2022                       |
|  |                            |                            |                            |
| Sample:                                      | LC_DCEF_BIC-1_2022-09-13_N | LC_DCEF_BIC-2_2022-09-13_N | LC_DCEF_BIC-3_2022-09-13_N |
| Sample Collection Date:                      | 13-Sep-22                  | 13-Sep-22                  | 13-Sep-22                  |
| CC#:   | CC231054                   | CC231055                   | CC231056                   |
| Sieve Size:                                  |                            |                            |                            |
|  | 400                        | 400                        | 400                        |
| Subsample %:                                 | 12                         | 15                         | 12                         |
| <u>Heterlimnius</u>                          | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Family: Staphylinidae                        | 1                          | 0                          | 0                          |
|  |                            |                            |                            |
| Order: Diptera                               | 1                          | 0                          | 0                          |
|  |                            |                            |                            |
| Family: Ceratopogonidae                      | 0                          | 0                          | 0                          |
| <u>Mallochohelea</u>                         | 0                          | 0                          | 0                          |
| Family: Chironomidae                         | 14 ND                      | 9 ND                       | 5 ND                       |
|  |                            |                            |                            |
| Subfamily: Chironominae                      | 0                          | 0                          | 0                          |
| Tribe: Tanytarsini                           | 0                          | 0                          | 0                          |
| Micropsectra                                 | 0                          | 1                          | 0                          |
| ·  |                            |                            |                            |
| <u>Stempellinella</u>                        | 0                          | 1                          | 0                          |
| Subfamily: Diamesinae                        | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Tribe: Diamesini                             | 0                          | 0                          | 0                          |
| <u>Diamesa</u>                               | 1                          | 3                          | 11                         |
| Pagastia                                     | 3                          | 10                         | 4                          |
|  | 8                          | 8                          |                            |
| <u>Pseudodiamesa</u>                         |                            |                            | 0                          |
| Subfamily: Orthocladiinae                    | 0                          | 0                          | 0                          |
| <u>Brillia</u>                               | 4                          | 1                          | 0                          |
|  | 0                          | 0                          | 0                          |
| <u>Corynoneura</u>                           |                            |                            |                            |
| Cricotopus (Nostococladius)                  | 0                          | 0                          | 0                          |
| <u>Diplocladius cultriger</u>                | 0                          | 0                          | 0                          |
|  | 1                          | 3                          | 6                          |
| <u>Eukiefferiella</u>                        |                            |                            |                            |
| <u>Hydrobaenus</u>                           | 1                          | 11                         | 0                          |
| Limnophyes                                   | 0                          | 0                          | 1                          |
|  | 0                          |                            | 0                          |
| <u>Metriocnemus</u>                          |                            | 1                          |                            |
| <u>Orthocladius complex</u>                  | 5                          | 18                         | 15                         |
| <u>Parametriocnemus</u>                      | 0                          | 1                          | 0                          |
|  |                            |                            |                            |
| <u>Parorthocladius</u>                       | 6                          | 4                          | 4                          |
| <u>Rheocricotopus</u>                        | 2                          | 2                          | 1                          |
| Tvetenia                                     | 8                          | 6                          | 6                          |
|  |                            |                            |                            |
| Subfamily: Tanypodinae                       | 0                          | 0                          | 0                          |
| <u>Krenopelopia</u>                          | 0                          | 0                          | 0                          |
| Tribe: Pentaneurini                          | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Telmatopelopia</u>                        | 0                          | 0                          | 0                          |
| Thienemannimyia group                        | 0                          | 0                          | 0                          |
| Family: Empididae                            | 1                          | 0                          | 0                          |
|  |                            |                            |                            |
| Chelifera/ Metachela                         | 0                          | 0                          | 0                          |
| Clinocerinae Unknown Genus A                 | 1                          | 0                          | 0                          |
| <u>Neoplasta</u>                             | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Oreogeton</u>                             | 1                          | 1                          | 0                          |
| <u>Trichoclinocera</u>                       | 0                          | 0                          | 0                          |
| Family: Pelecorhynchidae                     | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Glutops</u>                               | 0                          | 0                          | 0                          |
| Family: Psychodidae                          | 0                          | 0                          | 0                          |
|  | 5                          | 4                          | 0                          |
|  |                            |                            |                            |
| Family: Simuliidae                           | 0                          | 0                          | 0                          |
| <u>Prosimulium</u>                           | 0                          | 0                          | 0                          |
|  | 0                          | 0                          | 0                          |
| <u>Prosimulium/Helodon</u>                   |                            |                            |                            |
| <u>Simulium</u>                              | 0                          | 0                          | 0                          |
| Family: Tipulidae                            | 0                          | 0                          | 0                          |
| <u>Antocha</u>                               | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Dicranota</u>                             | 0                          | 1                          | 0                          |
| <u>Molophilus</u>                            | 0                          | 0                          | 0                          |
|  | 0                          | 0                          | 1                          |
| <u>Pedicia</u>                               |                            |                            | 1                          |
| <u>Tricyphona</u>                            | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Subphylum: Chelicerata                       | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Class: Arachnida                             | 0                          | 0                          | 0                          |
| Order: Trombidiformes                        | 0                          | 0                          | 1                          |
| Family: Feltriidae                           | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Feltria</u>                               | 0                          | 0                          | 0                          |
| Family: Hydryphantidae                       | 0                          | 0                          | 0                          |
| <u>Albertathyas</u>                          | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Family: Hygrobatidae                         | 0                          | 0                          | 0                          |
| <u>Atractides</u>                            | 0                          | 0                          | 0                          |
| Hygrobates                                   | 0                          | 0                          | 0                          |
| · · · · · · · · · · · · · · · · · · ·        |                            |                            |                            |
| Family: Lebertiidae                          | 0                          | 0                          | 0                          |
| <u>Lebertia</u>                              | 6                          | 8                          | 3                          |
| Family: Sperchontidae                        | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| <u>Sperchon</u>                              | 0                          | 0                          | 0                          |
| Family: Torrenticolidae                      | 0                          | 0                          | 0                          |
| <u>.                                    </u> | 0                          | 0                          | 0                          |
| . 53544446474J                               | •                          | · ·                        | J                          |
|  |                            |                            |                            |
| Order: Sarcoptiformes                        | 0                          | 0                          | 0                          |
| Order: Oribatida                             | 0                          | 0                          | 0                          |
| •  |                            |                            |                            |
| Family: Hydrozetidae                         | 0                          | 3                          | 1                          |
|  |                            |                            |                            |
| Phylum: Mollusca                             | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Class: Gastropoda                            | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Phylum: Annelida                             | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Subphylum: Clitellata                        | 0                          | 0                          | 0                          |
| Class: Oligochaeta                           | 0                          | 0                          | 0                          |
| Order: Lumbriculida                          | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Family: Lumbriculidae                        | 0                          | 0                          | 0                          |
| <u>Rhynchelmis</u>                           | 0                          | 0                          | 0                          |
|  |                            |                            |                            |
| Order: Tubificida                            | 0                          | 0                          | 0                          |
| Order: Tubificida                            | 0                          | 0                          | 0                          |
|  |                            |                            |                            |

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| 250-494-7553                            |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
| Site:                                   | 2022                       | 2022                       | 2022                       |
| Sample:                                 | LC_DCEF_BIC-1_2022-09-13_N | LC_DCEF_BIC-2_2022-09-13_N | LC_DCEF_BIC-3_2022-09-13_N |
| Sample Collection Date:                 | 13-Sep-22                  | 13-Sep-22                  | 13-Sep-22                  |
| CC#:                                    | CC231054                   | CC231055                   | CC231056                   |
| Sieve Size:                             | 400                        | 400                        | 400                        |
| Subsample %:                            | 12                         | 15                         | 12                         |
| Family: Enchytraeidae                   | 0                          | 0                          | 0                          |
| Family: Naididae                        | 0                          | 0                          | 0                          |
| Nais                                    | 0                          | 0                          | 0                          |
| Stylaria lacustris                      | 0                          | 0                          | 0                          |
| Subfamily: Tubificinae with hair chaeta | 0                          | 0                          | 0                          |
| Totals:                                 | 334                        | 333                        | 342                        |
|   |                            |                            |                            |
| Taxa present but not included:          |                            |                            |                            |
|   |                            |                            |                            |
| Phylum: Arthropoda                      | 0                          | 0                          | 0                          |
| Subphylum: Hexapoda                     | 0                          | 0                          | 0                          |
| Class: Insecta                          | 0                          | 0                          | 0                          |
| Order: Diptera                          | 0                          | 0                          | 0                          |
| Family: Cecidomyiidae                   | 0                          | 0                          | 0                          |
| , . , ,                                 |                            |                            |                            |
| Order: Homoptera                        | 0                          | 0                          | 0                          |
| Family: Cicadellidae                    | 0                          | 0                          | 0                          |
| , |                            |                            |                            |
| Order: Psocodea                         | 0                          | 0                          | 0                          |
| •                                       |                            |                            |                            |
| Subphylum: Crustacea                    | 0                          | 0                          | 0                          |
| Class: Ostracoda                        | 1                          | 1                          | 1                          |
| •                                       |                            |                            |                            |
| Phylum: Annelida                        | 0                          | 0                          | 0                          |
| Subphylum: Clitellata                   | 0                          | 0                          | 0                          |
| Class: Oligochaeta                      | 0                          | 0                          | 0                          |
| Order: Tubificida                       | 0                          | 0                          | 0                          |
| Family: Lumbricidae                     | 0                          | 0                          | 0                          |
| •                                       |                            |                            |                            |
| Phylum: Nemata                          | 1                          | 0                          | 0                          |
| Phylum: Platyhelminthes                 | 0                          | 0                          | 0                          |
| Class: Turbellaria                      | 0                          | 0                          | 1                          |
| Totals:                                 | 2                          | 1                          | 2                          |
|   |                            |                            |                            |



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| 250-494-7553                                  |                           |                           |                           |  |
|---|---------------------------|---------------------------|---------------------------|--|
| Site:   | 2022                      | 2022                      | 2022                      |  |
| Sample:                                       | LC_FRB_BIC-1_2022-09-10_N | LC_FRB_BIC-2_2022-09-10_N | LC_FRB_BIC-3_2022-09-10_N |  |
| Sample Collection Date:                       | 10-Sep-22                 | 10-Sep-22                 | 10-Sep-22                 |  |
| CC#:  | CC231057                  | CC231058                  | CC231059                  |  |
| Sieve Size:                                   | 400                       | 400                       | 400                       |  |
| Subsample %:                                  | 5                         | 5                         | 5                         |  |
| Phylum: Arthropoda                            | 0                         | 0                         | 0                         |  |
| Order: Collembola                             | 0                         | 0                         | 0                         |  |
|   |                           |                           |                           |  |
| Subphylum: Hexapoda                           | 0                         | 0                         | 0                         |  |
| Class: Insecta                                | 0                         | 0                         | 0                         |  |
| Order: Ephemeroptera                          | 0                         | 0                         | 0                         |  |
| Family: Ameletidae                            | 0                         | 0                         | 0                         |  |
| <u>Ameletus</u>                               | 1                         | 1                         | 1                         |  |
| Family: Baetidae                              | 2 ND                      | 15 ND                     | 10 ND                     |  |
| <u>Baetis</u>                                 | 1                         | 2                         | 1                         |  |
| <u>Baetis fuscatus gr.</u>                    | 0                         | 0                         | 0                         |  |
| <u>Baetis rhodani group</u>                   | 28                        | 23                        | 25                        |  |
| <u>Baetis bicaudatus</u>                      | 0                         | 0                         | 0                         |  |
| Family: Ephemerellidae                        | 13                        | 3                         | 0                         |  |
| <u>Drunella</u>                               | 0                         | 0                         | 0                         |  |
| <u>Drunella grandis group</u>                 | 1                         | 2                         | 3                         |  |
| <u>Drunella coloradensis</u>                  | 0                         | 0                         | 0                         |  |
| <u>Drunella doddsii</u>                       | 2                         | 0                         | 0                         |  |
| Family: Heptageniidae                         | 0                         | 5                         | 0                         |  |
| <u>Cinyqmula</u><br>-                         | 152                       | 94                        | 65                        |  |
| <u>Epeorus</u>                                | 12                        | 4                         | 2                         |  |
| Rhithrogena                                   | 6                         | 1                         | 1                         |  |
| Family: Siphlonuridae                         | 0                         | 0                         | 0                         |  |
| <u>Siphlonurus</u>                            | 0                         | 0                         | 0                         |  |
| L Oudou Placanter                             | 2                         | 0                         |                           |  |
| Order: Plecoptera                             | 0                         | 0                         | 0                         |  |
| Family: Capniidae                             | 23<br>0                   | 8 0                       | 5<br>0                    |  |
| <u>Mesocapnia</u><br>  Family: Chloroperlidae | 1                         | 0                         | 0                         |  |
| Haploperla                                    | 3                         | 0                         | 0                         |  |
| <u>нарюрена</u><br>Plumiperla                 | 0                         | 0                         | 0                         |  |
| <u>Sweltsa</u>                                | 1                         | 3                         | 0                         |  |
| <u>Swertsu</u><br>Utaperla                    | 0                         | 0                         | 0                         |  |
| Family: Leuctridae                            | 0                         | 0                         | 0                         |  |
| Paraleuctra                                   | 0                         | 0                         | 0                         |  |
| Family: Nemouridae                            | 0                         | 0                         | 0                         |  |
| Malenka                                       | 0                         | 0                         | 0                         |  |
| Visoka cataractae                             | 0                         | 0                         | 0                         |  |
| <u>Zapada</u>                                 | 16                        | 7 ND                      | 1                         |  |
| Zapada oregonensis group                      | 3                         | 4                         | 2                         |  |
| Zapada cinctipes                              | 2                         | 1                         | 2                         |  |
| Zapada columbiana                             | 0                         | 1                         | 0                         |  |
| Family: Peltoperlidae                         | 0                         | 0                         | 0                         |  |
| <u>Yoraperla</u>                              | 0                         | 0                         | 0                         |  |
| Family: Perlidae                              | 0                         | 0                         | 0                         |  |
| <u>Hesperoperla</u>                           | 0                         | 0                         | 0                         |  |
| Family: Perlodidae                            | 12                        | 4                         | 10                        |  |
| <u>Isoperla</u>                               | 2                         | 5                         | 7                         |  |
| <u>Kogotus</u>                                | 2                         | 2                         | 3                         |  |
| <u>Megarcys</u>                               | 2                         | 2                         | 2                         |  |
| <u>Setvena</u>                                | 0                         | 0                         | 0                         |  |
| Family: Taeniopterygidae                      | 16                        | 7                         | 2                         |  |
|   |                           |                           |                           |  |
| Order: Trichoptera                            | 0                         | 0                         | 0                         |  |
| Family: Brachycentridae                       | 0                         | 0                         | 0                         |  |
| Brachycentrus<br>Microscoma                   | 0                         | 0                         | 0                         |  |
| Micrasema                                     | 0                         | 0                         | 0                         |  |
| Family: Glossosomatidae                       | 1                         | 0                         | 0                         |  |
| Glossosoma                                    | 1                         | 0                         | 0                         |  |
| Family: Hydropsychidae                        | 1                         | 2 0                       | 1                         |  |
| <u>Parapsyche</u><br>Parapsyche elsis         | 0                         | 0                         | 1                         |  |
| Parapsyche elsis   Family: Leptoceridae       | 0                         | 0                         | 0                         |  |
| Family: Limnephilidae                         | 0                         | 0                         | 1                         |  |
| <u>Clostoeca disjuncta</u>                    | 0                         | 0                         | 0                         |  |
| <u> Dicosmoecus</u>                           | 0                         | 0                         | 0                         |  |
| <u>Ecclisomyia</u>                            | 0                         | 0                         | 0                         |  |
| Family: Rhyacophilidae                        | 0                         | 0                         | 0                         |  |
| Rhyacophila                                   | 0                         | 1                         | 1                         |  |
| Rhyacophila betteni group                     | 0                         | 1                         | 0                         |  |
| Rhyacophila brunnea/vemna group               | 5                         | 5                         | 1                         |  |
| Rhyacophila hyalinata group                   | 0                         | 0                         | 0                         |  |
| Rhyacophila vetina complex                    | 0                         | 0                         | 0                         |  |
| Rhyacophila vofixa group                      | 0                         | 0                         | 0                         |  |
| Rhyacophila atrata complex                    | 3                         | 1                         | 0                         |  |
| <u>Rhyacophila narvae</u>                     | 0                         | 0                         | 0                         |  |
| Family: Thremmatidae                          | 0                         | 0                         | 0                         |  |
| <u>Oligophlebodes</u>                         | 1                         | 0                         | 0                         |  |
| Family: Uenoidae                              | 0                         | 0                         | 0                         |  |
| <u>Neothremma</u>                             | 0                         | 0                         | 0                         |  |
|   |                           |                           |                           |  |
| Order: Coleoptera                             | 0                         | 0                         | 0                         |  |
| Family: Elmidae                               | 1 ND                      | 1 ND                      | 1 ND                      |  |
|   |                           |                           |                           |  |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553  |  |                                   |                                   |
|---|--|-----------------------------------|-----------------------------------|
| Site:<br>Sample:  |  | 2022<br>LC_FRB_BIC-2_2022-09-10_N | 2022<br>LC_FRB_BIC-3_2022-09-10_N |
| Sample Collection Date:   |  | 10-Sep-22                         | 10-Sep-22                         |
| CC#:<br>Sieve Size:   |  | CC231058<br>400                   | CC231059<br>400                   |
| Subsample %:  |  | 5                                 | 5                                 |
| <u>Heterlimnius</u><br>  Family: Staphylinidae                      | 3  | 3<br>0                            | 1<br>0                            |
| ганну. этарнуннцае  | U  | Ü                                 | U                                 |
| Order: Diptera  | 0  | 0                                 | 0                                 |
| Family: Ceratopogonidae<br><u>Mallochohelea</u>                     | 0  | 0<br>0                            | 0<br>0                            |
| Family: Chironomidae  | 18 ND  | 15 ND                             | 17 ND                             |
| Subfamily: Chironominae   | 0  | 0                                 | 0                                 |
| Tribe: Tanytarsini<br>Micropsectra                                  | 0<br>2   | 0<br>0                            | 0<br>2                            |
| <u>Stempellinella</u>   | 0  | 0                                 | 1                                 |
| Subfamily: Diamesinae   | 0  | 0                                 | 0                                 |
| Tribe: Diamesini Diamesa  | 0<br>2   | 0<br>5                            | 0<br>7                            |
| Pagastia  | 3  | 4                                 | 4                                 |
| <u>Pseudodiamesa</u><br>  Subfamily: Orthocladiinae                 | 0  | 0<br>1                            | 0                                 |
| Brillia   | 0  | 1 ND<br>0                         | 0<br>0                            |
| <u>Corynoneura</u>  | 0  | 0                                 | 0                                 |
| <u>Cricotopus (Nostococladius)</u><br><u>Diplocladius cultriger</u> | 0  | 0                                 | 0<br>0                            |
| <u>Diploctaalus Cultriger</u><br><u>Eukiefferiella</u>              | 2  | 1<br>7                            | 14                                |
| <u>Hydrobaenus</u>  | 1  | 0                                 | 0                                 |
| <u>Limnophyes</u><br>Metriocnemus                                   | 0  | 0<br>0                            | 0<br>0                            |
| <u>Orthocladius complex</u>   | 57   | 145                               | 144                               |
| <u>Parametriocnemus</u>   | 0  | 0                                 | 0                                 |
| <u>Parorthocladius</u><br><u>Rheocricotopus</u>                     | 0  | 1<br>1                            | 1<br>0                            |
| <u>Tvetenia</u>   | 10   | 8                                 | 2                                 |
| Subfamily: Tanypodinae  | 0  | 0                                 | 0                                 |
| <u>Krenopelopia</u><br>  Tribe: Pentaneurini                        | 0  | 0<br>0                            | 0<br>0                            |
| <u>Telmatopelopia</u>   | 0  | 0                                 | 2                                 |
| Thienemannimyia group   | 1<br>0   | 0                                 | 0                                 |
| Family: Empididae<br><u>Chelifera/ Metachela</u>                    | 0  | 0<br>0                            | 0                                 |
| Clinocerinae Unknown Genus A  | 0  | 0                                 | 0                                 |
| <u>Neoplasta</u><br><u>Oreogeton</u>                                | 1  | 0<br>0                            | 0                                 |
| <u>Trichoclinocera</u>  | 0  | 0                                 | 0                                 |
| Family: Pelecorhynchidae  | 0  | 0                                 | 0                                 |
| <u>Glutops</u><br>  Family: Psychodidae                             | 0<br>0   | 0<br>0                            | 0                                 |
| Pericoma/Telmatoscopus  | 85   | 30                                | 37                                |
| Family: Simuliidae  | 2  | 0                                 | 0                                 |
| <u>Prosimulium</u><br><u>Prosimulium/Helodon</u>                    | 0  | 0<br>0                            | 0                                 |
| <u>Simulium</u>   | 1  | 6                                 | 4                                 |
| Family: Tipulidae<br><u>Antocha</u>                                 | 0  | 0<br>0                            | 0                                 |
| <u>Dicranota</u>  | 0  | 0                                 | 0                                 |
| Molophilus  | 0  | 0                                 | 0                                 |
| <u>Pedicia</u><br><u>Tricyphona</u>                                 | 0  | 0<br>0                            | 0                                 |
|   |  |                                   |                                   |
| Subphylum: Chelicerata<br>  Class: Arachnida                        | 0  | 0<br>0                            | 0                                 |
| Order: Trombidiformes   | 0  | 0                                 | 0                                 |
| Family: Feltriidae  | 0  | 0                                 | 0                                 |
| <u>Feltria</u><br>  Family: Hydryphantidae                          | 0  | 0<br>0                            | 0<br>0                            |
| <u>Albertathyas</u>   | 0  | 0                                 | 0                                 |
| Family: Hygrobatidae Atractides                                     | 0  | 0<br>0                            | 0                                 |
| <u>Atractiaes</u><br><u>Hygrobates</u>                              | 0  | 0<br>1                            | 0                                 |
| Family: Lebertiidae   | 0  | 0                                 | 0                                 |
| <u>Lebertia</u><br>  Family: Sperchontidae                          | 3<br>0   | 5<br>0                            | 2                                 |
| <u>Sperchon</u>   | 1  | 1                                 | 0                                 |
| Family: Torrenticolidae   | 0  | 0                                 | 0                                 |
| <u>Testudacarus</u>   | 0  | 0                                 | 0                                 |
| Order: Sarcoptiformes   | 0  | 0                                 | 0                                 |
| Order: Oribatida<br>  Family: Hydrozetidae                          | 0  | 0<br>0                            | 1 0                               |
| i i diiniy. Hydrozeddae   | , and the second | Ü                                 | <u> </u>                          |
| Phylum: Mollusca  | 0  | 0                                 | 0                                 |
| Class: Gastropoda   | 0  | 0                                 | 0                                 |
| Phylum: Annelida  | 0  | 0                                 | 0                                 |
| Subphylum: Clitellata   | 0  | 0                                 | 0                                 |
| Class: Oligochaeta<br>  Order: Lumbriculida                         | 0  | 0<br>0                            | 0<br>0                            |
| Family: Lumbriculidae   | 0  | 0                                 | 0                                 |
| <u>Rhynchelmis</u>  | 0  | 0                                 | 0                                 |
| Order: Tubificida   | 0  | 0                                 | 0                                 |
|   |  |                                   |                                   |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

 $\underline{scottfinlayson@cordilleraconsulting.ca}$ 

| Class: Turbellaria

Totals:

|  | 94- |  |
|--|-----|--|
|  |     |  |

| 250-494-7553                            |                           |                           |                           |
|---|---------------------------|---------------------------|---------------------------|
| Site:                                   | 2022                      | 2022                      | 2022                      |
| Sample:                                 | LC_FRB_BIC-1_2022-09-10_N | LC_FRB_BIC-2_2022-09-10_N | LC_FRB_BIC-3_2022-09-10_N |
| Sample Collection Date:                 | 10-Sep-22                 | 10-Sep-22                 | 10-Sep-22                 |
| CC#:                                    | CC231057                  | CC231058                  | CC231059                  |
| Sieve Size:                             | 400                       | 400                       | 400                       |
| Subsample %:                            | 5                         | 5                         | 5                         |
| Family: Enchytraeidae                   | 0                         | 0                         | 0                         |
| Family: Naididae                        | 0                         | 0                         | 0                         |
| <u>Nais</u>                             | 2                         | 3                         | 5                         |
| <u>Stylaria lacustris</u>               | 0                         | 0                         | 0                         |
| Subfamily: Tubificinae with hair chaeta | 0                         | 0                         | 0                         |
| Totals:                                 | 515                       | 443                       | 392                       |
| Taxa present but not included:          |                           |                           |                           |
| Phylum: Arthropoda                      | 0                         | 0                         | 0                         |
| Subphylum: Hexapoda                     | 0                         | 0                         | 0                         |
| Class: Insecta                          | 0                         | 0                         | 0                         |
| Order: Diptera                          | 0                         | 0                         | 0                         |
| Family: Cecidomyiidae                   | 0                         | 0                         | 0                         |
| ,                                       | •                         | •                         | •                         |
| Order: Homoptera                        | 0                         | 0                         | 0                         |
| Family: Cicadellidae                    | 0                         | 0                         | 0                         |
|   |                           |                           |                           |
| Order: Psocodea                         | 0                         | 0                         | 0                         |
|   |                           |                           |                           |
| Subphylum: Crustacea                    | 0                         | 0                         | 0                         |
| Class: Ostracoda                        | 1                         | 1                         | 1                         |
| Phylum: Annelida                        | 0                         | 0                         | 0                         |
| Subphylum: Clitellata                   | 0                         | 0                         | 0                         |
| Class: Oligochaeta                      | 0                         | 0                         | 0                         |
| Order: Tubificida                       | 0                         | 0                         | 0                         |
| Family: Lumbricidae                     | 0                         | 0                         | 0                         |
| i . amily. Europhologic                 |                           | Ü                         |                           |
| Phylum: Nemata                          | 0                         | 0                         | 0                         |
| Phylum: Platyhelminthes                 | 0                         | 0                         | 0                         |
| l Class: Turbollaria                    | 1                         | 1                         | 1                         |



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

| 250-494-7553  |              |                |              |                |             |                 |
|---|--------------|----------------|--------------|----------------|-------------|-----------------|
| Site:   | 2            | .022           | 2            | 2022           | 2           | 2022            |
| Sample:   | LC_FRUS_BIC- | 1_2022-09-10_N | LC_FRUS_BIC- | 2_2022-09-10_N | LC_FRUS_BIC | -3_2022-09-10_N |
| Sample Collection Date:                                       | 10-9         | Sep-22         | 10-9         | Sep-22         | 10-         | Sep-22          |
| CC#:  |              | 31060          | CC2          | 231061         | CC          | 231062          |
| Sieve Size:   | 4            | 400            | 4            | 400            |             | 400             |
| Subsample %:  |              | 7              |              | 10             |             | 14              |
| Phylum: Arthropoda  | 0            |                | 0            |                | 0           |                 |
| Order: Collembola   | 0            |                | 0            |                | 0           |                 |
|   |              |                |              |                |             |                 |
| Subphylum: Hexapoda   | 0            |                | 0            |                | 0           |                 |
| Class: Insecta  | 0            |                | 0            |                | 0           |                 |
| Order: Ephemeroptera  | 1            | ND             | 0            |                | 0           |                 |
| Family: Ameletidae  | 0            |                | 0            |                | 0           |                 |
| <u>Ameletus</u>   | 0            |                | 0            |                | 42          |                 |
| Family: Baetidae  | 6            | ND             | 1            | ND             | 1           | ND              |
| <u>Baetis</u>   | 1            |                | 1            |                | 2           | ND              |
| <u>Baetis fuscatus gr.</u>                                    | 0            |                | 0            |                | 1           |                 |
| <u>Baetis rhodani group</u>                                   | 31           |                | 14           |                | 5           |                 |
| <u>Baetis bicaudatus</u>                                      | 0            |                | 0            |                | 0           |                 |
| Family: Ephemerellidae  | 6            |                | 14           |                | 1           |                 |
| <u>Drunella</u>   | 0            |                | 0            |                | 0           |                 |
| <u>Drunella grandis group</u><br><u>Drunella coloradensis</u> | 1<br>0       |                | 0<br>1       |                | 2           |                 |
| <u>Drunella doddsii</u>                                       | 1            |                | 2            |                | 0           |                 |
| Family: Heptageniidae   | 3            |                | 4            | ND             | 9           |                 |
| <u>Cinyamula</u>  | 97           |                | 132          | ND             | 124         |                 |
| Epeorus   | 0            |                | 1            |                | 0           |                 |
| Rhithrogena   | 0            |                | 0            |                | 0           |                 |
| Family: Siphlonuridae   | 0            |                | 0            |                | 0           |                 |
| <u>Siphlonurus</u>  | 0            |                | 0            |                | 1           |                 |
| <u></u>   |              |                |              |                |             |                 |
| Order: Plecoptera   | 0            |                | 0            |                | 0           |                 |
| Family: Capniidae   | 1            |                | 1            |                | 3           |                 |
| <u>Mesocapnia</u>   | 0            |                | 0            |                | 1           |                 |
| Family: Chloroperlidae  | 3            |                | 4            |                | 0           |                 |
| <u>Haploperla</u>   | 0            |                | 1            |                | 0           |                 |
| <u>Plumiperla</u>   | 0            |                | 0            |                | 0           |                 |
| <u>Sweltsa</u>  | 0            |                | 3            |                | 0           |                 |
| <u>Utaperla</u>   | 0            |                | 0            |                | 0           |                 |
| Family: Leuctridae  | 0            |                | 0            |                | 0           |                 |
| <u>Paraleuctra</u>  | 0            |                | 0            |                | 0           |                 |
| Family: Nemouridae  | 0            |                | 0            |                | 0           |                 |
| <u>Malenka</u>  | 0            |                | 0            |                | 0           |                 |
| <u>Visoka cataractae</u>                                      | 0            |                | 0            |                | 0           |                 |
| <u>Zapada</u>   | 5            | ND             | 3            |                | 0           |                 |
| Zapada oregonensis group                                      | 10           |                | 3            |                | 12          |                 |
| Zapada cinctipes  | 3            |                | 0            |                | 0           |                 |
| Zapada columbiana   | 1<br>0       |                | 0            |                | 0           |                 |
| Family: Peltoperlidae   | 0            |                | 0            |                | 0           |                 |
| <u>Yoraperla</u><br>  Family: Perlidae                        | 0            |                | 0            |                | 3           |                 |
| Hesperoperla  | 1            |                | 0            |                | 1           |                 |
| Family: Perlodidae  | 20           |                | 7            |                | 24          |                 |
| Isoperla  | 27           |                | 19           |                | 36          |                 |
| <u>Kogotus</u>  | 10           |                | 8            |                | 14          |                 |
| Megarcys  | 4            |                | 5            |                | 1           |                 |
| <u>Setvena</u>  | 0            |                | 0            |                | 0           |                 |
| Family: Taeniopterygidae                                      | 4            |                | 14           |                | 0           |                 |
| ***   |              |                |              |                |             |                 |
| Order: Trichoptera  | 0            |                | 1            | ND             | 0           |                 |
| Family: Brachycentridae                                       | 0            |                | 0            |                | 0           |                 |
| <u>Brachycentrus</u>  | 1            |                | 0            |                | 0           |                 |
| <u>Micrasema</u>  | 3            |                | 0            |                | 0           |                 |
| Family: Glossosomatidae                                       | 0            |                | 0            |                | 0           |                 |
| <u>Glossosoma</u>   | 0            |                | 0            |                | 0           |                 |
| Family: Hydropsychidae  | 5            |                | 5            |                | 1           |                 |
| <u>Parapsyche</u>   | 1            | ND             | 0            |                | 0           |                 |
| Parapsyche elsis  | 2            |                | 0            |                | 1           |                 |
| Family: Leptoceridae  | 0            |                | 0            |                | 0           |                 |
| Family: Limnephilidae   | 0            |                | 0            |                | 0           |                 |
| Clostoeca disjuncta   | 0            |                | 0            |                | 0           |                 |
| <u>Dicosmoecus</u><br>Ecclisomyia                             | 0<br>0       |                | 0            |                | 0           |                 |
| Family: Rhyacophilidae  | 0            |                | 0            |                | 0           |                 |
| Rhyacophila   | 1            | ND             | 3            |                | 0           |                 |
| <u>knyacopnila</u><br><u>Rhyacophila betteni group</u>        | 0            | IND            | 2            |                | 0           |                 |
| Rhyacophila betteni group Rhyacophila brunnea/vemna group     | 6            |                | 3            |                | 3           |                 |
| Rhyacophila hyalinata group                                   | 0            |                | 1            |                | 0           |                 |
| Rhyacophila vetina complex                                    | 0            |                | 0            |                | 0           |                 |
| Rhyacophila vofixa group                                      | 0            |                | 0            |                | 0           |                 |
| Rhyacophila atrata complex                                    | 1            |                | 4            |                | 0           |                 |
| Rhyacophila narvae  | 1            |                | 9            |                | 2           |                 |
| Family: Thremmatidae  | 0            |                | 0            |                | 0           |                 |
| Oligophlebodes  | 0            |                | 0            |                | 0           |                 |
| Family: Uenoidae  | 0            |                | 0            |                | 0           |                 |
| <u>Neothremma</u>   | 0            |                | 0            |                | 0           |                 |
|   |              |                |              |                |             |                 |
| Order: Coleoptera   | 0            |                | 0            |                | 0           |                 |
| Family: Elmidae   | 0            |                | 0            |                | 0           |                 |
|   |              |                |              |                |             |                 |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                  |                            |                            |                            |
|-------------------------------|----------------------------|----------------------------|----------------------------|
| Site:                         | 2022                       | 2022                       | 2022                       |
| Sample:                       | LC_FRUS_BIC-1_2022-09-10_N | LC_FRUS_BIC-2_2022-09-10_N | LC_FRUS_BIC-3_2022-09-10_N |
| Sample Collection Date:       | 10-Sep-22                  | 10-Sep-22                  | 10-Sep-22                  |
| CC#:                          | CC231060                   | CC231061                   | CC231062                   |
| Sieve Size:                   | 400                        | 400                        | 400                        |
|                               |                            |                            |                            |
| Subsample %:                  | 7                          | 10                         | 14                         |
| <u>Heterlimnius</u>           | 11                         | 23                         | 4                          |
| Family: Staphylinidae         | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Order: Diptera                | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Ceratopogonidae       | 0                          | 0                          | 0                          |
| <u>Mallochohelea</u>          | 1                          | 1                          | 0                          |
| Family: Chironomidae          | 9 ND                       | 4 ND                       | 5 ND                       |
|                               | 0                          | 0                          | 0                          |
| Subfamily: Chironominae       |                            |                            |                            |
| Tribe: Tanytarsini            | 0                          | 0                          | 0                          |
| <u>Micropsectra</u>           | 0                          | 1                          | 0                          |
| <u>Stempellinella</u>         | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Subfamily: Diamesinae         | 0                          | 0                          | 0                          |
| Tribe: Diamesini              | 0                          | 0                          | 0                          |
| Diamesa                       | 7                          | 0                          | 0                          |
| Pagastia                      | 0                          | 0                          | 2                          |
| <u> </u>                      |                            |                            |                            |
| <u>Pseudodiamesa</u>          | 0                          | 0                          | 0                          |
| Subfamily: Orthocladiinae     | 0                          | 0                          | 0                          |
| <u>Brillia</u>                | 0                          | 0                          | 0                          |
| Corynoneura                   | 0                          | 0                          | 0                          |
| Cricotopus (Nostococladius)   | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| <u>Diplocladius cultriger</u> | 0                          | 0                          | 0                          |
| <u>Eukiefferiella</u>         | 5                          | 0                          | 0                          |
| <u>Hydrobaenus</u>            | 0                          | 0                          | 5                          |
| <u>Limnophyes</u>             | 0                          | 1                          | 0                          |
|                               |                            |                            |                            |
| <u>Metriocnemus</u>           | 0                          | 0                          | 0                          |
| <u>Orthocladius complex</u>   | 46                         | 7                          | 10                         |
| <u>Parametriocnemus</u>       | 0                          | 0                          | 0                          |
| <u>Parorthocladius</u>        | 0                          | 0                          | 1                          |
|                               |                            |                            |                            |
| <u>Rheocricotopus</u>         | 0                          | 0                          | 2                          |
| <u>Tvetenia</u>               | 0                          | 1                          | 5                          |
| Subfamily: Tanypodinae        | 0                          | 0                          | 0                          |
|                               | 0                          | 0                          | 0                          |
| <u>Krenopelopia</u>           |                            |                            |                            |
| Tribe: Pentaneurini           | 0                          | 0                          | 0                          |
| <u>Telmatopelopia</u>         | 0                          | 0                          | 0                          |
| Thienemannimyia group         | 0                          | 0                          | 0                          |
| Family: Empididae             |                            |                            |                            |
|                               | 0                          | 1                          | 0                          |
| <u>Chelifera/ Metachela</u>   | 1                          | 2                          | 1                          |
| Clinocerinae Unknown Genus A  | 0                          | 0                          | 0                          |
| Neoplasta                     | 3                          | 6                          | 8                          |
|                               |                            |                            |                            |
| <u>Oreogeton</u>              | 0                          | 0                          | 0                          |
| <u>Trichoclinocera</u>        | 0                          | 0                          | 1                          |
| Family: Pelecorhynchidae      | 0                          | 0                          | 0                          |
| <u>Glutops</u>                | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Psychodidae           | 0                          | 0                          | 0                          |
| Pericoma/Telmatoscopus        | 4                          | 7                          | 4                          |
| Family: Simuliidae            | 0                          | 0                          | 0                          |
| <u>Prosimulium</u>            | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| <u>Prosimulium/Helodon</u>    | 0                          | 0                          | 0                          |
| <u>Simulium</u>               | 6                          | 0                          | 0                          |
| Family: Tipulidae             | 0                          | 1 ND                       | 0                          |
| Antocha                       | 0                          | 0                          | 3                          |
|                               |                            |                            |                            |
| <u>Dicranota</u>              | 0                          | 1                          | 0                          |
| <u>Molophilus</u>             | 0                          | 0                          | 0                          |
| <u>Pedicia</u>                | 0                          | 0                          | 0                          |
| <u>Tricyphona</u>             | 0                          | 0                          | 0                          |
|                               | ~                          | · ·                        | Ĭ                          |
|                               | _                          |                            |                            |
| Subphylum: Chelicerata        | 0                          | 0                          | 0                          |
| Class: Arachnida              | 0                          | 0                          | 0                          |
| Order: Trombidiformes         | 0                          | 1 ND                       | 0                          |
| Family: Feltriidae            | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| <u>Feltria</u>                | 0                          | 0                          | 0                          |
| Family: Hydryphantidae        | 0                          | 0                          | 0                          |
| <u>Albertathyas</u>           | 0                          | 0                          | 0                          |
| Family: Hygrobatidae          | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| <u>Atractides</u>             | 0                          | 0                          | 0                          |
| <u>Hygrobates</u>             | 0                          | 0                          | 0                          |
| Family: Lebertiidae           | 0                          | 0                          | 0                          |
| <u>Lebertia</u>               | 2                          | 3                          | 5                          |
|                               |                            |                            |                            |
| Family: Sperchontidae         | 0                          | 0                          | 0                          |
| <u>Sperchon</u>               | 0                          | 0                          | 2                          |
| Family: Torrenticolidae       | 0                          | 0                          | 0                          |
| <u>Testudacarus</u>           | 1                          | 0                          | 0                          |
|                               | -                          | Ÿ                          | - V                        |
|                               |                            |                            | _                          |
| Order: Sarcoptiformes         | 0                          | 0                          | 0                          |
| Order: Oribatida              | 0                          | 0                          | 0                          |
| Family: Hydrozetidae          | 0                          | 0                          | 0                          |
| i ranniy. riyurozenude        | U                          | · ·                        | U                          |
|                               |                            |                            |                            |
| Phylum: Mollusca              | 0                          | 0                          | 0                          |
| Class: Gastropoda             | 0                          | 0                          | 0                          |
| , 5.55. 55. 0000              | •                          | · ·                        | Ŭ                          |
|                               |                            |                            | _                          |
| Phylum: Annelida              | 0                          | 0                          | 0                          |
| Subphylum: Clitellata         | 0                          | 0                          | 0                          |
| Class: Oligochaeta            | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Order: Lumbriculida           | 0                          | 0                          | 0                          |
| Family: Lumbriculidae         | 0                          | 0                          | 0                          |
| <u>Rhynchelmis</u>            | 0                          | 0                          | 0                          |
| <del></del>                   |                            |                            |                            |
| Oudou Tukifisida              | 0                          | 0                          | 0                          |
| Order: Tubificida             | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                            |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
| Site:                                   | 2022                       | 2022                       | 2022                       |
| Sample:                                 | LC_FRUS_BIC-1_2022-09-10_N | LC_FRUS_BIC-2_2022-09-10_N | LC_FRUS_BIC-3_2022-09-10_N |
| Sample Collection Date:                 | 10-Sep-22                  | 10-Sep-22                  | 10-Sep-22                  |
| CC#:                                    | CC231060                   | CC231061                   | CC231062                   |
| Sieve Size:                             | 400                        | 400                        | 400                        |
| Subsample %:                            | 7                          | 10                         | 14                         |
| Family: Enchytraeidae                   | 0                          | 0                          | 0                          |
| Family: Naididae                        | 0                          | 0                          | 0                          |
| <u>Nais</u>                             | 0                          | 3                          | 0                          |
| Stylaria lacustris                      | 0                          | 0                          | 0                          |
| Subfamily: Tubificinae with hair chaeta | 0                          | 0                          | 0                          |
| Totals:                                 | 353                        | 329                        | 348                        |
|   |                            |                            |                            |
| Taxa present but not included:          |                            |                            |                            |
| Phylum: Arthropoda                      | 0                          | 0                          | 0                          |
| Subphylum: Hexapoda                     | 0                          | 0                          | 0                          |
| Class: Insecta                          | 0                          | 0                          | 0                          |
| Order: Diptera                          | 0                          | 0                          | 0                          |
| Family: Cecidomyiidae                   | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Order: Homoptera                        | 0                          | 0                          | 0                          |
| Family: Cicadellidae                    | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Order: Psocodea                         | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Subphylum: Crustacea                    | 0                          | 0                          | 0                          |
| Class: Ostracoda                        | 1                          | 1                          | 1                          |
|   |                            |                            |                            |
| Phylum: Annelida                        | 0                          | 0                          | 0                          |
| Subphylum: Clitellata                   | 0                          | 0                          | 0                          |
| Class: Oligochaeta                      | 0                          | 0                          | 0                          |
| Order: Tubificida                       | 0                          | 0                          | 0                          |
| Family: Lumbricidae                     | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Phylum: Nemata                          | 1                          | 1                          | 1                          |
| Phylum: Platyhelminthes                 | 0                          | 0                          | 0                          |
| Class: Turbellaria                      | 1                          | 1                          | 1                          |
| Totals:                                 | 3                          | 3                          | 3                          |



# Project: 22-19 (LCO Dry LAEMP) Minnow Environmental (BC)

Taxonomist: Scott Finlayson scottfinlayson@cordilleraconsulting.ca

| 250-494-7553                             |             |                  |             |                  |               |                |
|--|-------------|------------------|-------------|------------------|---------------|----------------|
| Site:                                    |             | 2022             |             | 2022             | 20            | )22            |
| Sample:                                  | LC GRCK BIG | C-1_2022-09-14_N | LC GRCK BIG | C-2_2022-09-14_N | LC GRCK BIC-3 | 3_2022-09-14_N |
| Sample Collection Date:                  |             | -Sep-22          |             | -Sep-22          |               | <br>ep-22      |
| CC#:                                     |             | 231063           |             | 2231064          |               | 31065          |
| Sieve Size:                              |             | 400              | CC          | 400              |               | 00             |
|  |             |                  |             |                  |               |                |
| Subsample %:                             |             | 14               | _           | 50               |               | .2             |
| Phylum: Arthropoda                       | 0           |                  | 0           |                  | 0             |                |
| Order: Collembola                        | 0           |                  | 0           |                  | 0             |                |
|  |             |                  |             |                  |               |                |
| Subphylum: Hexapoda                      | 0           |                  | 0           |                  | 0             |                |
| Class: Insecta                           | 0           |                  | 0           |                  | 0             |                |
| Order: Ephemeroptera                     | 0           |                  | 0           |                  | 0             |                |
| Family: Ameletidae                       | 0           |                  | 0           |                  | 0             |                |
|  | 1           |                  | 8           |                  |               |                |
| Ameletus                                 |             | ND               |             | ND               | 1             | ND             |
| Family: Baetidae                         | 23          | ND               | 4           | ND               | 9             | ND             |
| <u>Baetis</u>                            | 2           |                  | 1           |                  | 1             |                |
| <u>Baetis fuscatus gr.</u>               | 0           |                  | 0           |                  | 0             |                |
| <u>Baetis rhodani group</u>              | 7           |                  | 11          |                  | 6             |                |
| <u>Baetis bicaudatus</u>                 | 0           |                  | 0           |                  | 0             |                |
| Family: Ephemerellidae                   | 0           |                  | 2           |                  | 2             |                |
| <u>Drunella</u>                          | 0           |                  | 0           |                  | 0             |                |
| <u>Drunella grandis group</u>            | 0           |                  | 0           |                  | 0             |                |
| Drunella coloradensis                    | 0           |                  | 0           |                  | 0             |                |
| <u>Drunella doddsii</u>                  | 3           |                  | 7           |                  | 3             |                |
|  |             |                  |             |                  |               |                |
| Family: Heptageniidae                    | 2           |                  | 2           |                  | 0             |                |
| <u>Cinygmula</u><br>-                    | 17          |                  | 53          |                  | 20            |                |
| <u>Epeorus</u>                           | 51          |                  | 27          |                  | 47            |                |
| <u>Rhithrogena</u>                       | 12          |                  | 14          |                  | 11            |                |
| Family: Siphlonuridae                    | 0           |                  | 0           |                  | 0             |                |
| <u>Siphlonurus</u>                       | 0           |                  | 0           |                  | 0             |                |
|  |             |                  |             |                  |               |                |
| Order: Plecoptera                        | 1           | ND               | 0           |                  | 0             |                |
| Family: Capniidae                        | 11          |                  | 24          |                  | 13            |                |
| Mesocapnia                               | 0           |                  | 0           |                  | 0             |                |
| Family: Chloroperlidae                   | 1           |                  | 1           |                  | 0             |                |
|  |             |                  |             |                  |               |                |
| <u>Haploperla</u>                        | 0           |                  | 0           |                  | 0             |                |
| <u>Plumiperla</u>                        | 0           |                  | 0           |                  | 0             |                |
| <u>Sweltsa</u>                           | 3           |                  | 11          |                  | 11            |                |
| <u>Utaperla</u>                          | 0           |                  | 0           |                  | 0             |                |
| Family: Leuctridae                       | 1           |                  | 0           |                  | 0             |                |
| <u>Paraleuctra</u>                       | 0           |                  | 1           |                  | 2             |                |
| Family: Nemouridae                       | 3           | ND               | 1           | ND               | 3             | ND             |
| Malenka                                  | 0           |                  | 0           |                  | 0             |                |
| Visoka cataractae                        | 18          |                  | 56          |                  | 36            |                |
| <u>Zapada</u>                            | 5           |                  | 2           |                  | 7             |                |
| Zapada oregonensis group                 | 5           |                  | 10          |                  | 3             |                |
|  |             |                  |             |                  |               |                |
| Zapada cinctipes                         | 0           |                  | 0           |                  | 0             |                |
| Zapada columbiana                        | 49          |                  | 56          |                  | 39            |                |
| Family: Peltoperlidae                    | 0           |                  | 0           |                  | 0             |                |
| <u>Yoraperla</u>                         | 4           |                  | 9           |                  | 4             |                |
| Family: Perlidae                         | 0           |                  | 0           |                  | 0             |                |
| <u>Hesperoperla</u>                      | 0           |                  | 0           |                  | 0             |                |
| Family: Perlodidae                       | 6           |                  | 5           |                  | 9             |                |
| <u>Isoperla</u>                          | 0           |                  | 0           |                  | 0             |                |
| <u>Koqotus</u>                           | 0           |                  | 0           |                  | 0             |                |
| <u>Megarcys</u>                          | 0           |                  | 3           |                  | 2             |                |
| <u>Setvena</u>                           | 1           |                  | 5           |                  | 3             |                |
| Family: Taeniopterygidae                 | 7           |                  | 5           |                  | 9             |                |
| Faililly, Taelilopterygluae              | ,           |                  | 3           |                  | 9             |                |
| l Oudous Trible subsur                   | 2           |                  | 2           |                  | 0             |                |
| Order: Trichoptera                       | 0           |                  | 3           |                  | 0             |                |
| Family: Brachycentridae                  | 0           |                  | 0           |                  | 0             |                |
| <u>Brachycentrus</u>                     | 0           |                  | 0           |                  | 0             |                |
| <u>Micrasema</u>                         | 0           |                  | 0           |                  | 0             |                |
| Family: Glossosomatidae                  | 0           |                  | 0           |                  | 0             |                |
| <u>Glossosoma</u>                        | 0           |                  | 0           |                  | 0             |                |
| Family: Hydropsychidae                   | 12          |                  | 4           |                  | 3             |                |
| <u>Parapsyche</u>                        | 0           |                  | 0           |                  | 0             |                |
| Parapsyche elsis                         | 0           |                  | 0           |                  | 0             |                |
| Family: Leptoceridae                     | 0           |                  | 0           |                  | 0             |                |
| Family: Limnephilidae                    | 1           |                  | 2           |                  | 1             |                |
|  | 1           |                  | 0           |                  | 1             |                |
| Clostoeca disjuncta                      | 0           |                  |             |                  |               |                |
| <u>Dicosmoecus</u>                       | •           |                  | 0           |                  | 0             |                |
| Ecclisomyia                              | 0           |                  | 3           |                  | 0             |                |
| Family: Rhyacophilidae                   | 0           |                  | 0           |                  | 0             |                |
| <u>Rhyacophila</u>                       | 18          |                  | 11          |                  | 7             |                |
| Rhyacophila betteni group                | 0           |                  | 0           |                  | 1             |                |
| Rhyacophila brunnea/vemna group          | 6           |                  | 2           |                  | 1             |                |
| Rhyacophila hyalinata group              | 0           |                  | 0           |                  | 1             |                |
| Rhyacophila vetina complex               | 0           |                  | 0           |                  | 0             |                |
| Rhyacophila vofixa group                 | 2           |                  | 5           |                  | 6             |                |
| Rhyacophila atrata complex               | 0           |                  | 0           |                  | 0             |                |
| Rhyacophila narvae<br>Rhyacophila narvae | 12          |                  | 16          |                  | 9             |                |
|  |             |                  |             |                  |               |                |
| Family: Thremmatidae                     | 0           |                  | 0           |                  | 0             |                |
| <u>Oligophlebodes</u>                    | 0           |                  | 0           |                  | 0             |                |
| Family: Uenoidae                         | 0           |                  | 0           |                  | 0             |                |
| <u>Neothremma</u>                        | 11          |                  | 20          |                  | 22            |                |
|  |             |                  |             |                  |               |                |
| Order: Coleoptera                        | 0           |                  | 0           |                  | 0             |                |
| Family: Elmidae                          | 0           |                  | 0           |                  | 0             |                |
| •  |             |                  |             |                  |               |                |

Minnow Environmental (BC) Taxonomist: Scott Finlayson

| 250-494-7553                  | 2022                       | 22                         | 2017                       |
|-------------------------------|----------------------------|----------------------------|----------------------------|
| Site:                         |                            | 2022                       | 2022                       |
| Sample:                       | LC_GRCK_BIC-1_2022-09-14_N | LC_GRCK_BIC-2_2022-09-14_N | LC_GRCK_BIC-3_2022-09-14_N |
| Sample Collection Date:       |                            | 14-Sep-22                  | 14-Sep-22                  |
| CC#:                          |                            | CC231064                   | CC231065                   |
| Sieve Size:                   |                            | 400                        |                            |
|                               |                            |                            | 400                        |
| Subsample %:                  | 14                         | 50                         | 12                         |
| <u>Heterlimnius</u>           | 0                          | 0                          | 2                          |
| Family: Staphylinidae         | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Order: Diptera                | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Ceratopogonidae       | 0                          | 0                          | 0                          |
| <u>Mallochohelea</u>          | 0                          | 0                          | 0                          |
| Family: Chironomidae          | 1 ND                       | 7 ND                       | 4                          |
| Subfamily: Chironominae       | 0                          | 0                          | 0                          |
| Tribe: Tanytarsini            | 0                          | 0                          | 0                          |
|                               | 6                          | 0                          | 0                          |
| <u>Micropsectra</u>           |                            |                            |                            |
| <u>Stempellinella</u>         | 0                          | 0                          | 0                          |
| Subfamily: Diamesinae         | 0                          | 0                          | 0                          |
| Tribe: Diamesini              | 0                          | 0                          | 0                          |
| Diamesa                       | 0                          | 0                          | 0                          |
| Pagastia Pagastia             | 0                          | 1                          | 0                          |
|                               |                            |                            |                            |
| <u>Pseudodiamesa</u>          | 0                          | 1                          | 0                          |
| Subfamily: Orthocladiinae     | 0                          | 0                          | 0                          |
| <u>Brillia</u>                | 2                          | 2                          | 0                          |
| <u>Corynoneura</u>            | 0                          | 0                          | 0                          |
| Cricotopus (Nostococladius)   | 0                          | 0                          | 0                          |
|                               | 0                          | 0                          | 0                          |
| <u>Diplocladius cultriger</u> |                            |                            |                            |
| <u>Eukiefferiella</u>         | 0                          | 1                          | 0                          |
| <u>Hydrobaenus</u>            | 0                          | 0                          | 0                          |
| <u>Limnophyes</u>             | 0                          | 1                          | 0                          |
| <u>Metriocnemus</u>           | 0                          | 0                          | 0                          |
| <u>Orthocladius complex</u>   | 0                          | 0                          | 0                          |
|                               | 1                          | 1                          | 0                          |
| Parametriocnemus              |                            |                            |                            |
| <u>Parorthocladius</u>        | 0                          | 1                          | 0                          |
| Rheocricotopus                | 0                          | 0                          | 0                          |
| <u>Tvetenia</u>               | 0                          | 0                          | 0                          |
| Subfamily: Tanypodinae        | 0                          | 0                          | 0                          |
| <u>Krenopelopia</u>           | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Tribe: Pentaneurini           | 0                          | 0                          | 0                          |
| <u>Telmatopelopia</u>         | 0                          | 0                          | 0                          |
| <u>Thienemannimyia group</u>  | 0                          | 0                          | 0                          |
| Family: Empididae             | 0                          | 0                          | 0                          |
| <u>Chelifera/ Metachela</u>   | 1                          | 2                          | 1                          |
|                               |                            |                            |                            |
| Clinocerinae Unknown Genus A  | 0                          | 0                          | 0                          |
| <u>Neoplasta</u>              | 0                          | 1                          | 0                          |
| <u>Oreogeton</u>              | 0                          | 0                          | 0                          |
| <u>Trichoclinocera</u>        | 0                          | 0                          | 0                          |
| Family: Pelecorhynchidae      | 0                          | 0                          | 0                          |
| Glutops                       | 0                          | 1                          | 4                          |
|                               |                            |                            |                            |
| Family: Psychodidae           | 0                          | 0                          | 0                          |
| Pericoma/Telmatoscopus        | 2                          | 0                          | 1                          |
| Family: Simuliidae            | 0                          | 5                          | 2                          |
| <u>Prosimulium</u>            | 0                          | 0                          | 0                          |
| <u>Prosimulium/Helodon</u>    | 0                          | 0                          | 1                          |
| Simulium                      | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Tipulidae             | 0                          | 0                          | 0                          |
| <u>Antocha</u>                | 0                          | 0                          | 0                          |
| <u>Dicranota</u>              | 1                          | 0                          | 0                          |
| <u>Molophilus</u>             | 0                          | 0                          | 0                          |
| <u>Pedicia</u>                | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| <u>Tricyphona</u>             | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Subphylum: Chelicerata        | 0                          | 0                          | 0                          |
| Class: Arachnida              | 0                          | 0                          | 0                          |
| Order: Trombidiformes         | 0                          | 0                          | 0                          |
| Family: Feltriidae            | 0                          | 0                          | 0                          |
| Feltria                       | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Hydryphantidae        | 0                          | 0                          | 0                          |
| <u>Albertathyas</u>           | 0                          | 0                          | 0                          |
| Family: Hygrobatidae          | 0                          | 0                          | 0                          |
| <u>Atractides</u>             | 0                          | 3                          | 0                          |
| <u>Hygrobates</u>             | 0                          | 0                          | 0                          |
| Family: Lebertiidae           | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Lebertia                      | 0                          | 0                          | 0                          |
| Family: Sperchontidae         | 0                          | 0                          | 0                          |
| <u>Sperchon</u>               | 0                          | 0                          | 0                          |
| Family: Torrenticolidae       | 0                          | 0                          | 0                          |
| <u>Testudacarus</u>           | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Order: Sarcontiformes         | 0                          | 0                          | 0                          |
| Order: Sarcoptiformes         | 0                          | 0                          | 0                          |
| Order: Oribatida              | 0                          | 0                          | 0                          |
| Family: Hydrozetidae          | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Phylum: Mollusca              | 0                          | 0                          | 0                          |
| Class: Gastropoda             | 0                          | 0                          | 0                          |
| 1 class. Gasti opoda          | · ·                        | J                          | · ·                        |
| <b>81.1</b> 5 93              |                            |                            |                            |
| Phylum: Annelida              | 0                          | 0                          | 0                          |
| Subphylum: Clitellata         | 0                          | 0                          | 0                          |
| Class: Oligochaeta            | 0                          | 0                          | 0                          |
| Order: Lumbriculida           | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |
| Family: Lumbriculidae         | 0                          | 0                          | 0                          |
| <u>Rhynchelmis</u>            | 0                          | 0                          | 1                          |
|                               |                            |                            |                            |
| Order: Tubificida             | 0                          | 0                          | 0                          |
|                               |                            |                            |                            |

#### Project: 22-19 (LCO Dry LAEMP)

Minnow Environmental (BC) Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca 250-494-7553

Totals:

| 250-494-7553                            |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
| Site:                                   | 2022                       | 2022                       | 2022                       |
| Sample:                                 | LC_GRCK_BIC-1_2022-09-14_N | LC_GRCK_BIC-2_2022-09-14_N | LC_GRCK_BIC-3_2022-09-14_N |
| Sample Collection Date:                 | 14-Sep-22                  | 14-Sep-22                  | 14-Sep-22                  |
| CC#:                                    | CC231063                   | CC231064                   | CC231065                   |
| Sieve Size:                             | 400                        | 400                        | 400                        |
| Subsample %:                            | 14                         | 50                         | 12                         |
| Family: Enchytraeidae                   | 0                          | 0                          | 0                          |
| Family: Naididae                        | 0                          | 0                          | 0                          |
| <u>Nais</u>                             | 0                          | 0                          | 0                          |
| <u>Stylaria lacustris</u>               | 0                          | 0                          | 0                          |
| Subfamily: Tubificinae with hair chaeta | 0                          | 0                          | 18                         |
| Totals:                                 | 310                        | 411                        | 327                        |
| Taxa present but not included:          |                            |                            |                            |
| Phylum: Arthropoda                      | 0                          | 0                          | 0                          |
| Subphylum: Hexapoda                     | 0                          | 0                          | 0                          |
| Class: Insecta                          | 0                          | 0                          | 0                          |
| Order: Diptera                          | 0                          | 0                          | 0                          |
| Family: Cecidomyiidae                   | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Order: Homoptera                        | 0                          | 0                          | 0                          |
| Family: Cicadellidae                    | 0                          | 0                          | 0                          |
| Order: Psocodea                         | 0                          | 3                          | 0                          |
| Subphylum: Crustacea                    | 0                          | 0                          | 0                          |
| Class: Ostracoda                        | 0                          | 1                          | 0                          |
|   |                            |                            |                            |
| Phylum: Annelida                        | 0                          | 0                          | 0                          |
| Subphylum: Clitellata                   | 0                          | 0                          | 0                          |
| Class: Oligochaeta                      | 0                          | 0                          | 0                          |
| Order: Tubificida                       | 0                          | 0                          | 0                          |
| Family: Lumbricidae                     | 0                          | 0                          | 0                          |
|   |                            |                            |                            |
| Phylum: Nemata                          | 1                          | 1                          | 1                          |
| Phylum: Platyhelminthes                 | 0                          | 0                          | 0                          |
| Class: Turbellaria                      | 1                          | 1                          | 1                          |
| Totals:                                 | 2                          | 6                          | 2                          |

### Methods and QC Report 2022

Project ID: LCO Dry (22-19)

Client: Minnow Environmental



P: 250.494.7553

F: 250.494.7562

### Prepared by:

Cordillera Consulting Inc. Summerland, BC © 2022

### **Table of Contents**

| Sample Reception                             | 3  |
|--|----|
| Sample Sorting                               | 4  |
| Sorting Quality Control - Sorting Efficiency | 5  |
| Sorting Quality Control - Sub-Sampling QC    | 6  |
| Taxonomic Effort                             | 9  |
| Taxonomists                                  | 9  |
| Taxonomic QC                                 | 10 |
| Error Summary                                | 11 |
| Error Rationale                              | 11 |
| References                                   | 15 |
| Taxonomic Kevs                               | 15 |

#### **Sample Reception**

On September 26, 2022, Cordillera Consulting received 29 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 |
|----------------------------|----------|-----------|-------|-----------|
| LC_DC1_BIC-1_2022-09-12_N  | CC231037 | 9/12/2022 | 400μΜ | 1         |
| LC_DC1_BIC-2_2022-09-12_N  | CC231038 | 9/12/2022 | 400μΜ | 1         |
| LC_DC1_BIC-3_2022-09-12_N  | CC231039 | 9/12/2022 | 400μΜ | 1         |
| LC_DC2_BIC-1_2022-09-14_N  | CC231040 | 9/14/2022 | 400μΜ | 1         |
| LC_DC2_BIC-2_2022-09-14_N  | CC231041 | 9/14/2022 | 400μΜ | 1         |
| LC_DC2_BIC-3_2022-09-14_N  | CC231042 | 9/14/2022 | 400μΜ | 1         |
| LC_DC3_BIC-1_2022-09-13_N  | CC231043 | 9/13/2022 | 400μΜ | 1         |
| LC_DC3_BIC-2_2022-09-13_N  | CC231044 | 9/13/2022 | 400μΜ | 1         |
| LC_DC3_BIC-3_2022-09-13_N  | CC231045 | 9/13/2022 | 400μΜ | 1         |
| LC_DC4_BIC-1_2022-09-12_N  | CC231046 | 9/12/2022 | 400μΜ | 1         |
| LC_DC4_BIC-2_2022-09-12_N  | CC231047 | 9/12/2022 | 400μΜ | 1         |
| LC_DC4_BIC-3_2022-09-12_N  | CC231048 | 9/12/2022 | 400μΜ | 1         |
| LC_DCDS_BIC-1_2022-09-13_N | CC231049 | 9/13/2022 | 400μΜ | 1         |
| LC_DCDS_BIC-2_2022-09-13_N | CC231050 | 9/13/2022 | 400μM | 1         |
| LC_DCDS_BIC-3_2022-09-13_N | CC231051 | 9/13/2022 | 400μM | 1         |
| LC_DCDS_BIC-4_2022-09-13_N | CC231052 | 9/13/2022 | 400μM | 1         |
| LC_DCDS_BIC-5_2022-09-13_N | CC231053 | 9/13/2022 | 400μM | 1         |
| LC_DCEF_BIC-1_2022-09-13_N | CC231054 | 9/13/2022 | 400μM | 1         |
| LC_DCEF_BIC-2_2022-09-13_N | CC231055 | 9/13/2022 | 400μM | 1         |
| LC_DCEF_BIC-3_2022-09-13_N | CC231056 | 9/13/2022 | 400μM | 1         |
| LC_FRB_BIC-1_2022-09-10_N  | CC231057 | 9/10/2022 | 400μM | 1         |
| LC_FRB_BIC-2_2022-09-10_N  | CC231058 | 9/10/2022 | 400μM | 1         |
| LC_FRB_BIC-3_2022-09-10_N  | CC231059 | 9/10/2022 | 400μM | 1         |
| LC_FRUS_BIC-1_2022-09-10_N | CC231060 | 9/10/2022 | 400μM | 1         |
| LC_FRUS_BIC-2_2022-09-10_N | CC231061 | 9/10/2022 | 400μΜ | 1         |
| LC_FRUS_BIC-3_2022-09-10_N | CC231062 | 9/10/2022 | 400μΜ | 1         |
| LC_GRCK_BIC-1_2022-09-14_N | CC231063 | 9/14/2022 | 400μM | 1         |

| LC_GRCK_BIC-2_2022-09-14_N | CC231064 | 9/14/2022 | 400μΜ | 1 |
|----------------------------|----------|-----------|-------|---|
| LC_GRCK_BIC-3_2022-09-14_N | CC231065 | 9/14/2022 | 400μΜ | 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 300<sup>th</sup> 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 50<sup>th</sup> 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 |
| LC_DC1_BIC-1_2022-09-12_N | 12-Sep-22 | CC231037 | 5%                  | 617             |
| LC_DC1_BIC-2_2022-09-12_N | 12-Sep-22 | CC231038 | 10%                 | 339             |
| LC_DC1_BIC-3_2022-09-12_N | 12-Sep-22 | CC231039 | 5%                  | 513             |
| LC_DC2_BIC-1_2022-09-14_N | 14-Sep-22 | CC231040 | 14%                 | 329             |
| LC_DC2_BIC-2_2022-09-14_N | 14-Sep-22 | CC231041 | 15%                 | 335             |
| LC_DC2_BIC-3_2022-09-14_N | 14-Sep-22 | CC231042 | 8%                  | 335             |

| LC_DC3_BIC-1_2022-09-13_N  | 13-Sep-22 | CC231043 | 5%  | 622 |
|----------------------------|-----------|----------|-----|-----|
| LC_DC3_BIC-2_2022-09-13_N  | 13-Sep-22 | CC231044 | 8%  | 343 |
| LC_DC3_BIC-3_2022-09-13_N  | 13-Sep-22 | CC231045 | 5%  | 376 |
| LC_DC4_BIC-1_2022-09-12_N  | 12-Sep-22 | CC231046 | 7%  | 334 |
| LC_DC4_BIC-2_2022-09-12_N  | 12-Sep-22 | CC231047 | 5%  | 360 |
| LC_DC4_BIC-3_2022-09-12_N  | 12-Sep-22 | CC231048 | 13% | 385 |
| LC_DCDS_BIC-1_2022-09-13_N | 13-Sep-22 | CC231049 | 15% | 332 |
| LC_DCDS_BIC-2_2022-09-13_N | 13-Sep-22 | CC231050 | 8%  | 320 |
| LC_DCDS_BIC-3_2022-09-13_N | 13-Sep-22 | CC231051 | 16% | 319 |
| LC_DCDS_BIC-4_2022-09-13_N | 13-Sep-22 | CC231052 | 8%  | 346 |
| LC_DCDS_BIC-5_2022-09-13_N | 13-Sep-22 | CC231053 | 12% | 327 |
| LC_DCEF_BIC-1_2022-09-13_N | 13-Sep-22 | CC231054 | 12% | 334 |
| LC_DCEF_BIC-2_2022-09-13_N | 13-Sep-22 | CC231055 | 15% | 333 |
| LC_DCEF_BIC-3_2022-09-13_N | 13-Sep-22 | CC231056 | 12% | 342 |
| LC_FRB_BIC-1_2022-09-10_N  | 10-Sep-22 | CC231057 | 5%  | 515 |
| LC_FRB_BIC-2_2022-09-10_N  | 10-Sep-22 | CC231058 | 5%  | 443 |
| LC_FRB_BIC-3_2022-09-10_N  | 10-Sep-22 | CC231059 | 5%  | 392 |
| LC_FRUS_BIC-1_2022-09-10_N | 10-Sep-22 | CC231060 | 7%  | 353 |
| LC_FRUS_BIC-2_2022-09-10_N | 10-Sep-22 | CC231061 | 10% | 329 |
| LC_FRUS_BIC-3_2022-09-10_N | 10-Sep-22 | CC231062 | 14% | 348 |
| LC_GRCK_BIC-1_2022-09-14_N | 14-Sep-22 | CC231063 | 14% | 310 |
| LC_GRCK_BIC-2_2022-09-14_N | 14-Sep-22 | CC231064 | 50% | 411 |
| LC_GRCK_BIC-3_2022-09-14_N | 14-Sep-22 | CC231065 | 12% | 327 |

#### **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<br>Sample | Percent<br>Efficiency |
|--|---------|---|----------------------|-----------------------|
| Site - QC, Sample - QC3, CC# - CC231042, Psampled = 8%, Sieve size = 400 | ercent  |   |                      |                       |
| Chironomidae   |         | 1 |                      |                       |
|  |         | 3 |                      |                       |
| Lepidoptera  | Tatal.  |   | 225                  | 000/                  |
|  | Total:  | 4 | 335                  | 99%                   |
|  |         |   |                      |                       |
| Site - QC, Sample - QC2, CC# - CC231044, P                               | Parcant |   |                      |                       |
| sampled = 8%, Sieve size = 400   | ercent  |   |                      |                       |
| Plecoptera   |         | 3 |                      |                       |
| Chironomidae   |         | 3 |                      |                       |
| Cimonomidae  | Total:  | 6 | 343                  | 98%                   |
|  | iotai.  | 0 | 343                  | 30%                   |
|  |         |   |                      |                       |
| Site - QC, Sample - QC1, CC# - CC231062, P                               | ercent  |   |                      |                       |
| sampled = 14%, Sieve size = 400  | Crcciic |   |                      |                       |
| Chironomidae   |         | 1 |                      |                       |
| Heptageniidae  |         | 1 |                      |                       |
|  |         | 1 |                      |                       |
| Plecoptera   |         |   |                      | 222/                  |
|  | Total:  | 3 | 348                  | 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 subsamples 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 subsample 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               | on ID Organisms in Subsample |     |                        |     |     |     |     |     |     |     | So  | orter   |     | Precision       |        | Accuracy |     |     |     |     |    |      |      |               |       |        |       |
|--------|--------------------------|------------------------------|-----|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|---------|-----|-----------------|--------|----------|-----|-----|-----|-----|----|------|------|---------------|-------|--------|-------|
| CC#    | Sample Name              |                              | T   | Organisms in Subsample |     |     |     |     |     |     |     |     | By Time |     | Actual<br>Total | Percer | nt Range | Min | Max |     |     |    |      |      |               |       |        |       |
| CC#    | Sample Name              | 1                            | 2   | 3                      | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12      | 13  | 14              | 15     | 16       | 17  | 18  | 19  | 20  | Бу | Time |      | Percent Range |       | IVIIII | IVIUX |
| 230050 | LC_DCDS_BIC05_2022-05_NP | 349                          | 300 | 314                    | 300 | 301 | 317 | 302 | 300 | 308 | 290 | 290 | 308     | 301 | 302             | 314    | 298      | 333 | 328 | 327 | 330 | MP | 960  | 6212 | 0.00          | 16.91 | 0.84   | 12.36 |

#### **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<sup>1</sup>, SAFIT<sup>2</sup>, and PNAMP<sup>3</sup> 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 reenumeration 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:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ or\ ganisms\ counted\ in\ audit}*(100)$$

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.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x 100$$

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<br>index |
|--|-----------------|---------|------------|------------|--------------------------------------|
| Site - 2022, Sample - LC_DC1_BIC-2_2022-09-  |                 |         |            |            |                                      |
| 12_N, CC# - CC231038, Percent sampled = 10%, |                 |         |            |            |                                      |
| Sieve size = 400                             | 339             | 0.00    | 0          | 0.29498525 | 0.00294985                           |
| Site - 2022, Sample - LC_DC3_BIC-3_2022-09-  |                 |         |            |            |                                      |
| 13_N, CC# - CC231045, Percent sampled = 5%,  |                 |         |            |            |                                      |
| Sieve size = 400                             | 379             | 0.00    | 0.39735099 | 0.79155673 | 0.00397351                           |
| Site - 2022, Sample - LC_DCEF_BIC-3_2022-09- |                 |         |            |            |                                      |
| 13_N, CC# - CC231056, Percent sampled = 12%, |                 |         |            |            |                                      |
| Sieve size = 400                             | 341             | 0.00    | 0.14641288 | 1.4619883  | 0.01317716                           |

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

#### **Error Rationale**

| Site - 2022, Sample -<br>LC_DC1_BIC-2_2022-09-<br>12_N, CC# - CC231038,<br>Percent sampled = 10%,<br>Sieve size = 400 | Laboratory Count | QC Audit Count | Agreement | Misidentification | Questionable Taxonomic<br>Resolution | Enumeration | Insufficient Taxonomic<br>Resolution | Comments |
|---|------------------|----------------|-----------|-------------------|--------------------------------------|-------------|--------------------------------------|----------|
| Ameletus  | 1                | 1              |           |                   |                                      |             |                                      |          |
| Baetidae  | 5                | 5              |           |                   |                                      |             |                                      |          |

| Baetis                   | 2  | 2  |    |   |  |
|--------------------------|----|----|----|---|--|
| Baetis rhodani group     | 28 | 29 | No | Х |  |
| Chironomidae             | 13 | 13 |    |   |  |
| Cinygmula                | 27 | 27 |    |   |  |
| Diamesa                  | 9  | 9  |    |   |  |
| Drunella doddsii         | 12 | 12 |    |   |  |
| Empididae                | 1  | 1  |    |   |  |
| Enchytraeidae            | 1  | 1  |    |   |  |
| Ephemerellidae           | 15 | 15 |    |   |  |
| Eukiefferiella           | 4  | 4  |    |   |  |
| Heptageniidae            | 15 | 15 |    |   |  |
| Hydrobaenus              | 20 | 20 |    |   |  |
| Hydropsychidae           | 3  | 3  |    |   |  |
| Kogotus                  | 1  | 1  |    |   |  |
| Krenopelopia             | 1  | 1  |    |   |  |
| Limnephilidae            | 1  | 1  |    |   |  |
| Micropsectra             | 1  | 1  |    |   |  |
| Nemouridae               | 1  | 1  |    |   |  |
| Neoplasta                | 1  | 1  |    |   |  |
| Orthocladius complex     | 26 | 26 |    |   |  |
| Pagastia                 | 19 | 19 |    |   |  |
| Parapsyche elsis         | 1  | 1  |    |   |  |
| Parorthocladius          | 1  | 1  |    |   |  |
| Pericoma/Telmatoscopus   | 25 | 25 |    |   |  |
| Perlodidae               | 4  | 4  |    |   |  |
| Plecoptera               | 2  | 2  |    |   |  |
| Pseudodiamesa            | 1  | 1  |    |   |  |
| Rheocricotopus           | 5  | 5  |    |   |  |
| Rhyacophila              |    |    |    |   |  |
| brunnea/vemna group      | 1  | 1  |    |   |  |
| Rhyacophila hyalinata    |    |    |    |   |  |
| group                    | 1  | 1  |    |   |  |
| Rhyacophila narvae       | 1  | 1  |    |   |  |
| Taeniopterygidae         | 4  | 4  |    |   |  |
| Tanytarsini              | 2  | 2  |    |   |  |
| Trichoptera              | 12 | 11 | No | X |  |
| Tvetenia                 | 10 | 10 |    |   |  |
| Zapada                   | 11 | 11 |    |   |  |
| Zapada cinctipes         | 2  | 2  |    |   |  |
| Zapada columbiana        | 7  | 7  |    |   |  |
| Zapada oregonensis group | 42 | 42 |    |   |  |
|                          |    |    |    |   |  |

| Total:   | 339                | 339            |           |                   |                                      |             |                                      |          |
|--|--------------------|----------------|-----------|-------------------|--------------------------------------|-------------|--------------------------------------|----------|
| Totali   | 333                | 333            |           |                   | 0                                    | 2           | 0                                    |          |
| % Total Misidentification Rate   | misidentifications | x100           | 0.00      | Pass              |                                      |             |                                      |          |
| =  | total number       | =              |           |                   |                                      |             |                                      |          |
| Site - 2022, Sample -<br>LC_DC3_BIC-3_2022-09-<br>13_N, CC# - CC231045,<br>Percent sampled = 5%,<br>Sieve size = 400 | Laboratory Count   | QC Audit Count | Agreement | Misidentification | Questionable Taxonomic<br>Resolution | Enumeration | Insufficient Taxonomic<br>Resolution | Comments |
| Albertathyas   | 3                  | 3              |           |                   |                                      |             |                                      | <u> </u> |
| Brillia  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Capniidae  | 31                 | 32             | No        |                   |                                      | Χ           |                                      |          |
| Chironomidae   | 12                 | 12             |           |                   |                                      |             |                                      |          |
| Chloroperlidae   | 4                  | 4              |           |                   |                                      |             |                                      |          |
| Diamesa  | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Dicranota  | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Ephemerellidae   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Eukiefferiella   | 22                 | 22             |           |                   |                                      |             |                                      |          |
| Hydrobaenus  | 6                  | 6              |           |                   |                                      |             |                                      |          |
| Lebertia   | 4                  | 4              |           |                   |                                      |             |                                      |          |
| Limnephilidae  | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Limnophyes   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Malenka  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Megarcys   | 7                  | 7              |           |                   |                                      |             |                                      |          |
| Molophilus   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Nemouridae   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Oreogeton  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Oribatida  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Orthocladius complex   | 84                 | 84             |           |                   |                                      |             |                                      |          |
| Pagastia   | 28                 | 29             | No        |                   |                                      | Χ           |                                      |          |
| Parorthocladius  | 9                  | 9              |           |                   |                                      |             |                                      |          |
| Pericoma/Telmatoscopus   | 12                 | 12             |           |                   |                                      |             |                                      |          |
| Plumiperla   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Prosimulium  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Pseudodiamesa  | 33                 | 33             |           |                   |                                      |             |                                      |          |
| Rhyacophila  | 3                  | 3              |           |                   |                                      |             |                                      |          |
| Rhyacophila  |                    |                |           |                   |                                      |             |                                      |          |
| brunnea/vemna group  | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Rhyacophila vofixa group   | 1                  | 1              |           |                   |                                      |             |                                      |          |

| Sweltsa  | 1                  | 1              |           |                   |                                      |             |                                      |          |
|--|--------------------|----------------|-----------|-------------------|--------------------------------------|-------------|--------------------------------------|----------|
| Trichoclinocera  | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Tvetenia   | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Zapada   | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Zapada columbiana  | 72                 | 73             | No        |                   |                                      | Χ           |                                      |          |
| Zapada oregonensis group   | 11                 | 11             |           |                   |                                      |             |                                      |          |
| 1 0 0 1  |                    |                |           |                   |                                      |             |                                      |          |
|  |                    |                |           |                   |                                      |             |                                      |          |
| Total:   | 376                | 379            |           |                   |                                      |             |                                      |          |
|  |                    |                |           |                   | 0                                    | 3           | 0                                    |          |
| % Total Misidentification Rate   | misidentifications | x100           | 0.00      | Pass              |                                      |             |                                      |          |
| =  | total number       | =              |           |                   |                                      |             |                                      |          |
| Site - 2022, Sample -<br>LC_DCEF_BIC-3_2022-09-<br>13_N, CC# - CC231056,<br>Percent sampled = 12%,<br>Sieve size = 400 | Laboratory Count   | QC Audit Count | Agreement | Misidentification | Questionable Taxonomic<br>Resolution | Enumeration | Insufficient Taxonomic<br>Resolution | Comments |
| Ameletus   | 9                  | 9              |           |                   |                                      |             |                                      |          |
| Capniidae  | 6                  | 6              |           |                   |                                      |             |                                      |          |
| Chironomidae   | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Chloroperlidae   | 19                 | 18             | No        |                   |                                      | Χ           |                                      |          |
| Cinygmula  | 59                 | 55             | No        |                   |                                      | Χ           |                                      |          |
| Clostoeca disjuncta  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Diamesa  | 11                 | 11             |           |                   |                                      |             |                                      |          |
| Drunella doddsii   | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Epeorus  | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Ephemerellidae   | 37                 | 37             |           |                   |                                      |             |                                      |          |
| Eukiefferiella   | 6                  | 6              |           |                   |                                      |             |                                      |          |
| Heptageniidae  | 93                 | 97             | No        |                   |                                      | Χ           |                                      |          |
| Hydrozetidae   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Lebertia   | 3                  | 3              |           |                   |                                      |             |                                      |          |
| Leuctridae   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Limnephilidae  | 2                  | 2              |           |                   |                                      |             |                                      |          |
| Limnophyes   | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Megarcys   | 5                  | 5              |           |                   |                                      |             |                                      |          |
| Orthocladius complex   | 15                 | 15             |           |                   |                                      |             |                                      |          |
| Pagastia   | 4                  | 4              |           |                   |                                      |             |                                      |          |
| Parorthocladius  | 4                  | 4              |           |                   |                                      |             |                                      |          |
| Pedicia  | 1                  | 1              |           |                   |                                      |             |                                      |          |
| Perlodidae   | 4                  | 4              |           |                   |                                      |             |                                      |          |

| Rheocricotopus                 | 1                  | 1    |      |      |   |   |   |  |
|--------------------------------|--------------------|------|------|------|---|---|---|--|
| Rhithrogena                    | 2                  | 2    |      |      |   |   |   |  |
| Rhyacophila                    | 3                  | 3    |      |      |   |   |   |  |
| Rhyacophila betteni group      | 1                  | 1    |      |      |   |   |   |  |
| Rhyacophila                    |                    |      |      |      |   |   |   |  |
| brunnea/vemna group            | 1                  | 1    |      |      |   |   |   |  |
| Rhyacophila narvae             | 2                  | 2    |      |      |   |   |   |  |
| Sweltsa                        | 15                 | 15   |      |      |   |   |   |  |
| Trichoptera                    | 6                  | 6    |      |      |   |   |   |  |
| Trombidiformes                 | 1                  | 1    |      |      |   |   |   |  |
| Tvetenia                       | 6                  | 6    |      |      |   |   |   |  |
| Visoka cataractae              | 4                  | 4    |      |      |   |   |   |  |
| Yoraperla                      | 3                  | 3    |      |      |   |   |   |  |
| Zapada                         | 3                  | 3    |      |      |   |   |   |  |
|                                |                    |      |      |      |   |   |   |  |
|                                |                    |      |      |      |   |   |   |  |
| Total:                         | 342                | 341  |      |      |   |   |   |  |
|                                |                    |      |      |      | 0 | 3 | 0 |  |
| % Total Misidentification Rate | misidentifications | x100 | 0.00 | Pass |   |   |   |  |
| =                              | total number       | =    |      |      |   |   |   |  |

#### References

### **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).

http://www.safit.org/Docs/SAFIT\_Taxonomic\_Literature\_Database\_1\_March\_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North American Riffle Beetles (Coleoptera: Dryopidea: Elmidae). Entomological News 89 (1&2): 1-13

<sup>&</sup>lt;sup>1</sup> 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

<sup>&</sup>lt;sup>2</sup> Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

<sup>&</sup>lt;sup>3</sup> Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida. http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and Diagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera: Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera: Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman, R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly. 2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4<sup>th</sup>. Kendall/Hunt, Dubuque, IA

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu. 2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of larval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2<sup>nd</sup> ed. University of Toronto Press. Toronto Ontario.

### **BENTHIC TISSUE CHEMISTRY**

TrichAnalytics Laboratory Report 2022-334 (Finalized 26-May-22)



### Trich Analytics Inc.

### Tissue Microchemistry Analysis Report

Client: Mike Pope Date Received: 16 May 2022

Project Manager

Teck Coal Limited

Date of Analysis: 22 May 2022
Final Report Date: 26 May 2022

 Phone:
 (250) 425-8449
 Project No.:
 2022-334

 Email:
 mike.pope@teck.com; jessica.ritz@teck.com;
 Method No.:
 MET-002.06

teckcoal@eguisonline.com; aguascilab@teck.com; robin.valleau@minnow.com

Client Project: LCO\_LAEMP (PO 818999)

Analytical Request: Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 45 samples.

See chain of custody form provided for sample identification numbers.

#### Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg) Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.

Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.

RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 102% (ranging from 97-106%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

26 May 2022

[The analytical report shall not be reproduced except in full under the expressed written consent of TrichAnalytics Inc.]

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



Project No: 2022-334

|           |          |               | LC_FRB_INV-  | LC_FRB_INV-  | LC_FRB_INV-  | LC_FRB_INV-  | LC_FRB_INV-  |
|-----------|----------|---------------|--------------|--------------|--------------|--------------|--------------|
|           |          | Client ID     | 1_2022-05_NP | 2_2022-05_NP | 3_2022-05_NP | 4_2022-05_NP | 5_2022-05_NP |
|           |          | Lab ID        | 317          | 318          | 319          | 320          | 321          |
|           | We       | et Weight (g) | 0.2734       | 0.2554       | 0.5036       | 0.3749       | 0.2703       |
|           |          | y Weight (g)  | 0.0628       | 0.0588       | 0.1181       | 0.0733       | 0.0777       |
|           |          | Moisture (%)  | 77.0         | 77.0         | 76.5         | 80.4         | 71.3         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)        | (ppm)        | (ppm)        | (ppm)        | (ppm)        |
| 7Li       | 0.010    | 0.033         | 6.8          | 1.3          | 1.3          | 1.3          | 1.5          |
| 11B       | 0.067    | 0.223         | 11           | 2.4          | 2.4          | 2.9          | 4.2          |
| 23Na      | 2.6      | 8.7           | 3,651        | 3,101        | 3,575        | 2,958        | 3,246        |
| 24Mg      | 0.065    | 0.217         | 2,055        | 1,689        | 1,681        | 1,637        | 1,551        |
| 27Al      | 0.036    | 0.120         | 7,956        | 1,858        | 1,763        | 2,312        | 2,610        |
| 31P       | 67       | 223           | 11,849       | 12,441       | 12,719       | 11,040       | 10,674       |
| 39K       | 2.4      | 8.0           | 12,459       | 11,910       | 10,313       | 9,195        | 11,037       |
| 44Ca      | 7.6      | 25            | 3,373        | 3,500        | 4,083        | 3,539        | 3,627        |
| 49Ti      | 0.224    | 0.747         | 787          | 153          | 179          | 153          | 245          |
| 51V       | 0.035    | 0.117         | 23           | 3.7          | 4.3          | 4.9          | 7.4          |
| 52Cr      | 0.094    | 0.313         | 76           | 21           | 27           | 27           | 48           |
| 55Mn      | 0.006    | 0.020         | 127          | 62           | 80           | 86           | 59           |
| 57Fe      | 0.956    | 3.2           | 2,635        | 1,066        | 1,111        | 1,470        | 1,314        |
| 59Co      | 0.011    | 0.037         | 4.8          | 1.7          | 3.2          | 3.4          | 2.5          |
| 60Ni      | 0.001    | 0.003         | 162          | 37           | 41           | 48           | 61           |
| 63Cu      | 0.013    | 0.043         | 25           | 21           | 24           | 20           | 21           |
| 66Zn      | 0.242    | 0.807         | 289          | 262          | 373          | 290          | 228          |
| 75As      | 0.417    | 1.4           | 1.2          | 0.843        | 0.813        | 0.783        | 0.873        |
| 77Se      | 0.374    | 1.2           | 9.7          | 9.4          | 8.5          | 9.0          | 7.7          |
| 88Sr      | 0.001    | 0.003         | 16           | 6.9          | 5.9          | 5.8          | 8.0          |
| 95Mo      | 0.001    | 0.003         | 0.631        | 0.702        | 0.365        | 0.449        | 0.365        |
| 107Ag     | 0.001    | 0.003         | 0.168        | 0.165        | 0.199        | 0.151        | 0.151        |
| 111Cd     | 0.066    | 0.220         | 2.9          | 4.0          | 3.0          | 3.3          | 1.4          |
| 118Sn     | 0.037    | 0.123         | 0.456        | 0.782        | 0.571        | 0.274        | 0.281        |
| 121Sb     | 0.003    | 0.010         | 0.160        | 0.061        | 0.075        | 0.081        | 0.094        |
| 137Ba     | 0.001    | 0.003         | 152          | 57           | 60           | 61           | 78           |
| 202Hg     | 0.022    | 0.073         | 0.078        | 0.065        | 0.065        | 0.049        | 0.049        |
| 205Tl     | 0.001    | 0.003         | 0.129        | 0.041        | 0.051        | 0.060        | 0.063        |
| 208Pb     | 0.003    | 0.010         | 1.3          | 0.502        | 0.620        | 0.712        | 0.684        |
| 238U      | 0.001    | 0.003         | 0.257        | 0.088        | 0.086        | 0.125        | 0.134        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_FRUS_INV-<br>1_2022-05_NP | LC_FRUS_INV-<br>2_2022-05_NP | LC_FRUS_INV-<br>3_2022-05_NP | LC_FRUS_INV-<br>4_2022-05_NP | LC_FRUS_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|           |          | Lab ID        | 322                          | 323                          | 324                          | 325                          | 326                          |
|           | We       | et Weight (g) | 0.2878                       | 0.5570                       | 0.2929                       | 0.4102                       | 0.4014                       |
|           |          | y Weight (g)  | 0.0553                       | 0.1456                       | 0.0716                       | 0.1087                       | 0.1039                       |
|           |          | Moisture (%)  | 80.8                         | 73.9                         | 75.6                         | 73.5                         | 74.1                         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        |
| 7Li       | 0.010    | 0.033         | 2.2                          | 2.7                          | 2.4                          | 0.928                        | 1.4                          |
| 11B       | 0.067    | 0.223         | 5.5                          | 5.1                          | 4.5                          | 2.0                          | 2.7                          |
| 23Na      | 2.6      | 8.7           | 3,247                        | 3,178                        | 3,300                        | 2,845                        | 3,528                        |
| 24Mg      | 0.065    | 0.217         | 1,461                        | 2,144                        | 1,803                        | 1,746                        | 1,703                        |
| 27Al      | 0.036    | 0.120         | 4,031                        | 3,923                        | 4,048                        | 1,497                        | 2,554                        |
| 31P       | 67       | 223           | 10,946                       | 10,668                       | 11,367                       | 12,472                       | 11,908                       |
| 39K       | 2.4      | 8.0           | 10,275                       | 11,070                       | 12,267                       | 9,419                        | 11,183                       |
| 44Ca      | 7.6      | 25            | 4,399                        | 8,435                        | 4,742                        | 4,335                        | 3,245                        |
| 49Ti      | 0.224    | 0.747         | 269                          | 363                          | 338                          | 106                          | 194                          |
| 51V       | 0.035    | 0.117         | 8.6                          | 8.2                          | 9.4                          | 3.2                          | 5.0                          |
| 52Cr      | 0.094    | 0.313         | 25                           | 39                           | 51                           | 25                           | 30                           |
| 55Mn      | 0.006    | 0.020         | 60                           | 78                           | 74                           | 47                           | 49                           |
| 57Fe      | 0.956    | 3.2           | 2,193                        | 2,039                        | 2,891                        | 1,057                        | 1,629                        |
| 59Co      | 0.011    | 0.037         | 1.0                          | 3.1                          | 3.4                          | 2.1                          | 2.3                          |
| 60Ni      | 0.001    | 0.003         | 42                           | 56                           | 79                           | 37                           | 42                           |
| 63Cu      | 0.013    | 0.043         | 27                           | 19                           | 24                           | 24                           | 24                           |
| 66Zn      | 0.242    | 0.807         | 229                          | 176                          | 245                          | 285                          | 242                          |
| 75As      | 0.417    | 1.4           | 0.693                        | 0.964                        | 0.994                        | 0.663                        | 0.723                        |
| 77Se      | 0.374    | 1.2           | 9.2                          | 7.1                          | 10                           | 9.0                          | 11                           |
| 88Sr      | 0.001    | 0.003         | 7.4                          | 12                           | 9.5                          | 7.7                          | 6.8                          |
| 95Mo      | 0.001    | 0.003         | 0.730                        | 0.533                        | 0.561                        | 0.281                        | 0.477                        |
| 107Ag     | 0.001    | 0.003         | 0.206                        | 0.158                        | 0.165                        | 0.160                        | 0.165                        |
| 111Cd     | 0.066    | 0.220         | 1.1                          | 1.3                          | 3.9                          | 2.5                          | 4.0                          |
| 118Sn     | 0.037    | 0.123         | 0.998                        | 0.312                        | 0.690                        | 0.427                        | 0.886                        |
| 121Sb     | 0.003    | 0.010         | 0.091                        | 0.151                        | 0.097                        | 0.053                        | 0.074                        |
| 137Ba     | 0.001    | 0.003         | 80                           | 131                          | 112                          | 55                           | 75                           |
| 202Hg     | 0.022    | 0.073         | 0.072                        | 0.065                        | 0.068                        | 0.078                        | 0.065                        |
| 205Tl     | 0.001    | 0.003         | 0.064                        | 0.083                        | 0.078                        | 0.038                        | 0.046                        |
| 208Pb     | 0.003    | 0.010         | 1.2                          | 1.5                          | 1.1                          | 0.529                        | 0.614                        |
| 238U      | 0.001    | 0.003         | 0.128                        | 0.144                        | 0.173                        | 0.075                        | 0.101                        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC4_INV-<br>1_2022-05_NP | LC_DC4_INV-<br>2_2022-05_NP | LC_DC4_INV-<br>3_2022-05_NP | LC_DC4_INV-<br>4_2022-05_NP | LC_DC4_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|           |          | Lab ID        | 327                         | 328                         | 329                         | 330                         | 331                         |
|           | We       | et Weight (g) | 0.3353                      | 0.6203                      | 0.4071                      | 0.3858                      | 0.4998                      |
|           |          | y Weight (g)  | 0.0547                      | 0.1493                      | 0.0882                      | 0.0780                      | 0.1143                      |
|           |          | Moisture (%)  | 83.7                        | 75.9                        | 78.3                        | 79.8                        | 77.1                        |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       |
| 7Li       | 0.010    | 0.033         | 0.826                       | 0.664                       | 1.7                         | 0.941                       | 1.2                         |
| 11B       | 0.067    | 0.223         | 2.3                         | 1.3                         | 5.0                         | 2.8                         | 3.3                         |
| 23Na      | 2.6      | 8.7           | 3,693                       | 3,700                       | 4,118                       | 3,106                       | 3,003                       |
| 24Mg      | 0.065    | 0.217         | 1,753                       | 1,139                       | 1,685                       | 1,542                       | 1,889                       |
| 27Al      | 0.036    | 0.120         | 1,197                       | 796                         | 2,871                       | 1,914                       | 2,185                       |
| 31P       | 67       | 223           | 14,032                      | 13,564                      | 14,041                      | 12,343                      | 11,796                      |
| 39K       | 2.4      | 8.0           | 11,466                      | 11,646                      | 12,070                      | 10,449                      | 10,583                      |
| 44Ca      | 7.6      | 25            | 3,943                       | 2,422                       | 5,713                       | 4,015                       | 4,389                       |
| 49Ti      | 0.224    | 0.747         | 130                         | 56                          | 276                         | 166                         | 205                         |
| 51V       | 0.035    | 0.117         | 3.9                         | 3.7                         | 9.8                         | 8.0                         | 8.3                         |
| 52Cr      | 0.094    | 0.313         | 12                          | 21                          | 45                          | 34                          | 24                          |
| 55Mn      | 0.006    | 0.020         | 45                          | 59                          | 72                          | 67                          | 83                          |
| 57Fe      | 0.956    | 3.2           | 763                         | 735                         | 1,832                       | 1,607                       | 1,393                       |
| 59Co      | 0.011    | 0.037         | 0.761                       | 1.5                         | 1.4                         | 2.4                         | 2.0                         |
| 60Ni      | 0.001    | 0.003         | 25                          | 45                          | 80                          | 62                          | 46                          |
| 63Cu      | 0.013    | 0.043         | 15                          | 13                          | 18                          | 16                          | 17                          |
| 66Zn      | 0.242    | 0.807         | 200                         | 198                         | 246                         | 236                         | 224                         |
| 75As      | 0.417    | 1.4           | 1.5                         | 1.7                         | 2.0                         | 1.7                         | 1.8                         |
| 77Se      | 0.374    | 1.2           | 10                          | 9.9                         | 9.0                         | 8.6                         | 8.3                         |
| 88Sr      | 0.001    | 0.003         | 6.6                         | 3.6                         | 8.9                         | 6.9                         | 7.4                         |
| 95Mo      | 0.001    | 0.003         | 1.1                         | 0.856                       | 1.3                         | 0.898                       | 0.646                       |
| 107Ag     | 0.001    | 0.003         | 0.131                       | 0.103                       | 0.155                       | 0.137                       | 0.220                       |
| 111Cd     | 0.066    | 0.220         | 2.7                         | 1.2                         | 2.0                         | 3.8                         | 1.8                         |
| 118Sn     | 0.037    | 0.123         | 0.723                       | 0.323                       | 0.612                       | 0.479                       | 0.311                       |
| 121Sb     | 0.003    | 0.010         | 0.112                       | 0.077                       | 0.194                       | 0.157                       | 0.165                       |
| 137Ba     | 0.001    | 0.003         | 109                         | 114                         | 175                         | 168                         | 180                         |
| 202Hg     | 0.022    | 0.073         | 0.072                       | 0.059                       | 0.091                       | 0.065                       | 0.098                       |
| 205Tl     | 0.001    | 0.003         | 0.055                       | 0.032                       | 0.089                       | 0.078                       | 0.094                       |
| 208Pb     | 0.003    | 0.010         | 0.523                       | 0.386                       | 0.912                       | 0.881                       | 0.990                       |
| 238U      | 0.001    | 0.003         | 0.104                       | 0.080                       | 0.193                       | 0.162                       | 0.198                       |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC1_INV-<br>1_2022-05_NP | LC_DC1_INV-<br>2_2022-05_NP | LC_DC1_INV-<br>3_2022-05_NP | LC_DC1_INV-<br>4_2022-05_NP | LC_DC1_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|           |          | Lab ID        | 332                         | 333                         | 334                         | 335                         | 336                         |
|           | We       | et Weight (g) | 0.7797                      | 0.4728                      | 0.4700                      | 0.5640                      | 0.5795                      |
|           |          | y Weight (g)  | 0.1849                      | 0.0902                      | 0.1253                      | 0.1047                      | 0.1263                      |
|           |          | Moisture (%)  | 76.3                        | 80.9                        | 73.3                        | 81.4                        | 78.2                        |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       |
| 7Li       | 0.010    | 0.033         | 0.448                       | 0.733                       | 1.0                         | 0.853                       | 1.8                         |
| 11B       | 0.067    | 0.223         | 1.0                         | 2.1                         | 1.9                         | 2.1                         | 5.6                         |
| 23Na      | 2.6      | 8.7           | 2,714                       | 3,245                       | 4,253                       | 3,651                       | 3,310                       |
| 24Mg      | 0.065    | 0.217         | 1,364                       | 1,839                       | 1,526                       | 1,835                       | 1,532                       |
| 27Al      | 0.036    | 0.120         | 342                         | 1,432                       | 1,259                       | 1,464                       | 4,363                       |
| 31P       | 67       | 223           | 10,512                      | 13,965                      | 14,721                      | 13,000                      | 11,011                      |
| 39K       | 2.4      | 8.0           | 8,380                       | 11,722                      | 12,565                      | 11,501                      | 12,086                      |
| 44Ca      | 7.6      | 25            | 3,755                       | 3,067                       | 2,395                       | 3,319                       | 2,722                       |
| 49Ti      | 0.224    | 0.747         | 33                          | 67                          | 75                          | 87                          | 282                         |
| 51V       | 0.035    | 0.117         | 1.5                         | 4.2                         | 4.0                         | 4.2                         | 11                          |
| 52Cr      | 0.094    | 0.313         | 9.4                         | 16                          | 27                          | 18                          | 60                          |
| 55Mn      | 0.006    | 0.020         | 56                          | 63                          | 95                          | 67                          | 88                          |
| 57Fe      | 0.956    | 3.2           | 435                         | 856                         | 1,153                       | 972                         | 2,398                       |
| 59Co      | 0.011    | 0.037         | 0.952                       | 1.1                         | 2.0                         | 1.7                         | 2.3                         |
| 60Ni      | 0.001    | 0.003         | 25                          | 32                          | 63                          | 41                          | 87                          |
| 63Cu      | 0.013    | 0.043         | 11                          | 19                          | 16                          | 16                          | 13                          |
| 66Zn      | 0.242    | 0.807         | 184                         | 269                         | 316                         | 365                         | 193                         |
| 75As      | 0.417    | 1.4           | 0.964                       | 0.911                       | 1.2                         | 1.5                         | 1.6                         |
| 77Se      | 0.374    | 1.2           | 7.3                         | 14                          | 12                          | 9.6                         | 10                          |
| 88Sr      | 0.001    | 0.003         | 3.9                         | 6.4                         | 5.0                         | 5.4                         | 9.7                         |
| 95Mo      | 0.001    | 0.003         | 0.407                       | 0.638                       | 0.667                       | 0.580                       | 1.3                         |
| 107Ag     | 0.001    | 0.003         | 0.069                       | 0.132                       | 0.136                       | 0.129                       | 0.136                       |
| 111Cd     | 0.066    | 0.220         | 4.9                         | 2.5                         | 5.2                         | 9.8                         | 4.0                         |
| 118Sn     | 0.037    | 0.123         | 0.123                       | 0.553                       | 0.336                       | 1.1                         | 0.524                       |
| 121Sb     | 0.003    | 0.010         | 0.076                       | 0.116                       | 0.119                       | 0.110                       | 0.303                       |
| 137Ba     | 0.001    | 0.003         | 57                          | 123                         | 155                         | 110                         | 204                         |
| 202Hg     | 0.022    | 0.073         | 0.059                       | 0.071                       | 0.098                       | 0.102                       | 0.078                       |
| 205Tl     | 0.001    | 0.003         | 0.041                       | 0.061                       | 0.061                       | 0.075                       | 0.115                       |
| 208Pb     | 0.003    | 0.010         | 0.140                       | 0.408                       | 0.477                       | 0.444                       | 1.1                         |
| 238U      | 0.001    | 0.003         | 0.054                       | 0.095                       | 0.096                       | 0.112                       | 0.128                       |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_GRCK_INV-<br>1_2022-05_NP | LC_GRCK_INV-<br>2_2022-05_NP | LC_GRCK_INV-<br>3_2022-05_NP | LC_GRCK_INV-<br>4_2022-05_NP | LC_GRCK_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|           |          | Lab ID        | 337                          | 338                          | 339                          | 340                          | 341                          |
|           | We       | et Weight (g) | 0.5422                       | 0.5966                       | 0.5969                       | 0.4255                       | 0.4614                       |
|           |          | y Weight (g)  | 0.1177                       | 0.1229                       | 0.1240                       | 0.0768                       | 0.0906                       |
|           |          | Moisture (%)  | 78.3                         | 79.4                         | 79.2                         | 82.0                         | 80.4                         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        |
| 7Li       | 0.010    | 0.033         | 1.2                          | 1.0                          | 1.2                          | 1.5                          | 1.8                          |
| 11B       | 0.067    | 0.223         | 5.0                          | 4.7                          | 6.3                          | 4.3                          | 8.7                          |
| 23Na      | 2.6      | 8.7           | 3,852                        | 3,158                        | 4,389                        | 3,755                        | 3,422                        |
| 24Mg      | 0.065    | 0.217         | 2,100                        | 1,914                        | 1,552                        | 1,325                        | 2,075                        |
| 27Al      | 0.036    | 0.120         | 2,252                        | 1,853                        | 2,884                        | 1,885                        | 3,786                        |
| 31P       | 67       | 223           | 12,420                       | 12,395                       | 9,187                        | 10,522                       | 10,920                       |
| 39K       | 2.4      | 8.0           | 13,208                       | 12,077                       | 12,048                       | 10,376                       | 12,099                       |
| 44Ca      | 7.6      | 25            | 4,257                        | 3,250                        | 2,207                        | 3,078                        | 5,844                        |
| 49Ti      | 0.224    | 0.747         | 242                          | 150                          | 184                          | 108                          | 269                          |
| 51V       | 0.035    | 0.117         | 3.4                          | 4.2                          | 4.5                          | 3.3                          | 7.3                          |
| 52Cr      | 0.094    | 0.313         | 21                           | 18                           | 17                           | 17                           | 34                           |
| 55Mn      | 0.006    | 0.020         | 145                          | 158                          | 84                           | 81                           | 173                          |
| 57Fe      | 0.956    | 3.2           | 1,543                        | 1,740                        | 1,556                        | 1,240                        | 2,378                        |
| 59Co      | 0.011    | 0.037         | 2.4                          | 2.4                          | 1.4                          | 1.3                          | 2.8                          |
| 60Ni      | 0.001    | 0.003         | 32                           | 30                           | 29                           | 26                           | 52                           |
| 63Cu      | 0.013    | 0.043         | 23                           | 20                           | 14                           | 19                           | 19                           |
| 66Zn      | 0.242    | 0.807         | 205                          | 244                          | 112                          | 156                          | 206                          |
| 75As      | 0.417    | 1.4           | 1.6                          | 1.7                          | 2.5                          | 0.829                        | 1.8                          |
| 77Se      | 0.374    | 1.2           | 7.9                          | 7.9                          | 6.8                          | 6.0                          | 5.6                          |
| 88Sr      | 0.001    | 0.003         | 16                           | 10                           | 8.6                          | 10                           | 19                           |
| 95Mo      | 0.001    | 0.003         | 0.986                        | 0.914                        | 1.7                          | 0.551                        | 0.812                        |
| 107Ag     | 0.001    | 0.003         | 0.106                        | 0.083                        | 0.053                        | 0.068                        | 0.091                        |
| 111Cd     | 0.066    | 0.220         | 3.4                          | 3.6                          | 1.9                          | 1.3                          | 3.3                          |
| 118Sn     | 0.037    | 0.123         | 0.913                        | 0.607                        | 0.365                        | 0.532                        | 0.906                        |
| 121Sb     | 0.003    | 0.010         | 0.089                        | 0.077                        | 0.111                        | 0.053                        | 0.105                        |
| 137Ba     | 0.001    | 0.003         | 157                          | 72                           | 75                           | 90                           | 138                          |
| 202Hg     | 0.022    | 0.073         | 0.081                        | 0.075                        | 0.051                        | 0.047                        | 0.068                        |
| 205Tl     | 0.001    | 0.003         | 0.094                        | 0.093                        | 0.094                        | 0.067                        | 0.094                        |
| 208Pb     | 0.003    | 0.010         | 0.775                        | 0.646                        | 0.794                        | 0.557                        | 1.3                          |
| 238U      | 0.001    | 0.003         | 0.220                        | 0.175                        | 0.268                        | 0.119                        | 0.348                        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DC2_INV-  | LC_DC2_INV-  | LC_DC2_INV-  | LC_DC2_INV-  | LC_DC2_INV-  |
|-----------|----------|---------------|--------------|--------------|--------------|--------------|--------------|
|           |          | Client ID     | 1_2022-05_NP | 2_2022-05_NP | 3_2022-05_NP | 4_2022-05_NP | 5_2022-05_NP |
|           |          |               |              |              |              |              |              |
|           |          | Lab ID        | 342          | 343          | 344          | 345          | 346          |
|           |          | et Weight (g) | 0.5495       | 0.3888       | 0.3497       | 0.2357       | 0.3307       |
|           |          | ry Weight (g) | 0.1571       | 0.0844       | 0.0786       | 0.0666       | 0.0730       |
|           |          | Moisture (%)  | 71.4         | 78.3         | 77.5         | 71.7         | 77.9         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)        | (ppm)        | (ppm)        | (ppm)        | (ppm)        |
| 7Li       | 0.010    | 0.033         | 1.3          | 0.874        | 0.733        | 2.2          | 1.3          |
| 11B       | 0.067    | 0.223         | 2.8          | 1.3          | 1.5          | 8.3          | 2.8          |
| 23Na      | 2.6      | 8.7           | 3,116        | 4,259        | 3,263        | 2,897        | 2,945        |
| 24Mg      | 0.065    | 0.217         | 1,093        | 1,379        | 1,733        | 2,127        | 1,762        |
| 27Al      | 0.036    | 0.120         | 2,466        | 1,537        | 1,117        | 6,646        | 2,541        |
| 31P       | 67       | 223           | 10,647       | 12,962       | 12,131       | 11,898       | 12,033       |
| 39K       | 2.4      | 8.0           | 10,731       | 12,480       | 10,839       | 12,714       | 9,599        |
| 44Ca      | 7.6      | 25            | 2,059        | 1,767        | 2,696        | 4,034        | 4,260        |
| 49Ti      | 0.224    | 0.747         | 255          | 99           | 104          | 486          | 209          |
| 51V       | 0.035    | 0.117         | 6.2          | 3.0          | 4.3          | 22           | 7.4          |
| 52Cr      | 0.094    | 0.313         | 23           | 22           | 33           | 140          | 40           |
| 55Mn      | 0.006    | 0.020         | 123          | 67           | 92           | 84           | 87           |
| 57Fe      | 0.956    | 3.2           | 1,447        | 869          | 1,094        | 4,198        | 1,407        |
| 59Co      | 0.011    | 0.037         | 1.9          | 1.0          | 2.5          | 7.1          | 2.3          |
| 60Ni      | 0.001    | 0.003         | 53           | 44           | 67           | 223          | 66           |
| 63Cu      | 0.013    | 0.043         | 15           | 17           | 20           | 24           | 18           |
| 66Zn      | 0.242    | 0.807         | 193          | 218          | 388          | 262          | 232          |
| 75As      | 0.417    | 1.4           | 0.976        | 0.781        | 0.667        | 1.4          | 0.716        |
| 77Se      | 0.374    | 1.2           | 11           | 11           | 13           | 13           | 11           |
| 88Sr      | 0.001    | 0.003         | 5.1          | 4.3          | 7.7          | 14           | 8.9          |
| 95Mo      | 0.001    | 0.003         | 0.812        | 0.957        | 0.972        | 1.5          | 0.725        |
| 107Ag     | 0.001    | 0.003         | 0.159        | 0.159        | 0.204        | 0.242        | 0.174        |
| 111Cd     | 0.066    | 0.220         | 1.3          | 2.4          | 3.1          | 1.4          | 1.9          |
| 118Sn     | 0.037    | 0.123         | 0.197        | 0.465        | 0.609        | 0.662        | 0.489        |
| 121Sb     | 0.003    | 0.010         | 0.132        | 0.101        | 0.118        | 0.389        | 0.167        |
| 137Ba     | 0.001    | 0.003         | 124          | 98           | 131          | 197          | 136          |
| 202Hg     | 0.022    | 0.073         | 0.088        | 0.081        | 0.109        | 0.105        | 0.081        |
| 205Tl     | 0.001    | 0.003         | 0.062        | 0.046        | 0.057        | 0.134        | 0.081        |
| 208Pb     | 0.003    | 0.010         | 0.741        | 0.443        | 0.452        | 1.5          | 0.680        |
| 238U      | 0.001    | 0.003         | 0.156        | 0.085        | 0.095        | 0.368        | 0.184        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- |
|-----------|----------|---------------|--------------|--------------|--------------|--------------|--------------|
|           |          | Client ID     | 1_2022-05_NP | 2_2022-05_NP | 3_2022-05_NP | 4_2022-05_NP | 5_2022-05_NP |
|           |          | Lab ID        | 347          | 348          | 349          | 350          | 351          |
|           | We       | et Weight (g) | 0.3833       | 0.2707       | 0.2837       | 0.2546       | 0.2696       |
|           |          | ry Weight (g) | 0.0810       | 0.0479       | 0.0557       | 0.0520       | 0.0553       |
|           |          | Moisture (%)  | 78.9         | 82.3         | 80.4         | 79.6         | 79.5         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)        | (ppm)        | (ppm)        | (ppm)        | (ppm)        |
| 7Li       | 0.010    | 0.033         | 0.479        | 0.546        | 0.620        | 0.497        | 0.424        |
| 11B       | 0.067    | 0.223         | 0.940        | 1.1          | 1.4          | 0.819        | 2.1          |
| 23Na      | 2.6      | 8.7           | 2,682        | 3,558        | 4,026        | 3,097        | 4,076        |
| 24Mg      | 0.065    | 0.217         | 1,594        | 1,138        | 1,468        | 1,295        | 1,578        |
| 27Al      | 0.036    | 0.120         | 187          | 307          | 402          | 416          | 422          |
| 31P       | 67       | 223           | 13,674       | 11,815       | 11,871       | 11,076       | 11,722       |
| 39K       | 2.4      | 8.0           | 9,077        | 10,494       | 11,723       | 10,052       | 12,026       |
| 44Ca      | 7.6      | 25            | 4,115        | 1,935        | 2,704        | 1,707        | 2,716        |
| 49Ti      | 0.224    | 0.747         | 10           | 17           | 37           | 25           | 29           |
| 51V       | 0.035    | 0.117         | 0.986        | 1.1          | 1.9          | 1.3          | 2.1          |
| 52Cr      | 0.094    | 0.313         | 8.3          | 8.0          | 21           | 13           | 11           |
| 55Mn      | 0.006    | 0.020         | 28           | 22           | 27           | 25           | 41           |
| 57Fe      | 0.956    | 3.2           | 398          | 380          | 576          | 423          | 532          |
| 59Co      | 0.011    | 0.037         | 0.268        | 0.651        | 1.1          | 0.505        | 0.866        |
| 60Ni      | 0.001    | 0.003         | 11           | 11           | 32           | 21           | 19           |
| 63Cu      | 0.013    | 0.043         | 20           | 16           | 22           | 19           | 20           |
| 66Zn      | 0.242    | 0.807         | 261          | 197          | 207          | 217          | 223          |
| 75As      | 0.417    | 1.4           | 1.2          | 1.3          | 2.2          | 1.3          | 2.4          |
| 77Se      | 0.374    | 1.2           | 6.0          | 6.0          | 7.4          | 7.0          | 7.5          |
| 88Sr      | 0.001    | 0.003         | 4.4          | 3.0          | 3.4          | 2.8          | 3.3          |
| 95Mo      | 0.001    | 0.003         | 0.522        | 0.377        | 0.377        | 0.609        | 0.365        |
| 107Ag     | 0.001    | 0.003         | 0.121        | 0.068        | 0.106        | 0.083        | 0.060        |
| 111Cd     | 0.066    | 0.220         | 5.2          | 10           | 7.9          | 8.7          | 9.6          |
| 118Sn     | 0.037    | 0.123         | 0.184        | 0.834        | 0.701        | 0.403        | 0.267        |
| 121Sb     | 0.003    | 0.010         | 0.056        | 0.051        | 0.061        | 0.056        | 0.053        |
| 137Ba     | 0.001    | 0.003         | 109          | 84           | 88           | 72           | 118          |
| 202Hg     | 0.022    | 0.073         | 0.068        | 0.047        | 0.061        | 0.061        | 0.064        |
| 205Tl     | 0.001    | 0.003         | 0.019        | 0.024        | 0.028        | 0.024        | 0.046        |
| 208Pb     | 0.003    | 0.010         | 0.102        | 0.159        | 0.179        | 0.229        | 0.252        |
| 238U      | 0.001    | 0.003         | 0.048        | 0.054        | 0.070        | 0.051        | 0.069        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DCDS_INV-<br>1_2022-05_NP | LC_DCDS_INV-<br>2_2022-05_NP | LC_DCDS_INV-<br>3_2022-05_NP | LC_DCDS_INV-<br>4_2022-05_NP | LC_DCDS_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|           |          | Lab ID        | 352                          | 353                          | 354                          | 355                          | 356                          |
|           | We       | et Weight (g) | 0.4702                       | 0.1976                       | 0.2825                       | 0.5246                       | 0.4669                       |
|           |          | y Weight (g)  | 0.0985                       | 0.0480                       | 0.0604                       | 0.1073                       | 0.1082                       |
|           |          | Moisture (%)  | 79.1                         | 75.7                         | 78.6                         | 79.5                         | 76.8                         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        | (ppm)                        |
| 7Li       | 0.010    | 0.033         | 0.598                        | 1.8                          | 1.3                          | 0.820                        | 0.692                        |
| 11B       | 0.067    | 0.223         | 1.7                          | 6.4                          | 3.1                          | 2.5                          | 1.7                          |
| 23Na      | 2.6      | 8.7           | 3,704                        | 3,190                        | 2,675                        | 3,480                        | 3,494                        |
| 24Mg      | 0.065    | 0.217         | 1,144                        | 1,506                        | 1,579                        | 1,263                        | 1,367                        |
| 27Al      | 0.036    | 0.120         | 993                          | 5,858                        | 2,968                        | 1,530                        | 902                          |
| 31P       | 67       | 223           | 13,608                       | 12,692                       | 11,153                       | 13,264                       | 13,341                       |
| 39K       | 2.4      | 8.0           | 11,112                       | 10,548                       | 9,439                        | 10,565                       | 9,959                        |
| 44Ca      | 7.6      | 25            | 2,095                        | 3,605                        | 2,989                        | 2,416                        | 3,105                        |
| 49Ti      | 0.224    | 0.747         | 61                           | 571                          | 233                          | 109                          | 65                           |
| 51V       | 0.035    | 0.117         | 3.0                          | 13                           | 7.3                          | 4.4                          | 2.9                          |
| 52Cr      | 0.094    | 0.313         | 22                           | 95                           | 39                           | 27                           | 16                           |
| 55Mn      | 0.006    | 0.020         | 84                           | 112                          | 104                          | 90                           | 75                           |
| 57Fe      | 0.956    | 3.2           | 716                          | 2,715                        | 1,549                        | 884                          | 569                          |
| 59Co      | 0.011    | 0.037         | 2.2                          | 5.4                          | 1.5                          | 2.4                          | 1.4                          |
| 60Ni      | 0.001    | 0.003         | 50                           | 161                          | 79                           | 50                           | 31                           |
| 63Cu      | 0.013    | 0.043         | 13                           | 20                           | 16                           | 13                           | 11                           |
| 66Zn      | 0.242    | 0.807         | 203                          | 277                          | 263                          | 200                          | 205                          |
| 75As      | 0.417    | 1.4           | 0.706                        | 1.1                          | 1.0                          | 0.723                        | 0.538                        |
| 77Se      | 0.374    | 1.2           | 11                           | 12                           | 9.9                          | 10                           | 8.1                          |
| 88Sr      | 0.001    | 0.003         | 5.1                          | 13                           | 8.6                          | 5.0                          | 5.5                          |
| 95Mo      | 0.001    | 0.003         | 0.814                        | 1.3                          | 1.1                          | 0.617                        | 0.449                        |
| 107Ag     | 0.001    | 0.003         | 0.121                        | 0.174                        | 0.174                        | 0.121                        | 0.151                        |
| 111Cd     | 0.066    | 0.220         | 1.6                          | 4.4                          | 4.9                          | 2.6                          | 3.7                          |
| 118Sn     | 0.037    | 0.123         | 0.345                        | 0.858                        | 0.590                        | 0.353                        | 0.249                        |
| 121Sb     | 0.003    | 0.010         | 0.091                        | 0.237                        | 0.180                        | 0.119                        | 0.093                        |
| 137Ba     | 0.001    | 0.003         | 105                          | 156                          | 162                          | 96                           | 224                          |
| 202Hg     | 0.022    | 0.073         | 0.064                        | 0.078                        | 0.078                        | 0.064                        | 0.071                        |
| 205Tl     | 0.001    | 0.003         | 0.055                        | 0.163                        | 0.097                        | 0.081                        | 0.047                        |
| 208Pb     | 0.003    | 0.010         | 0.388                        | 1.3                          | 0.820                        | 0.545                        | 0.326                        |
| 238U      | 0.001    | 0.003         | 0.123                        | 0.225                        | 0.208                        | 0.103                        | 0.111                        |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC3_INV-<br>1_2022-05_NP | LC_DC3_INV-<br>2_2022-05_NP | LC_DC3_INV-<br>3_2022-05_NP | LC_DC3_INV-<br>4_2022-05_NP | LC_DC3_INV-<br>5_2022-05_NP |
|-----------|----------|---------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|           |          | Lab ID        | 357                         | 358                         | 359                         | 360                         | 361                         |
|           | We       | et Weight (g) | 0.2991                      | 0.2610                      | 0.3314                      | 0.2074                      | 0.2462                      |
|           |          | y Weight (g)  | 0.0693                      | 0.0716                      | 0.0839                      | 0.0462                      | 0.0570                      |
|           |          | Moisture (%)  | 76.8                        | 72.6                        | 74.7                        | 77.7                        | 76.8                        |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       |
| 7Li       | 0.010    | 0.033         | 1.4                         | 0.445                       | 0.174                       | 0.643                       | 0.215                       |
| 11B       | 0.067    | 0.223         | 5.3                         | 1.2                         | 0.414                       | 2.6                         | 0.518                       |
| 23Na      | 2.6      | 8.7           | 3,181                       | 2,935                       | 2,588                       | 3,509                       | 2,766                       |
| 24Mg      | 0.065    | 0.217         | 1,429                       | 1,639                       | 1,162                       | 1,031                       | 1,036                       |
| 27Al      | 0.036    | 0.120         | 3,965                       | 815                         | 154                         | 1,888                       | 296                         |
| 31P       | 67       | 223           | 10,106                      | 14,161                      | 10,777                      | 12,201                      | 10,341                      |
| 39K       | 2.4      | 8.0           | 8,895                       | 7,367                       | 8,294                       | 10,196                      | 7,107                       |
| 44Ca      | 7.6      | 25            | 2,695                       | 4,004                       | 979                         | 1,510                       | 1,232                       |
| 49Ti      | 0.224    | 0.747         | 348                         | 67                          | 9.3                         | 120                         | 21                          |
| 51V       | 0.035    | 0.117         | 8.9                         | 2.5                         | 0.606                       | 4.9                         | 0.953                       |
| 52Cr      | 0.094    | 0.313         | 57                          | 33                          | 11                          | 33                          | 17                          |
| 55Mn      | 0.006    | 0.020         | 61                          | 40                          | 39                          | 39                          | 33                          |
| 57Fe      | 0.956    | 3.2           | 2,067                       | 866                         | 267                         | 2,091                       | 437                         |
| 59Co      | 0.011    | 0.037         | 1.9                         | 2.2                         | 0.747                       | 2.3                         | 0.583                       |
| 60Ni      | 0.001    | 0.003         | 98                          | 64                          | 19                          | 60                          | 31                          |
| 63Cu      | 0.013    | 0.043         | 17                          | 15                          | 12                          | 23                          | 16                          |
| 66Zn      | 0.242    | 0.807         | 163                         | 145                         | 156                         | 162                         | 168                         |
| 75As      | 0.417    | 1.4           | 0.639                       | 0.605                       | < 0.417                     | 0.470                       | < 0.417                     |
| 77Se      | 0.374    | 1.2           | 7.2                         | 4.7                         | 7.6                         | 8.2                         | 5.7                         |
| 88Sr      | 0.001    | 0.003         | 7.1                         | 5.7                         | 2.3                         | 4.6                         | 2.4                         |
| 95Mo      | 0.001    | 0.003         | 0.940                       | 0.225                       | 0.253                       | 0.393                       | 0.449                       |
| 107Ag     | 0.001    | 0.003         | 0.113                       | 0.147                       | 0.083                       | 0.344                       | 0.140                       |
| 111Cd     | 0.066    | 0.220         | 1.0                         | 0.725                       | 0.690                       | 0.846                       | 0.690                       |
| 118Sn     | 0.037    | 0.123         | 0.329                       | 0.123                       | 0.133                       | 0.285                       | 0.188                       |
| 121Sb     | 0.003    | 0.010         | 0.159                       | 0.069                       | 0.036                       | 0.178                       | 0.049                       |
| 137Ba     | 0.001    | 0.003         | 95                          | 39                          | 32                          | 42                          | 35                          |
| 202Hg     | 0.022    | 0.073         | 0.067                       | 0.028                       | 0.050                       | 0.057                       | 0.057                       |
| 205Tl     | 0.001    | 0.003         | 0.139                       | 0.061                       | 0.026                       | 0.096                       | 0.031                       |
| 208Pb     | 0.003    | 0.010         | 1.3                         | 0.504                       | 0.138                       | 0.486                       | 0.148                       |
| 238U      | 0.001    | 0.003         | 0.143                       | 0.047                       | 0.031                       | 0.093                       | 0.028                       |

#### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Page 10 of 21

Teck Coal Limited
Tissue QA/QC Relative Percent Difference Results

| C         | Client ID   | LC_FRB_         | INV-5_2022                   | 2-05_NP    | LC_FRUS         | _INV-4_202                   | 2-05_NP    | LC_DC1          | _INV-2_2022                  | 2-05_NP    |
|-----------|-------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|
|           | Lab ID      |                 | 321                          |            |                 | 325                          |            |                 | 333                          |            |
| Parameter | DL<br>(ppm) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |
| 7Li       | 0.010       | 1.5             | 1.7                          | 13         | 0.928           | 1.3                          | 33         | 0.733           | 0.684                        | 6.9        |
| 11B       | 0.067       | 4.2             | 4.6                          | 9.1        | 2.0             | 2.7                          | 30         | 2.1             | 2.0                          | 4.9        |
| 23Na      | 2.6         | 3,246           | 2,908                        | 11         | 2,845           | 2,674                        | 6.2        | 3,245           | 3,503                        | 7.6        |
| 24Mg      | 0.065       | 1,551           | 1,516                        | 2.3        | 1,746           | 2,081                        | 18         | 1,839           | 1,808                        | 1.7        |
| 27Al      | 0.036       | 2,610           | 3,745                        | 36         | 1,497           | 2,122                        | 35         | 1,432           | 1,122                        | 24         |
| 31P       | 67          | 10,674          | 10,403                       | 2.6        | 12,472          | 12,688                       | 1.7        | 13,965          | 14,469                       | 3.5        |
| 39K       | 2.4         | 11,037          | 9,685                        | 13         | 9,419           | 9,307                        | 1.2        | 11,722          | 11,668                       | 0.5        |
| 44Ca      | 7.6         | 3,627           | 3,595                        | 0.9        | 4,335           | 6,330                        | 37         | 3,067           | 2,823                        | 8.3        |
| 49Ti      | 0.224       | 245             | 323                          | 28         | 106             | 146                          | 32         | 67              | 64                           | 4.6        |
| 51V       | 0.035       | 7.4             | 8.3                          | 12         | 3.2             | 4.4                          | 32         | 4.2             | 3.3                          | 24         |
| 52Cr      | 0.094       | 48              | 48                           | 0.0        | 25              | 18                           | 33         | 16              | 20                           | 22         |
| 55Mn      | 0.006       | 59              | 63                           | 6.6        | 47              | 49                           | 4.2        | 63              | 57                           | 10         |
| 57Fe      | 0.956       | 1,314           | 1,462                        | 11         | 1,057           | 1,168                        | 10         | 856             | 818                          | 4.5        |
| 59Co      | 0.011       | 2.5             | 2.8                          | 11         | 2.1             | 2.0                          | 4.9        | 1.1             | 1.2                          | 8.7        |
| 60Ni      | 0.001       | 61              | 69                           | 12         | 37              | 29                           | 24         | 32              | 36                           | 12         |
| 63Cu      | 0.013       | 21              | 17                           | 21         | 24              | 22                           | 8.7        | 19              | 16                           | 17         |
| 66Zn      | 0.242       | 228             | 174                          | 27         | 285             | 273                          | 4.3        | 269             | 292                          | 8.2        |
| 75As      | 0.417       | 0.873           | 0.753                        | -          | 0.663           | 0.843                        | -          | 0.911           | 1.1                          | -          |
| 77Se      | 0.374       | 7.7             | 7.3                          | 5.3        | 9.0             | 8.0                          | 12         | 14              | 12                           | 15         |
| 88Sr      | 0.001       | 8.0             | 5.9                          | 30         | 7.7             | 11                           | 35         | 6.4             | 6.7                          | 4.6        |
| 95Mo      | 0.001       | 0.365           | 0.351                        | 3.9        | 0.281           | 0.365                        | 26         | 0.638           | 0.609                        | 4.7        |
| 107Ag     | 0.001       | 0.151           | 0.131                        | 14         | 0.160           | 0.223                        | 33         | 0.132           | 0.113                        | 16         |
| 111Cd     | 0.066       | 1.4             | 1.3                          | 7.4        | 2.5             | 2.4                          | 4.1        | 2.5             | 2.9                          | 15         |
| 118Sn     | 0.037       | 0.281           | 0.202                        | -          | 0.427           | 0.415                        | 2.9        | 0.553           | 0.730                        | 28         |
| 121Sb     | 0.003       | 0.094           | 0.080                        | 16         | 0.053           | 0.079                        | 39         | 0.116           | 0.094                        | 21         |
| 137Ba     | 0.001       | 78              | 64                           | 20         | 55              | 69                           | 23         | 123             | 100                          | 21         |
| 202Hg     | 0.022       | 0.049           | 0.065                        | -          | 0.078           | 0.072                        | -          | 0.071           | 0.068                        | -          |
| 205Tl     | 0.001       | 0.063           | 0.060                        | 4.9        | 0.038           | 0.046                        | 19         | 0.061           | 0.055                        | 10         |
| 208Pb     | 0.003       | 0.684           | 0.692                        | 1.2        | 0.529           | 0.648                        | 20         | 0.408           | 0.462                        | 12         |
| 238U      | 0.001       | 0.134           | 0.136                        | 1.5        | 0.075           | 0.072                        | 4.1        | 0.095           | 0.082                        | 15         |

#### Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

#### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited
Tissue QA/QC Relative Percent Difference Results

| (         | Client ID   | LC_DCDS   |                              | 2-05_NP    | LC_DCDS_INV-4_2022-05_NP |                              |            |  |  |  |  |  |
|-----------|-------------|---|------------------------------|------------|--------------------------|------------------------------|------------|--|--|--|--|--|
|           | Lab ID      |   | 352                          |            |                          | 355                          |            |  |  |  |  |  |
| Parameter | DL<br>(ppm) | Sample<br>(ppm)   | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm)          | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |  |  |  |  |  |
| 7Li       | 0.010       | Cab ID   Sample (ppm)   DL (ppm)   Cpm) | 0.820                        | 0.966      | 16                       |                              |            |  |  |  |  |  |
| 11B       | 0.067       | 1.7   | 2.5                          | 38         | 2.5                      | 3.2                          | 25         |  |  |  |  |  |
| 23Na      | 2.6         | 3,704   | 4,056                        | 9.1        | 3,480                    | 4,370                        | 23         |  |  |  |  |  |
| 24Mg      | 0.065       | 1,144   | 1,298                        | 13         | 1,263                    | 1,345                        | 6.3        |  |  |  |  |  |
| 27AI      | 0.036       | 993   | 1,482                        | 40         | 1,530                    | 1,991                        | 26         |  |  |  |  |  |
| 31P       | 67          | 13,608  | 11,552                       | 16         | 13,264                   | 14,022                       | 5.6        |  |  |  |  |  |
| 39K       | 2.4         | 11,112  | 11,528                       | 3.7        | 10,565                   | 12,657                       | 18         |  |  |  |  |  |
| 44Ca      | 7.6         | 2,095   | 2,461                        | 16         | 2,416                    | 2,451                        | 1.4        |  |  |  |  |  |
| 49Ti      | 0.224       | 61  | 82                           | 29         | 109                      | 132                          | 19         |  |  |  |  |  |
| 51V       | 0.035       | 3.0   | 4.3                          | 36         | 4.4                      | 5.5                          | 22         |  |  |  |  |  |
| 52Cr      | 0.094       | 22  | 28                           | 24         | 27                       | 20                           | 30         |  |  |  |  |  |
| 55Mn      |             |   | 84                           | 0.0        | 90                       | 131                          | 37         |  |  |  |  |  |
| 57Fe      | 0.956       | 716   | 895                          | 22         | 884                      | 1,062                        | 18         |  |  |  |  |  |
| 59Co      | 0.011       | 2.2   | 2.7                          | 20         | 2.4                      | 2.4                          | 0.0        |  |  |  |  |  |
| 60Ni      | 0.001       | 50  | 55                           | 9.5        | 50                       | 46                           | 8.3        |  |  |  |  |  |
| 63Cu      | 0.013       | 13  | 13                           | 0.0        | 13                       | 12                           | 8.0        |  |  |  |  |  |
| 66Zn      | 0.242       | 203   | 202                          | 0.5        | 200                      | 211                          | 5.4        |  |  |  |  |  |
| 75As      | 0.417       | 0.706   | 0.739                        | -          | 0.723                    | 0.941                        | -          |  |  |  |  |  |
| 77Se      | 0.374       | 11  | 9.1                          | 19         | 10                       | 11                           | 9.5        |  |  |  |  |  |
| 88Sr      | 0.001       | 5.1   | 5.2                          | 1.9        | 5.0                      | 6.1                          | 20         |  |  |  |  |  |
| 95Mo      | 0.001       | 0.814   | 0.702                        | 15         | 0.617                    | 0.674                        | 8.8        |  |  |  |  |  |
| 107Ag     | 0.001       | 0.121   | 0.106                        | 13         | 0.121                    | 0.117                        | 3.4        |  |  |  |  |  |
| 111Cd     | 0.066       | 1.6   | 1.7                          | 6.1        | 2.6                      | 3.0                          | 14         |  |  |  |  |  |
| 118Sn     | 0.037       | 0.345   | 0.456                        | -          | 0.353                    | 0.487                        | -          |  |  |  |  |  |
| 121Sb     | 0.003       | 0.091   | 0.098                        | 7.4        | 0.119                    | 0.143                        | 18         |  |  |  |  |  |
| 137Ba     | 0.001       | 105   | 113                          | 7.3        | 96                       | 129                          | 29         |  |  |  |  |  |
| 202Hg     | 0.022       | 0.064   | 0.064                        | -          | 0.064                    | 0.078                        | -          |  |  |  |  |  |
| 205TI     | 0.001       | 0.055   | 0.075                        | 31         | 0.081                    | 0.092                        | 13         |  |  |  |  |  |
| 208Pb     | 0.003       | 0.388   | 0.536                        | 32         | 0.545                    | 0.655                        | 18         |  |  |  |  |  |
| 238U      | 0.001       | 0.123   | 0.113                        | 8.5        | 0.103                    | 0.152                        | 38         |  |  |  |  |  |

#### Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

#### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

### Teck Coal Limited Tissue QA/QC Accuracy and Precision Results

|           | S        | ample Group ID           |                                  | 01              |                      |                                  | 02              |                      |  |  |
|-----------|----------|--------------------------|----------------------------------|-----------------|----------------------|----------------------------------|-----------------|----------------------|--|--|
| Parameter | DL (ppm) | Certified<br>Conc. (ppm) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) |  |  |
| 7Li       | 0.010    | 1.21                     | 1.3                              | 109             | 12                   | 1.3                              | 107             | 5.4                  |  |  |
| 11B       | 0.067    | 4.5                      | 4.5                              | 100             | 2.4                  | 4.6                              | 103             | 1.2                  |  |  |
| 23Na      | 2.6      | 14,000                   | 16,217                           | 116             | 4.1                  | 14,069                           | 100             | 5.8                  |  |  |
| 24Mg      | 0.065    | 910                      | 1,045                            | 115             | 6.5                  | 929                              | 102             | 5.1                  |  |  |
| 27Al      | 0.036    | 197.2                    | 180                              | 92              | 9.3                  | 183                              | 93              | 4.6                  |  |  |
| 31P       | 67       | 8,000                    | 8,976                            | 112             | 4.9                  | 7,670                            | 96              | 5.6                  |  |  |
| 39K       | 2.4      | 15,500                   | 16,754                           | 108             | 6.0                  | 15,789                           | 102             | 3.6                  |  |  |
| 44Ca      | 7.6      | 2,360                    | 2,571                            | 109             | 4.7                  | 2,372                            | 100             | 2.2                  |  |  |
| 49Ti      | 0.224    | 12.24                    | 13                               | 105             | 17                   | 10                               | 86              | 9.7                  |  |  |
| 51V       | 0.035    | 1.57                     | 1.7                              | 111             | 6.6                  | 1.5                              | 96              | 16                   |  |  |
| 52Cr      | 0.094    | 1.87                     | 2.2                              | 116             | 5.3                  | 2.0                              | 105             | 7.7                  |  |  |
| 55Mn      | 0.006    | 3.17                     | 3.6                              | 113             | 6.1                  | 3.1                              | 98              | 5.1                  |  |  |
| 57Fe      | 0.956    | 343                      | 375                              | 109             | 3.2                  | 346                              | 101             | 6.8                  |  |  |
| 59Co      | 0.011    | 0.25                     | 0.289                            | 116             | 8.6                  | 0.250                            | 100             | 6.5                  |  |  |
| 60Ni      | 0.001    | 1.34                     | 1.5                              | 112             | 6.7                  | 1.5                              | 112             | 9.4                  |  |  |
| 63Cu      | 0.013    | 15.7                     | 18                               | 115             | 5.6                  | 17                               | 106             | 6.9                  |  |  |
| 66Zn      | 0.242    | 51.6                     | 58                               | 112             | 4.0                  | 51                               | 99              | 5.0                  |  |  |
| 75As      | 0.417    | 6.87                     | 7.4                              | 108             | 3.3                  | 6.8                              | 98              | 5.2                  |  |  |
| 77Se      | 0.374    | 3.45                     | 3.6                              | 106             | 8.8                  | 3.3                              | 97              | 6.2                  |  |  |
| 88Sr      | 0.001    | 10.1                     | 11                               | 105             | 5.2                  | 10                               | 99              | 6.2                  |  |  |
| 95Mo      | 0.001    | 0.29                     | 0.348                            | 120             | 4.4                  | 0.293                            | 101             | 2.3                  |  |  |
| 107Ag     | 0.001    | 0.0252                   | 0.028                            | 113             | 11                   | 0.027                            | 105             | 15                   |  |  |
| 111Cd     | 0.066    | 0.299                    | 0.303                            | 102             | 9.0                  | 0.316                            | 106             | 9.5                  |  |  |
| 118Sn     | 0.037    | 0.061                    | 0.058                            | 95              | 14                   | 0.078                            | 128             | 18                   |  |  |
| 121Sb     | 0.003    | 0.011                    | 0.013                            | 115             | 16                   | 0.011                            | 104             | 19                   |  |  |
| 137Ba     | 0.001    | 8.6                      | 8.2                              | 95              | 2.9                  | 7.8                              | 91              | 3.2                  |  |  |
| 202Hg     | 0.022    | 0.412                    | 0.473                            | 115             | 6.1                  | 0.429                            | 104             | 7.2                  |  |  |
| 205TI     | 0.001    | 0.0013                   | -                                | -               | -                    | -                                | -               | -                    |  |  |
| 208Pb     | 0.003    | 0.404                    | 0.386                            | 95              | 11                   | 0.356                            | 88              | 13                   |  |  |
| 238U      | 0.001    | 0.05                     | 0.050                            | 100             | 11                   | 0.050                            | 100             | 10                   |  |  |

#### Notes:

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

#### Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

TI certified concentration from NIST-2976.

Accuracy and precision for TI are not reported as the certified concentration is too close to the reportable detection limit.

### Teck Coal Limited Tissue QA/QC Accuracy and Precision Results

Sample Group ID 03

| Parameter | DL (ppm) | Certified<br>Conc. (ppm) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) |  |  |  |  |
|-----------|----------|--------------------------|----------------------------------|-----------------|----------------------|--|--|--|--|
| 7Li       | 0.010    | 1.21                     | 1.2                              | 98              | 7.1                  |  |  |  |  |
| 11B       | 0.067    | 4.5                      | 4.4                              | 97              | 2.6                  |  |  |  |  |
| 23Na      | 2.6      | 14,000                   | 13,693                           | 98              | 3.0                  |  |  |  |  |
| 24Mg      | 0.065    | 910                      | 893                              | 98              | 5.7                  |  |  |  |  |
| 27AI      | 0.036    | 197.2                    | 194                              | 98              | 4.8                  |  |  |  |  |
| 31P       | 67       | 8,000                    | 7,872                            | 98              | 1.4                  |  |  |  |  |
| 39K       | 2.4      | 15,500                   | 14,714                           | 95              | 3.1                  |  |  |  |  |
| 44Ca      | 7.6      | 2,360                    | 2,343                            | 99              | 2.5                  |  |  |  |  |
| 49Ti      | 0.224    | 12.24                    | 11                               | 87              | 13                   |  |  |  |  |
| 51V       | 0.035    | 1.57                     | 1.7                              | 106             | 8.1                  |  |  |  |  |
| 52Cr      | 0.094    | 1.87                     | 1.9                              | 104             | 5.9                  |  |  |  |  |
| 55Mn      | 0.006    | 3.17                     | 3.2                              | 101             | 4.4                  |  |  |  |  |
| 57Fe      | 0.956    | 343                      | 351                              | 102             | 3.0                  |  |  |  |  |
| 59Co      | 0.011    | 0.25                     | 0.272                            | 109             | 5.3                  |  |  |  |  |
| 60Ni      | 0.001    | 1.34                     | 1.3                              | 100             | 6.7                  |  |  |  |  |
| 63Cu      | 0.013    | 15.7                     | 16                               | 103             | 5.2                  |  |  |  |  |
| 66Zn      | 0.242    | 51.6                     | 52                               | 101             | 1.9                  |  |  |  |  |
| 75As      | 0.417    | 6.87                     | 7.0                              | 102             | 2.3                  |  |  |  |  |
| 77Se      | 0.374    | 3.45                     | 3.6                              | 103             | 5.5                  |  |  |  |  |
| 88Sr      | 0.001    | 10.1                     | 10                               | 99              | 0.9                  |  |  |  |  |
| 95Mo      | 0.001    | 0.29                     | 0.292                            | 101             | 5.2                  |  |  |  |  |
| 107Ag     | 0.001    | 0.0252                   | 0.027                            | 105             | 15                   |  |  |  |  |
| 111Cd     | 0.066    | 0.299                    | 0.314                            | 105             | 15                   |  |  |  |  |
| 118Sn     | 0.037    | 0.061                    | 0.069                            | 113             | 19                   |  |  |  |  |
| 121Sb     | 0.003    | 0.011                    | 0.011                            | 103             | 5.1                  |  |  |  |  |
| 137Ba     | 0.001    | 8.6                      | 8.2                              | 95              | 5.5                  |  |  |  |  |
| 202Hg     | 0.022    | 0.412                    | 0.429                            | 104             | 3.7                  |  |  |  |  |
| 205Tl     | 0.001    | 0.0013                   | -                                | -               | -                    |  |  |  |  |
| 208Pb     | 0.003    | 0.404                    | 0.363                            | 90              | 12                   |  |  |  |  |
| 238U      | 0.001    | 0.05                     | 0.049                            | 99              | 4.2                  |  |  |  |  |

#### 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.

TI certified concentration from NIST-2976.

Accuracy and precision for TI are not reported as the certified concentration is too close to the reportable detection limit.

# Teck Coal Limited Sample Group Information

| Sample<br>Group ID | Client ID                   | Lab ID | Date of<br>Analysis |
|--------------------|-----------------------------|--------|---------------------|
| 01                 | LC_FRB_INV-1_2022-05_NP     | 317    | 22 May 2022         |
|                    | LC_FRB_INV-2_2022-05_NP     | 318    |                     |
|                    | LC_FRB_INV-3_2022-05_NP     | 319    |                     |
|                    | LC_FRB_INV-4_2022-05_NP     | 320    |                     |
|                    | LC_FRB_INV-5_2022-05_NP     | 321    |                     |
|                    | LC_FRUS_INV-1_2022-05_NP    | 322    |                     |
|                    | LC FRUS INV-2 2022-05 NP    | 323    |                     |
|                    | LC_FRUS_INV-3_2022-05_NP    | 324    |                     |
|                    | LC_FRUS_INV-4_2022-05_NP    | 325    |                     |
|                    | LC_FRUS_INV-5_2022-05_NP    | 326    |                     |
|                    | <br>LC_DC4_INV-1_2022-05_NP | 327    |                     |
|                    | LC_DC4_INV-2_2022-05_NP     | 328    |                     |
|                    | LC_DC4_INV-3_2022-05_NP     | 329    |                     |
|                    | LC_DC4_INV-4_2022-05_NP     | 330    |                     |
|                    | LC_DC4_INV-5_2022-05_NP     | 331    |                     |
|                    | LC_DC1_INV-1_2022-05_NP     | 332    |                     |
| 02                 | LC_DC1_INV-2_2022-05_NP     | 333    | 22 May 2022         |
|                    | LC_DC1_INV-3_2022-05_NP     | 334    |                     |
|                    | LC_DC1_INV-4_2022-05_NP     | 335    |                     |
|                    | LC_DC1_INV-5_2022-05_NP     | 336    |                     |
|                    | LC_GRCK_INV-1_2022-05_NP    | 337    |                     |
|                    | LC_GRCK_INV-2_2022-05_NP    | 338    |                     |
|                    | LC_GRCK_INV-3_2022-05_NP    | 339    |                     |
|                    | LC_GRCK_INV-4_2022-05_NP    | 340    |                     |
|                    | LC_GRCK_INV-5_2022-05_NP    | 341    |                     |
|                    | LC_DC2_INV-1_2022-05_NP     | 342    |                     |
|                    | LC_DC2_INV-2_2022-05_NP     | 343    |                     |
|                    | LC_DC2_INV-3_2022-05_NP     | 344    |                     |
|                    | LC_DC2_INV-4_2022-05_NP     | 345    |                     |
|                    | LC_DC2_INV-5_2022-05_NP     | 346    |                     |
|                    | LC_DCEF_INV-1_2022-05_NP    | 347    |                     |
|                    | LC_DCEF_INV-2_2022-05_NP    | 348    |                     |
|                    | LC_DCEF_INV-3_2022-05_NP    | 349    |                     |
|                    | LC_DCEF_INV-4_2022-05_NP    | 350    |                     |
| 03                 | LC_DCEF_INV-5_2022-05_NP    | 351    | 22 May 2022         |
|                    | LC_DCDS_INV-1_2022-05_NP    | 352    |                     |
|                    | LC_DCDS_INV-2_2022-05_NP    | 353    |                     |
|                    | LC_DCDS_INV-3_2022-05_NP    | 354    |                     |
|                    | LC_DCDS_INV-4_2022-05_NP    | 355    |                     |
|                    | LC_DCDS_INV-5_2022-05_NP    | 356    |                     |

# Teck Coal Limited Sample Group Information

| Sample   | Cli - ID                |        | Date of     |
|----------|-------------------------|--------|-------------|
| Group ID | Client ID               | Lab ID | Analysis    |
| 03       | LC_DC3_INV-1_2022-05_NP | 357    | 22 May 2022 |
|          | LC_DC3_INV-2_2022-05_NP | 358    |             |
|          | LC_DC3_INV-3_2022-05_NP | 359    |             |
|          | LC_DC3_INV-4_2022-05_NP | 360    |             |
|          | LC_DC3_INV-5_2022-05_NP | 361    |             |
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| _   |  |  |  |               |                        | 325         |                           | 323                      | 322                        | 321                      | 320                      | 319                     | 318                       | 418                      | Ć D   |  |                           |                     |                         |                               |   |                                |  |                  |   |
|---|--|--|--|---------------|------------------------|-------------|---------------------------|--------------------------|----------------------------|--------------------------|--------------------------|-------------------------|---------------------------|--------------------------|---|--|---------------------------|---------------------|-------------------------|-------------------------------|---|--------------------------------|--|------------------|---|
| Emer  | Pri  | SERVICE REQUEST (rush - subject to availability) |  |               | WWO TENOTHORY          | 8           | LC_FRUS_INV-3_2022-05_NP> | LC_FRUS_INV-2_2022-05_NP | LC_FRUS_INV-1_2022-05_NP \ | LC_FRB_INV-5_2022-05_NP_ | LC_FRB_INV-4_2022-05_NP/ | LC_FRB_INV-3_2022-05_NP | LC_FRB_INV-2_2022-05_NP / | LC_FRB_INV-1_2022-05_NP_ | Sample ID   | <i>y</i> .   | Pho                       |                     |                         |                               |   | Proje                          | Facility N                                 |                  |   |
| Emergency (1 Business Day) - 100% surcharge | iority (2-3 busin  | l' (rush - subject                               |  | 1 0 010777    | ENINSPECIAL            |             |                           |                          |                            |                          |                          |                         |                           |                          | ~ ~   |  | Phone Number 250-425-8449 | Postal Code         | City                    |                               | Address 421 Pine Ave                    | Project Manager Mike Pope      | Name / Job# Line                           | PROJ             | Γ |
| ss Day) - 100% si                           | Regular (default) Priority (2-3 business days) - 50% surcharge | to availability)                                 |  |               | PO \$18000             | LC_FRUS     | LC_FRUS                   | LC_FRUS                  | LC_FRUS                    | LC_FRB                   | LC_FRB                   | LC_FRB                  | LC_FRB                    | LC_FRB                   | Sample Location (sys loc code)                    | SAMPLE DETAILS                                       | 425-8449                  | V0B 2G0             | Sparwood                |                               | ddress 421 Pine Ave                     | e Pope                         | Facility Name / Job# Line Creek Operations | COC ID:          |   |
| rcharge X                                   | default)<br>ircharge   |  |  |               |                        | TA          | TA                        | TA                       | TA                         | TA                       | TA                       | TA                      | TA                        | TA                       | Field Matrix                                      | DETAILS  |                           | GO                  | bod                     |                               |   |                                | 0.   |                  |   |
|   |  |  |  |               |                        | Z           | Z                         | Z                        | z                          | Z                        | N                        | Z                       | Z                         | z                        | Hazardous Material (Yes/No)                       |  |                           |                     |                         |                               |   |                                |  | CO               |   |
|   | Sampler's Name   |  |  | 2             | RELINQUIS              | 11-May-22 / | 11-May-22 🗸               | 11-May-22 🗸              | 11-May-22 /                | 11-May-22 🗸              | 11-May-22 /              | 11-May-22 /             | 11-May-22 /               | 11-May-22 ✓              | Date  |  |                           | Country Ca          | Province BC             |                               |   |                                |  | LCO_LAEMP        |   |
|   | me   |  |  | Robin Valleau | HED BY/A               | 10:45       | 10:40                     | 10:35                    | 10:30                      | 11:35                    | 11:30                    | 11:25                   | 11:20                     | 11:15                    | Time (24hr)                                       |  |                           | Canada              | ()                      |                               |   |                                |  |                  |   |
|   |  | ÷?   |  | eau           | MEDIATION              | ВІТ         | ВІТ                       | BIT                      | BTT                        | BIT                      | BIT                      | ВІТ                     | BIT                       | BIT                      | Species   | , J. J.  | P                         |                     |                         |                               |   |                                |  | TUR              |   |
|   | Robin  |  |  |               | ION                    | Composite   | Composite                 | Composite                | Composite                  | Composite                | Composite                | Composite               | Composite                 | 0                        | Sample<br>Type                                    |  | Phone Number              | Postal Code V8M 0B3 | City                    | Addiess                       | Email                                   | Lab Contact Jennie Christensen | Lab Name TrichAnalytics Inc                | TURNAROUND TIME: |   |
|   | Robin Valleau  |  |  | May 15, 2022  | DATE                   |             |                           | -                        |                            | -                        | -                        |                         |                           | -                        | ANALYSIS PRESERV. Fig.  Number of Containers      |  |                           | V8M 0               | City Saanichton         | 207-17                        | jennie.                                 | Jennie                         | TrichA                                     | TIME:            |   |
|   | =  | Salaria<br>Salaria                               |  | 5, 2022       | TE/TIME                | x           | x                         | X                        | X                          | x                        | х                        | Х                       | ×                         | ×                        | Metals in Biota by CRC ICPMS<br>(wet and dry)     | AN   |                           | В3                  | nton                    | Address 207-1755 Sean Heights | christense                              | Christens                      | nalytics I                                 | IE:              |   |
|   |  | 7.0  |  |               | ACC                    | X           | X                         | X                        | X                          | ×                        | x                        | ×                       | ×                         | ×                        | Mercury in Biota by CVAAS<br>(wet, dry & routine) | ANALYSIS REQUESTED                                   |                           | Country             | Province                | leights                       | Email jennie.christensen@trichanalytics | en                             | nc.  |                  |   |
|   | Mobile #   |  |  |               | BPIEDB                 | X           | x                         | ×                        | х                          | ×                        | ×                        | ×                       | ×                         | X                        | Moisture Content by<br>Gravimetry                 | EQUEST   |                           | Canada              | BC                      |                               | alytics                                 |                                |  |                  |   |
|   | #  |  |  |               | CCEPTED BY/APPILIATION |             |                           |                          |                            |                          |                          |                         |                           |                          |   | ED   | PO number                 |                     | Email 5:                | Email 4:                      | Email 2:                                | Email 1:                       | Report                                     |                  |   |
|   |  |  |  |               | NOW                    |             |                           |                          |                            | -                        |                          |                         |                           |                          |   |  | er                        |                     |                         |                               |   |                                | Format /                                   | 74               |   |
|   | 416-970-7535   |  |  |               | D.                     |             |                           |                          |                            |                          |                          |                         |                           |                          |   | Fillered - F. J                                      | 818999                    | (                   | Robin valleau@minnow.ca | teckcoal@equisonline.com      | essica.Ritz@teck.com                    | mike.pope@teck.com             | Report Format / Distribution               | RUSH:            |   |
|   | 535  |  |  |               | DATE/TIME              |             |                           |                          |                            |                          |                          |                         |                           |                          |   | Filtered - F: Field, L. Lab, FL: Field & Lab, N; Nor |                           |                     | Y X                     |                               | x x                                     |                                | Excel                                      |                  |   |
|   |  |  |  |               |                        |             |                           |                          |                            |                          | -                        | -                       |                           |                          |   | Field & Lab  |                           |                     |                         |                               | 1                                       |                                | PDF 1                                      |                  |   |
|   |  |  |  |               |                        |             |                           |                          |                            |                          |                          |                         |                           |                          |   | N; None  |                           |                     |                         |                               |   |                                | EDD  |                  |   |

Received by: Alex Wade

Project #: 2022 - 334

|                                       |  |                                       |  |  |                           |                         | 333                       | 332 1                   | 331                      | 330                       |                           | 328                     | 32.7                      | 326                      | Reduit  |  |                           |                     |  |                               |   |                                |  |                  |      |
|---------------------------------------|--|---------------------------------------|--|--|---------------------------|-------------------------|---------------------------|-------------------------|--------------------------|---------------------------|---------------------------|-------------------------|---------------------------|--------------------------|---|--|---------------------------|---------------------|--|-------------------------------|---|--------------------------------|--|------------------|------|
| Fo                                    | Pri  | SERVICE REQUEST                       |  | P  | ADDITIONAL COMME          | IC DC1 INV.3 2022-05 ND | LC_DC1_INV-2_2022-05_NP_/ | LC_DC1_INV-1_2022-05_NP | LC_DC4_INV-5_2022-05_NP_ | LC_DC4_INV-4_2022-05_NP / | LC_DC4_INV-3_2022-05_NP / | LC_DC4_INV-2_2022-05_NP | LC_DC4_INV-1_2022-05_NP / | LC_FRUS_INV-5_2022-05_NP | Sample ID   |  | Phor                      | P                   |  |                               |   | Projec                         | Facility N                                 |                  | Teck |
| gency (1 E                            | ority (2-3                                   | (rush - st                            |  | PO 818999  | MINISPE                   |                         |                           |                         |                          |                           |                           |                         |                           |                          |   |  | ne Numbe                  | Postal Code         | City   | Addres                        | Ema                                     | ct Manage                      | lame / Job                                 |                  |      |
| For Emergency <1 Day, ASAP or Weekend | Priority (2-3 business days) - 50% surcharge | - subject to availability)  Reoular ( |  |  | CIAL INSTRUCTIONS         | 10 PC                   | LC DC1                    | LC_DC1                  | LC_DC4                   | LC_DC4                    | LC_DC4                    | LC_DC4                  | LC_DC4                    | LC_FRUS                  | Sample Location (sys loc code)                    | SAMPLE DETAILS                                       | Phone Number 250-425-8449 | e V0B 2G0           | y Sparwood                                   | Address 421 Pine Ave          | Email Mike.pope@teck.com                | Project Manager Mike Pope      | Facility Name / Job# Line Creek Operations | COC ID:          |      |
| rcharge X<br>eekend                   | rcharge                                      | default)                              |  |  | IA                        | ! 5                     | TA                        | TA                      | TA                       | TA                        | TA                        | TA                      | TA                        | TA                       | Field<br>Matrix                                   | DETAILS  |                           | 30                  | od   |                               |   |                                |  |                  |      |
| Sa                                    |  |                                       |  |  | 2                         | 2                       | 2                         | 2                       | Z                        | Z                         | N                         | Z                       | Z                         | Z                        | Hazardous Material (Yes/No)                       |  |                           |                     |  |                               |   |                                |  | LCO_             |      |
| Sampler's Signature                   | Sampler's Name                               |                                       |  | Ra   | RELINOUSHED BY A FILL TON | II-iviay-22             | 11_May_22                 | 11-May-22 /             | 11-May-22 🗸              | 11-May-22                 | 11-May-22                 | 11-May-22 /             | 11-May-22                 | 11-May-22/               | Date  |  |                           | Country Ca          | Province BC                                  |                               |   |                                |  | LAEMP            |      |
| ture                                  | ne   |                                       |  | Robin Valleau  | 9:40                      | 9:35                    | 0.25                      | 9:30                    | 9:05                     | 9:00                      | 8:55                      | 8:50                    | 8:45                      | 10:50                    | Time (24hr)                                       |  |                           | Canada              |  |                               |   |                                |  |                  |      |
|                                       |  |                                       |  | eau  | BUT                       | ВП                      | PIT                       | BIT                     | BIT                      | BIT                       | TIB                       | віт                     | BIT                       | ВІТ                      | Species   |  | Ph                        |                     |  |                               |   |                                |  | TURN             | ,    |
|                                       | Robin  |                                       |  | \$   | Composite                 | Composite               |                           | Composite               | Composite                | Composite                 | Composite                 | Composite               | Composite                 | Composite                | Sample<br>Type                                    |  | Phone Number              | Postal Code V8M 0B3 | City   | Address                       | Emai                                    | Lab Contact Jennie Christensen | Lab Name TrichAnalytics Inc                | TURNAROUND TIME: | age  |
|                                       | Robin Valleau                                |                                       |  | May 1  |                           |                         |                           | _                       | -                        |                           | -                         |                         |                           | -                        | ANALYSIS PRESERV. Fig.  Number of Containers      |  |                           | V8M 0               | City Saanichton                              | 207-17                        | jennie.                                 | Jennie                         | ne TrichA                                  | TIME:            | 9    |
|                                       | _  |                                       |  | 1ay 15, 2022   | 1 X                       | ×                       |                           | ×                       | х                        | ×                         | x                         | x                       | ×                         | ×                        | Metals in Biota by CRC ICPMS<br>(wet and dry)     | AN   |                           | В3                  | iton   | Address 207-1753 Sean Heights | hristense                               | Christens                      | ichAnalytics I                             |                  | 1    |
|                                       |  | 01-11                                 |  | Alve   | ×                         | ×                       | 4 ;                       | ×                       | ×                        | ×                         | x                         | X                       | x                         | x                        | Mercury in Biota by CVAAS<br>(wet, dry & routine) | ANALYSIS REQUESTED                                   |                           | Country             | Province                                     | Teights                       | Email jennie.christensen@trichanalytics | en                             | nc.  |                  |      |
| Date/Time                             | Mobile #                                     |                                       |  |  | X                         | ×                       |                           | ×                       | ×                        | ×                         | ×                         | ×                       | х                         | Х                        | Moisture Content by<br>Gravimetry                 | EQUEST   |                           | Canada              | ВС   |                               | dytics                                  |                                |  |                  |      |
| ime                                   | e#   |                                       |  |  | X X                       |                         |                           |                         |                          |                           |                           |                         |                           |                          |   | ED   | PO number                 |                     | Email 5:                                     | Email 3:                      | Email 2:                                | Email 1:                       | Renort                                     |                  |      |
|                                       |  |                                       |  | KILON  | NOW.                      |                         |                           |                         |                          |                           |                           |                         |                           |                          |   |  | ег                        |                     |  |                               |   | 2                              | Eormat                                     |                  |      |
| May 15, 2022                          | 416-970-7535                                 |                                       |  |  |                           |                         |                           |                         |                          |                           |                           |                         |                           |                          |   | Filtered - F:  | 818999                    |                     | AquaSciLab@teck.com  Robin valleau@minnow.ca | teckcoal@equisonline.com      | essica.Ritz@teck.com                    | Email 1: mike pope@teck.com    | OTHER INFO                                 | RUSH:            |      |
| 022                                   | 535  |                                       |  | The state of the s |                           |                         |                           |                         |                          |                           |                           |                         | -                         |                          |   | Filtered - Fr Field, L. Lah, F3.: Field & Lab. N: No |                           |                     | × ×  | X                             | X                                       | EXCE                           | 10000                                      |                  |      |
|                                       |  |                                       |  | VIE  |                           |                         |                           |                         |                          |                           |                           |                         |                           |                          |   | , FL: Field d  |                           |                     | * *  | X                             | ×                                       | Y                              | - 100                                      |                  |      |
|                                       |  |                                       |  |  |                           |                         |                           |                         |                          |                           |                           | -                       |                           |                          |   | Lab, N: N  |                           |                     | e k  | X                             | X                                       | Y EDD                          | EDD  |                  |      |

Page 2 of 5

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Project #: 2022 - 334

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| Date   Time   Sample   Sample   Time   Dat   | N 10-May-22 / RELINQUISHE Robi | Regular (default) Priority (2-3 business days) - 50% surcharge | Priority (2-3 busines                            |
|--|--------------------------------|--|--|
| omposite  Type  Omposite  Type  ANALYSIS  Number of Containers  Number of Containers  Number of Containers  X X X X X Metals in Biota by CRC (wet and dry)  May 15, 2022  May 15, 2022   |                                |  |  |
| omposite  DATE/TIME  May 15, 2022  Mercury in Biota by CRC (wet and dry)  Mercury in Biota by CRC (wet and dry)  |                                | availability)  | SERVICE REQUEST (rash - subject to availability) |
| omposite  Type  Omposite  Type  ANALYSIS  Number of Containers  Number of Containers  Number of Containers  X X X X X X Metals in Biota by CRC (wet and dry)  May 15, 2022   |                                |  |  |
| omposite  I I I I I I I I I Number of Containers  Number of Containers  X X X X X X X X Metals in Biota by CRC (wet and dry)  Mercury in Biota by CRC  |                                |  | PO 818999  |
| Time (24hr) Species Sample (24hr) Species Type Species Type Species Type Type Of Composite Sample Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Type Species Sample Species Sample Species Type Species Sample Species Type Species Sample Species Sp |                                | TIONS  | NEWNO  |
| Time (24hr) Species Sample (24hr) Species Sample Sample Sample Sample Sample Sample Species Type Composite Sample Sample Species Type Type Composite Sample Sample Sample Species Type Sample Sample Species Type Composite Sample Species Type Composite Sample Species Species Specie |                                | LC_DC2 TA  | LC_DC2_INV-2_2022-05_NP _                        |
| Time  Time  Time  (24hr) Species  Sample  9:48  BIT Composite  13:45  BIT Composite  1 1 1 1 1 1   | N 10-May-22                    | LC_DC2 TA  | LC_DC2_INV-1_2022-05_NP_/                        |
| Time  Time  Time  Time  Time  Species  Sample  9:45  BIT  Composite  In the species of Containers  ANALYSIS  Number of Containers  Wetals in Biota by CRO (wet and dry)  XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   | N 11-May-22                    | LC_GRCK TA   | LC_GRCK_INV-5_2022-05_NP                         |
| Time (24hr) Species Sample (24hr) Species Type Sample Species Type Composite Type Composite Number of Containers X X X X X Mercury in Biota by CRC (wet, dry & routine) X X X X X X Moisture Content by X X X X X X Moisture Content by X X X X X X X X X X X X X X X X X X  | N 11-May-22-/                  | LC_GRCK TA   | LC_GRCK_INV-4_2022-05_NP                         |
| Time  Time  Time  Opension | N 11-May-22 /                  | LC_GRCK TA   | LC_GRCK_INV-3_2022-05_NP/                        |
| 9:50 BIT Composite  1 1 Number of Containers  X X Metals in Biota by CRC (wet, dry & routine)  X X Moisture Content by  Moisture Content by  | N 11-May-22                    | LC_GRCK TA   | LC_GRCK_INV-2_2022-05_NP /                       |
| 9:50  BIT Composite  Number of Containers  Metals in Biota by CRC (wet, dry & routine)  Moisture Content by  Moisture Content by   | N 11-May-22                    | LC_GRCK TA   | LC_GRCK_INV-1_2022-05_NP                         |
| 9:45  BIT Composite  ANALYSIS  Number of Containers  Metals in Biota by CRC (wet and dry)  Mercury in Biota by CRC (wet, dry & routine)  Moisture Content by   | N 11-May-22                    | LC_DC1 TA  | LC_DC1_INV-5_2022-05_NP /                        |
| 24hr) Species Sample ANALYSIS Number of Containers Metals in Biota by CRC (wet and dry) Mercury in Biota by CRC (wet, dry & routine) Moisture Content by   | N 11-May-22                    | LC_DC1 TA  | LC_DCI_INV-4_2022-05_NP /                        |
| PICPMS  VAAS   | Hazardous Material (Yes/No)    | Sample Location Field (Sys loc code) Matrix                    | Sample ID (Si                                    |
| ANALYSIS REQUESTED PRICE - FIGH L Lab, FL FER & Lab, N. P.   |                                | SAMPLE DETAILS   |  |
|  |                                | 25-8449  | Phone Number 250-425-8449                        |
| Canada Postal Code V8M 0B3 Country Canada  | Country                        | V0B 2G0  | Postal Code                                      |
| BC City Saanichton Province BC   | Province                       | Sparwood   | City   |
| Email 4:   |                                |  |  |
| Email 3:   |                                | ine Ave  | Address 421 Pine Ave                             |
| atrichanalytics Email 2:   |                                | Email Mike.pope@teck.com                                       | Email Mike                                       |
| TIO,   |                                | Pope   | Project Manager Mike Pope                        |
|  |                                | # Line Creek Operations  | Facility Name / Joh# Line Creek Operations       |
| TURNAROUND TIM   | LCO_LAEMP                      |  | )  |

Received by Alex wode
Projed #: 2022 - 334

| Emergen<br>For E   | PO 818999  SERVICE REQUEST (rush - subject to availability) Regul Priority (2-3 business days) - 50% |                                | ADDITIONAL COMMENTS/SPEC | 352 LC_DCDS_INV-1_2022-05_NP | 351 LC_DCEF_INV-5_2022-05_NP/ | 350 LC_DCEF_INV-4_2022-05_NP/ | 349 LC_DCEF_INV-3_2022-05_NP / | 348 LC_DCEF_INV-2_2022-05_NP | LC_DCEF_INV-1_2022-05_NP / | LC_DC2_INV-5_2022-05_NP / | 345 LC_DC2_INV-4_2022-05_NP | 344 LC_DC2_INV-3_2022-05_NP > | Sample ID   |           | Phone Y   | Post   |                           |                           |                     | Project N                     | Facility Nam                            |                                |  |  |
|--|--|--------------------------------|--------------------------|------------------------------|-------------------------------|-------------------------------|--------------------------------|------------------------------|----------------------------|---------------------------|-----------------------------|-------------------------------|-------------|-----------|---|--|---------------------------|---------------------------|---------------------|-------------------------------|---|--------------------------------|--|--|
| Emergency (1 Business Day) - 100% surcharge<br>For Emergency <1 Day, ASAP or Weekend | Regular (default) Priority (2-3 business days) - 50% surcharge                                       | ish - subject (o availability) |                          | \$18999                      | SSPECIAL INSTRUCTIONS         | LC_DCDS                       | LC_DCEF                        | LC_DCEF                      | LC_DCEF                    | LC_DCEF                   | LC_DCEF                     | LC_DC2                        | LC_DC2      | LC_DC2    | Sample Location (sys loc code)                    | SAMPLE I                                       | Phone Number 250-425-8449 |                           | City Sparwood       | Addieso and the Care          | Address 421 Pine Ave                    | Project Manager Mike Pope      | Facility Name / Job# Line Creek Operations | PROJECT/CLIENT INFO  |
| rcharge X<br>eekend  | default)<br>rcharge  |                                |                          |                              |                               | TA                            | TA                             | TA                           | TA                         | TA                        | TA                          | TA                            | TA          | TA        | Field<br>Matrix                                   | DETAILS  |                           | 30                        | bo                  |                               |   |                                |  |  |
| Sam  | Sa   |                                |                          |                              |                               | 2                             | Z                              | Z                            | Z                          | Z                         | Z                           | Z                             | N           | Z         | Hazardous Material (Yes/No)                       |  |                           | C                         | P                   |                               |   |                                |  |  |
| Sampler's Signature  | Sampler's Name   |                                |                          | R                            | RELINQUISHED BY/AFFILIATION   | 10-May-22                     | 10-May-22 J                    | 10-May-22 /                  | 10-May-22 J                | 10-May-22~                | 10-May-22                   | 10-May-22 /                   | 10-May-22 / | 10-May-22 | Date  |  |                           |                           | Province BC         |                               |   |                                |  |  |
| ture   | ne   |                                |                          | Robin Valleau                | HED BY/A                      | 12:30                         | 11:20                          | 11:15                        | 11:10                      | 11:05                     | 11:00                       | 15:50                         | 15:45       | 15:40     | Time (24hr)                                       |  |                           | Canada                    |                     |                               |   |                                |  |  |
|  |  | *                              |                          | au                           | IN I HE                       | BIT                           | ВІТ                            | BIT                          | BIT                        | BIT                       | ВІТ                         | BIT                           | ВІТ         | ВІТ       | Species   |  | Pł                        |                           |                     |                               |   |                                |  | avavi  |
|  | Robin  |                                |                          |                              | ON .                          | Composite                     | Composite                      | Composite                    | Composite                  | Composite                 | Composite                   | Composite                     | Composite   | Composite | Sample<br>Type                                    |  | Phone Number              | Postal Code               | City                | Address                       | Email                                   | Lab Contact Jennie Christensen | Lab Name TrichAnalytics Inc                |  |
|  | Robin Valleau  |                                |                          | May 15, 2022                 | DATE                          | -                             | E.                             |                              | E                          |                           | -                           |                               | -           | -         | ANALYSIS PRESERV. Pile.  Number of Containers     |  |                           | V8M 0B3                   | City Saanichton     | Address 207-1755 Sean Heights | Email jennie.christensen@trichanalytics | Jennie C                       | TrichAn                                    | Yath Yata  |
|  |  |                                |                          | , 2022                       | MINID                         | ×                             | x                              | Х                            | Х                          | Х                         | х                           | Х                             | x           | ×         | Metals in Biota by CRC ICPMS<br>(wet and dry)     | ANA  |                           |                           |                     | 3 Sean He                     | nristensen                              | hristenser                     | alytics Inc                                | AGION  |
|  |  |                                |                          |                              | ACC                           | ×                             | ×                              | x                            | X                          | X                         | x                           | ×                             | ×           | ×         | Mercury in Biota by CVAAS<br>(wet, dry & routine) | LYSISR   |                           | Country                   | Province            | aghts                         | @trichana                               |                                |  |  |
| Date/Time  | Mobile #   |                                |                          |                              | EPZTE D R                     | ×                             | ×                              | ×                            | ×                          | X                         | X                           | ×                             | ×           | X         | Moisture Content by<br>Gravimetry                 | ANALYSIS REQUESTED                             |                           |                           | BC                  |                               | alytics                                 |                                |  |  |
| me   | #  |                                |                          |                              | ACCEPTED BYANESH ATTON        |                               |                                |                              |                            |                           |                             |                               |             |           |   | <b>a</b>                                       | PO number                 | Cilian C.                 | Email 4:            | Email 3:                      | Email 2:                                | Email 1:                       | Report Format / Distribution               |  |
|  |  |                                |                          |                              | ON .                          |                               |                                |                              |                            |                           |                             |                               |             |           |   |  |                           | NOUBL VE                  | AquaSciLa           | teckcoal@                     | jessica.R                               | mike.pop                       | rmat / Dis                                 |  |
| May 15, 2022   | 416-970-7535   |                                |                          |                              | T.                            |                               |                                |                              |                            |                           |                             |                               |             |           |   | Filtered - F: Fi                               | 818999                    | Koonii valeau@iiiiiiow.ca | AquaSclLab@teck.com | teckcoal@equisonline.com      | essica.Ritz@teck.com                    | mike.pope@teck.com             | stribution                                 | AND DESIGNATION OF THE PARTY OF |
| )22  | 35   |                                |                          |                              | N CONTRACTOR                  |                               |                                |                              |                            |                           |                             |                               |             |           |   | Filtered F. Field to Lab VI. Paul & Lab W. No. |                           | À                         | ×                   | X                             | ×                                       | 500000                         | Excel                                      |  |
|  |  |                                |                          |                              |                               |                               |                                |                              |                            |                           |                             |                               |             |           |   | 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1        |                           | 2                         |                     |                               | X                                       |                                | PDF  |  |
|  |  |                                |                          |                              |                               |                               |                                |                              |                            |                           |                             |                               |             |           |   |  |                           | -                         | X                   | ×                             | X                                       | X                              | EDD  |  |

Page 4 of 5

17 may 2012

Received by: Alex White

Project #: 2022 -334

LC\_DCDS\_INV-5\_2022-05\_NP LC\_DC3\_INV-5\_2022-05\_NP > LC\_DC3\_INV-4\_2022-05\_NP / LC\_DC3\_INV-3\_2022-05\_NP LC\_DCDS\_INV-4\_2022-05\_NP LC\_DC3\_INV-2\_2022-05\_NP\_ LC\_DC3\_INV-1\_2022-05\_NP LC\_DCDS\_INV-2\_2022-05\_NP LC\_DCDS\_INV-3\_2022-05\_NP DDITIONAL COMMENTS/SPECIAL INSTRUCTIONS Sample ID Emergency (1 Business Day) - 100% surcharge X
For Emergency <1 Day, ASAP or Weekend Phone Number 250-425-8449 Regular (default)
Priority (2-3 business days) - 50% surcharge PO 818999 Postal Code Address 421 Pine Ave Sample Location (sys loc code) LC\_DCDS LC\_DC3 LC\_DC3 LC\_DCDS LC\_DCDS LC\_DCDS LC\_DC3 LC\_DC3 LC\_DC3 Sparwood V0B 2G0 Field Matrix TA TA TA TA TA TA TA TA TA Z Z 2 Z Z Z 2 Z Hazardous Material (Yes/No) Country Province 10-May-22 10-May-22 Date

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£58 926

361 360 359 53 CS ID

Teck

Facility Name / Job# Line Creek Operations

PROJECT/CLIENT INFO

COC ID:

Project Manager Mike Pope

Email Mike.pope@teck.com

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LCO\_LAEMP Sampler's Signature Sampler's Name 10-May-22 J 10-May-22 / 10-May-22 -10-May-22 10-May-22 10-May-22 10-May-22 Canada ВС Robin Valleau Time (24hr) 10:20 10:15 10:00 10:10 10:05 12:45 12:40 12:35 12:50 Species BIT BIT HIT BIT BIT BIT BIT BIT BIT TURNAROUND TIME: Phone Number Page Postal Code V8M 0B3 Lab Contact Jennie Christensen Composite Composite Composite Composite Composite Composite Composite Lab Name TrichAnalytics Inc. Composite Composite Sample Type Address 207-1753 Sean Heights Robin Valleau Email jennie.christensen@trichanalytics City Saanichton LABORATORY 1 of May 15, 2022 -Number of Containers 2 Metals in Biota by CRC ICPMS × × × × × × × × × wet and dry) ANALYSIS REQUESTED Received Country Province Mercury in Biota by CVAAS (wet, dry & routine) × × × × × × × × × Canada BC Moisture Content by Date/Time × × × × × × × × Mobile # Gravimetry ha PO number Email 2: Email 5: Email 4: Email 3: Email 1: Report Format / Distribution Alex Robin valleau@minnow.ca // teckcoal@equisonline.com mike.pope@teck.com AquaSciLab@teck.com essica.Ritz@teck.com appe RUSH: OTHER INFO 818999 May 15, 2022 416-970-7535 Filtered - F: Field, L: Lab. FL: Field & Lab. N: No. Project #: 2022 - 334 Excel PDF EDD

## **BENTHIC TISSUE CHEMISTRY**

TrichAnalytics Laboratory Report 2022-393 (Finalized 13-Oct-22)



## Trich Analytics Inc.

### Tissue Microchemistry Analysis Report

Client: Nicole Zathey Date Received: 29 Sep 2022

Project Manager

Teck Coal Ltd

Date of Analysis: 05 Oct 2022

Final Report Date: 13 Oct 2022

Phone: (250) 865-3048 Project No.: 2022-393 Email: nicole.zathey@teck.com; aquascilab@teck.com; jessica.ritz@teck.com; Method No.: MET-002.06

teck.lab.results@teck.com; lbowron@minnow.ca; robin.valleau@minnow.ca;

teckcoal@equisonline.com

Client Project: LCO\_LAEMP\_DRY\_2022-09 Line Creek Operation (PO 818999)

**Analytical Request:** Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 48 samples.

See chain of custody form provided for sample identification numbers.

#### Notes:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).

Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.

Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.

RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 108% (ranging from 107-109%).

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

13 Oct 2022

Date

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



Project No: 2022-393

|           |          |               | LC_DC1_INV-    | LC_DC1_INV-    | LC_DC1_INV-    | LC_DC1_INV-    | LC_DC1_INV-    |
|-----------|----------|---------------|----------------|----------------|----------------|----------------|----------------|
|           |          | Client ID     | 1_2022-09-12_N | 2_2022-09-12_N | 3_2022-09-12_N | 4_2022-09-12_N | 5_2022-09-12_N |
|           |          |               |                |                |                |                |                |
|           |          | Lab ID        | 419            | 420            | 421            | 422            | 423            |
|           |          | et Weight (g) | 0.4333         | 0.4106         | 0.2347         | 0.3648         | 0.6957         |
|           | Di       | y Weight (g)  | 0.1164         | 0.0972         | 0.0559         | 0.0816         | 0.1592         |
|           |          | Moisture (%)  | 73.1           | 76.3           | 76.2           | 77.6           | 77.1           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)          | (ppm)          | (ppm)          | (ppm)          | (ppm)          |
| 7Li       | 0.025    | 0.083         | 2.5            | 1.8            | 1.7            | 0.991          | 1.3            |
| 11B       | 0.074    | 0.247         | 5.3            | 3.6            | 3.6            | 0.969          | 2.7            |
| 23Na      | 3.2      | 11            | 3,778          | 2,583          | 3,081          | 5,014          | 2,755          |
| 24Mg      | 0.050    | 0.167         | 1,660          | 1,476          | 1,404          | 1,330          | 1,166          |
| 27Al      | 0.053    | 0.177         | 4,628          | 3,567          | 2,849          | 602            | 2,585          |
| 31P       | 63       | 210           | 12,991         | 8,878          | 10,247         | 16,025         | 9,709          |
| 39K       | 3.1      | 10            | 17,444         | 11,043         | 11,537         | 18,017         | 10,636         |
| 44Ca      | 13       | 43            | 4,911          | 8,654          | 8,303          | 3,462          | 4,561          |
| 49Ti      | 0.001    | 0.003         | 350            | 258            | 202            | 43             | 172            |
| 51V       | 0.025    | 0.083         | 13             | 8.9            | 7.1            | 1.8            | 7.0            |
| 52Cr      | 0.153    | 0.510         | 27             | 8.1            | 36             | 10             | 19             |
| 55Mn      | 0.006    | 0.020         | 67             | 69             | 58             | 24             | 56             |
| 57Fe      | 1.5      | 5.0           | 2,396          | 1,657          | 2,231          | 548            | 1,548          |
| 59Co      | 0.009    | 0.030         | 1.8            | 0.974          | 0.986          | 0.397          | 0.943          |
| 60Ni      | 0.030    | 0.100         | 63             | 29             | 62             | 18             | 38             |
| 63Cu      | 0.149    | 0.497         | 18             | 14             | 14             | 11             | 14             |
| 66Zn      | 0.335    | 1.1           | 155            | 122            | 116            | 123            | 182            |
| 75As      | 0.453    | 1.5           | 1.4            | 1.2            | 1.1            | 0.604          | 0.893          |
| 77Se      | 0.381    | 1.3           | 8.3            | 7.2            | 8.3            | 8.3            | 9.6            |
| 88Sr      | 0.001    | 0.003         | 10             | 17             | 12             | 3.7            | 8.1            |
| 95Mo      | 0.014    | 0.047         | 0.776          | 0.662          | 0.799          | 0.480          | 0.662          |
| 107Ag     | 0.001    | 0.003         | 0.132          | 0.111          | 0.102          | 0.072          | 0.126          |
| 111Cd     | 0.036    | 0.120         | 1.9            | 2.4            | 2.2            | 0.908          | 2.2            |
| 118Sn     | 0.019    | 0.063         | 0.400          | 0.646          | 0.625          | 0.090          | 0.357          |
| 121Sb     | 0.004    | 0.013         | 0.165          | 0.122          | 0.125          | 0.030          | 0.113          |
| 137Ba     | 0.001    | 0.003         | 167            | 287            | 199            | 44             | 185            |
| 202Hg     | 0.025    | 0.083         | 0.056          | 0.051          | 0.056          | 0.031          | 0.074          |
| 205TI     | 0.001    | 0.003         | 0.063          | 0.056          | 0.045          | 0.016          | 0.040          |
| 208Pb     | 0.002    | 0.007         | 0.861          | 0.695          | 0.668          | 0.137          | 0.488          |
| 238U      | 0.001    | 0.003         | 0.221          | 0.177          | 0.132          | 0.031          | 0.147          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC2_INV-<br>1_2022-09-14_N | LC_DC2_INV-<br>2_2022-09-14_N | LC_DC2_INV-<br>3_2022-09-14_N | LC_DC2_INV-<br>4_2022-09-14_N | LC_DC2_INV-<br>5_2022-09-14_N |
|-----------|----------|---------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|           |          |               |                               |                               |                               |                               |                               |
|           |          | Lab ID        | 424                           | 425                           | 426                           | 427                           | 428                           |
|           |          | et Weight (g) | 0.4722                        | 0.1764                        | 0.3899                        | 0.6971                        | 0.5792                        |
|           |          | ry Weight (g) | 0.0916                        | 0.0399                        | 0.0820                        | 0.1530                        | 0.1424                        |
|           |          | Moisture (%)  | 80.6                          | 77.4                          | 79.0                          | 78.1                          | 75.4                          |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         |
| 7Li       | 0.025    | 0.083         | 0.522                         | 1.7                           | 1.1                           | 2.1                           | 0.631                         |
| 11B       | 0.074    | 0.247         | 0.345                         | 4.1                           | 1.7                           | 4.2                           | 0.942                         |
| 23Na      | 3.2      | 11            | 2,712                         | 2,387                         | 2,842                         | 2,684                         | 1,522                         |
| 24Mg      | 0.050    | 0.167         | 207                           | 650                           | 453                           | 773                           | 428                           |
| 27Al      | 0.053    | 0.177         | 86                            | 3,347                         | 1,652                         | 3,706                         | 926                           |
| 31P       | 63       | 210           | 11,301                        | 9,368                         | 10,186                        | 9,601                         | 7,217                         |
| 39K       | 3.1      | 10            | 7,771                         | 9,438                         | 10,283                        | 11,072                        | 4,298                         |
| 44Ca      | 13       | 43            | 467                           | 2,357                         | 1,253                         | 2,779                         | 1,629                         |
| 49Ti      | 0.001    | 0.003         | 4.8                           | 227                           | 107                           | 239                           | 54                            |
| 51V       | 0.025    | 0.083         | 0.343                         | 8.9                           | 3.9                           | 10                            | 2.3                           |
| 52Cr      | 0.153    | 0.510         | 3.6                           | 63                            | 8.5                           | 43                            | 12                            |
| 55Mn      | 0.006    | 0.020         | 10                            | 48                            | 25                            | 64                            | 42                            |
| 57Fe      | 1.5      | 5.0           | 114                           | 1,747                         | 756                           | 1,726                         | 459                           |
| 59Co      | 0.009    | 0.030         | 0.274                         | 1.4                           | 0.695                         | 2.4                           | 0.662                         |
| 60Ni      | 0.030    | 0.100         | 11                            | 117                           | 22                            | 86                            | 22                            |
| 63Cu      | 0.149    | 0.497         | 8.8                           | 16                            | 10                            | 18                            | 10                            |
| 66Zn      | 0.335    | 1.1           | 93                            | 135                           | 114                           | 247                           | 100                           |
| 75As      | 0.453    | 1.5           | < 0.453                       | 0.704                         | 0.553                         | 1.2                           | < 0.453                       |
| 77Se      | 0.381    | 1.3           | 7.4                           | 7.9                           | 6.6                           | 8.9                           | 6.1                           |
| 88Sr      | 0.001    | 0.003         | 0.712                         | 6.6                           | 3.2                           | 8.8                           | 3.4                           |
| 95Mo      | 0.014    | 0.047         | 0.240                         | 1.1                           | 0.343                         | 0.959                         | 0.365                         |
| 107Ag     | 0.001    | 0.003         | 0.078                         | 0.156                         | 0.114                         | 0.132                         | 0.093                         |
| 111Cd     | 0.036    | 0.120         | 0.942                         | 1.8                           | 1.1                           | 3.5                           | 1.2                           |
| 118Sn     | 0.019    | 0.063         | 0.032                         | 0.436                         | 1.1                           | 0.513                         | 0.197                         |
| 121Sb     | 0.004    | 0.013         | 0.030                         | 0.125                         | 0.086                         | 0.187                         | 0.043                         |
| 137Ba     | 0.001    | 0.003         | 31                            | 115                           | 72                            | 145                           | 54                            |
| 202Hg     | 0.025    | 0.083         | 0.072                         | 0.092                         | 0.072                         | 0.107                         | 0.087                         |
| 205TI     | 0.001    | 0.003         | 0.010                         | 0.061                         | 0.031                         | 0.077                         | 0.018                         |
| 208Pb     | 0.002    | 0.007         | 0.047                         | 0.582                         | 0.304                         | 0.893                         | 0.224                         |
| 238U      | 0.001    | 0.003         | 0.021                         | 0.202                         | 0.083                         | 0.219                         | 0.058                         |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC3_INV-<br>1_2022-09-13_N | LC_DC3_INV-<br>2_2022-09-13_N | LC_DC3_INV-<br>3_2022-09-13_N | LC_DC3_INV-<br>4_2022-09-13_N | LC_DC3_INV-<br>5_2022-09-13_N |
|-----------|----------|---------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|           |          | CHOILID       | 1_2022 05 15_14               | 2_2022 03 13_14               | 5_2022 05 15_14               | 4_2022 05 15_11               | 5_2022 05 15_14               |
|           |          | Lab ID        | 429                           | 430                           | 431                           | 432                           | 433                           |
|           | We       | et Weight (g) | 0.2440                        | 0.2556                        | 0.3614                        | 0.2269                        | 0.4485                        |
|           |          | y Weight (g)  | 0.0465                        | 0.0514                        | 0.0921                        | 0.0604                        | 0.0884                        |
|           |          | Moisture (%)  | 80.9                          | 79.9                          | 74.5                          | 73.4                          | 80.3                          |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         |
| 7Li       | 0.025    | 0.083         | 1.5                           | 2.2                           | 1.8                           | 0.841                         | 1.4                           |
| 11B       | 0.074    | 0.247         | 2.5                           | 4.4                           | 4.1                           | 1.2                           | 0.983                         |
| 23Na      | 3.2      | 11            | 3,487                         | 3,307                         | 2,969                         | 3,472                         | 7,549                         |
| 24Mg      | 0.050    | 0.167         | 1,511                         | 1,668                         | 1,829                         | 1,601                         | 1,003                         |
| 27Al      | 0.053    | 0.177         | 2,097                         | 3,661                         | 2,838                         | 797                           | 676                           |
| 31P       | 63       | 210           | 12,545                        | 12,116                        | 12,977                        | 14,308                        | 10,744                        |
| 39K       | 3.1      | 10            | 11,037                        | 12,351                        | 15,186                        | 14,627                        | 11,501                        |
| 44Ca      | 13       | 43            | 6,321                         | 8,202                         | 7,314                         | 3,020                         | 1,431                         |
| 49Ti      | 0.001    | 0.003         | 129                           | 262                           | 206                           | 59                            | 46                            |
| 51V       | 0.025    | 0.083         | 5.5                           | 11                            | 9.8                           | 2.5                           | 1.9                           |
| 52Cr      | 0.153    | 0.510         | 9.2                           | 48                            | 13                            | 10                            | 5.0                           |
| 55Mn      | 0.006    | 0.020         | 46                            | 65                            | 58                            | 32                            | 16                            |
| 57Fe      | 1.5      | 5.0           | 794                           | 2,220                         | 1,526                         | 556                           | 152                           |
| 59Co      | 0.009    | 0.030         | 1.0                           | 3.1                           | 2.0                           | 1.1                           | 0.302                         |
| 60Ni      | 0.030    | 0.100         | 35                            | 88                            | 49                            | 30                            | 11                            |
| 63Cu      | 0.149    | 0.497         | 16                            | 18                            | 21                            | 21                            | 6.1                           |
| 66Zn      | 0.335    | 1.1           | 144                           | 167                           | 170                           | 156                           | 66                            |
| 75As      | 0.453    | 1.5           | 0.578                         | 0.931                         | 0.905                         | 0.616                         | < 0.453                       |
| 77Se      | 0.381    | 1.3           | 7.7                           | 9.4                           | 9.9                           | 8.8                           | 10                            |
| 88Sr      | 0.001    | 0.003         | 12                            | 16                            | 11                            | 3.9                           | 2.7                           |
| 95Mo      | 0.014    | 0.047         | 0.548                         | 0.685                         | 0.708                         | 0.411                         | 0.367                         |
| 107Ag     | 0.001    | 0.003         | 0.090                         | 0.132                         | 0.207                         | 0.162                         | 0.036                         |
| 111Cd     | 0.036    | 0.120         | 1.4                           | 1.8                           | 2.1                           | 1.3                           | 0.266                         |
| 118Sn     | 0.019    | 0.063         | 0.979                         | 0.837                         | 0.678                         | 0.625                         | 0.131                         |
| 121Sb     | 0.004    | 0.013         | 0.111                         | 0.155                         | 0.148                         | 0.055                         | 0.037                         |
| 137Ba     | 0.001    | 0.003         | 139                           | 169                           | 126                           | 35                            | 8.1                           |
| 202Hg     | 0.025    | 0.083         | 0.074                         | 0.079                         | 0.092                         | 0.056                         | 0.038                         |
| 205Tl     | 0.001    | 0.003         | 0.056                         | 0.071                         | 0.067                         | 0.031                         | 0.013                         |
| 208Pb     | 0.002    | 0.007         | 0.501                         | 0.868                         | 0.686                         | 0.252                         | 0.061                         |
| 238U      | 0.001    | 0.003         | 0.161                         | 0.262                         | 0.224                         | 0.060                         | 0.038                         |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DC4_COMPN   |                | LC_DC4_INV-    | LC_DC4_INV-    | LC_DC4_INV-    |
|-----------|----------|---------------|----------------|----------------|----------------|----------------|----------------|
|           |          | Client ID     | OLI-1_2022-09- | 2_2022-09-12_N | 3_2022-09-12_N | 4_2022-09-12_N | 5_2022-09-12_N |
|           |          |               | 12_N           |                |                |                |                |
|           |          | Lab ID        | 434            | 435            | 436            | 437            | 438            |
|           | We       | et Weight (g) | 0.2631         | 0.3397         | 0.5776         | 0.7787         | 0.6136         |
|           | Di       | y Weight (g)  | 0.0464         | 0.0735         | 0.1233         | 0.1881         | 0.1446         |
|           |          | Moisture (%)  | 82.4           | 78.4           | 78.7           | 75.8           | 76.4           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)          | (ppm)          | (ppm)          | (ppm)          | (ppm)          |
| 7Li       | 0.025    | 0.083         | 1.3            | 1.1            | 0.615          | 0.552          | 0.646          |
| 11B       | 0.074    | 0.247         | 2.4            | 2.4            | 0.940          | 0.812          | 0.841          |
| 23Na      | 3.2      | 11            | 3,077          | 4,059          | 3,132          | 3,094          | 2,816          |
| 24Mg      | 0.050    | 0.167         | 1,345          | 1,025          | 875            | 817            | 1,253          |
| 27Al      | 0.053    | 0.177         | 2,109          | 1,717          | 491            | 549            | 599            |
| 31P       | 63       | 210           | 10,186         | 13,418         | 12,601         | 11,302         | 10,466         |
| 39K       | 3.1      | 10            | 11,603         | 13,304         | 10,591         | 9,695          | 11,057         |
| 44Ca      | 13       | 43            | 3,494          | 3,245          | 1,522          | 869            | 1,816          |
| 49Ti      | 0.001    | 0.003         | 119            | 116            | 34             | 39             | 41             |
| 51V       | 0.025    | 0.083         | 5.8            | 5.3            | 1.8            | 1.8            | 1.9            |
| 52Cr      | 0.153    | 0.510         | 45             | 20             | 10             | 9.0            | 11             |
| 55Mn      | 0.006    | 0.020         | 37             | 52             | 24             | 37             | 22             |
| 57Fe      | 1.5      | 5.0           | 1,562          | 955            | 335            | 410            | 463            |
| 59Co      | 0.009    | 0.030         | 2.1            | 1.0            | 0.573          | 0.418          | 1.2            |
| 60Ni      | 0.030    | 0.100         | 72             | 44             | 19             | 26             | 22             |
| 63Cu      | 0.149    | 0.497         | 15             | 12             | 9.9            | 13             | 10             |
| 66Zn      | 0.335    | 1.1           | 138            | 155            | 107            | 118            | 199            |
| 75As      | 0.453    | 1.5           | 1.0            | 1.1            | 0.785          | 0.606          | 0.799          |
| 77Se      | 0.381    | 1.3           | 7.0            | 10             | 9.1            | 8.8            | 7.7            |
| 88Sr      | 0.001    | 0.003         | 5.4            | 5.3            | 2.3            | 1.4            | 1.9            |
| 95Mo      | 0.014    | 0.047         | 0.480          | 0.502          | 0.343          | 0.580          | 0.316          |
| 107Ag     | 0.001    | 0.003         | 0.108          | 0.120          | 0.093          | 0.082          | 0.076          |
| 111Cd     | 0.036    | 0.120         | 2.0            | 2.7            | 0.984          | 0.846          | 2.0            |
| 118Sn     | 0.019    | 0.063         | 0.647          | 0.431          | 0.142          | 0.141          | 0.189          |
| 121Sb     | 0.004    | 0.013         | 0.091          | 0.101          | 0.048          | 0.050          | 0.046          |
| 137Ba     | 0.001    | 0.003         | 93             | 190            | 55             | 60             | 42             |
| 202Hg     | 0.025    | 0.083         | 0.054          | 0.097          | 0.066          | 0.042          | 0.084          |
| 205Tl     | 0.001    | 0.003         | 0.039          | 0.034          | 0.018          | 0.018          | 0.026          |
| 208Pb     | 0.002    | 0.007         | 0.440          | 0.525          | 0.137          | 0.180          | 0.200          |
| 238U      | 0.001    | 0.003         | 0.138          | 0.171          | 0.053          | 0.050          | 0.049          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DCDS_INV-   | LC_DCDS_INV-   | LC_DCDS_INV-   | LC_DCDS_INV-   | LC_DCDS_INV-   |
|-----------|----------|---------------|----------------|----------------|----------------|----------------|----------------|
|           |          | Client ID     | 1_2022-09-13_N | 2_2022-09-13_N | 3_2022-09-13_N | 4_2022-09-13_N | 5_2022-09-13_N |
|           |          |               |                |                |                |                |                |
|           |          | Lab ID        | 439            | 440            | 441            | 442            | 443            |
|           |          | et Weight (g) | 0.1824         | 0.6907         | 0.5320         | 0.6808         | 0.3517         |
|           |          | y Weight (g)  | 0.0472         | 0.1456         | 0.1195         | 0.1702         | 0.0850         |
|           |          | Moisture (%)  | 74.1           | 78.9           | 77.5           | 75.0           | 75.8           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)          | (ppm)          | (ppm)          | (ppm)          | (ppm)          |
| 7Li       | 0.025    | 0.083         | 4.5            | 2.2            | 1.5            | 0.359          | 1.9            |
| 11B       | 0.074    | 0.247         | 9.7            | 3.7            | 2.4            | 0.798          | 3.5            |
| 23Na      | 3.2      | 11            | 2,375          | 2,978          | 3,941          | 1,697          | 3,020          |
| 24Mg      | 0.050    | 0.167         | 1,521          | 1,237          | 1,538          | 614            | 1,328          |
| 27Al      | 0.053    | 0.177         | 6,410          | 2,937          | 1,243          | 299            | 2,875          |
| 31P       | 63       | 210           | 10,526         | 10,989         | 14,586         | 5,860          | 11,307         |
| 39K       | 3.1      | 10            | 11,080         | 10,475         | 14,385         | 5,611          | 11,725         |
| 44Ca      | 13       | 43            | 5,706          | 3,686          | 3,733          | 1,237          | 3,334          |
| 49Ti      | 0.001    | 0.003         | 691            | 240            | 100            | 19             | 228            |
| 51V       | 0.025    | 0.083         | 26             | 9.0            | 4.0            | 1.1            | 8.3            |
| 52Cr      | 0.153    | 0.510         | 37             | 25             | 12             | 5.3            | 25             |
| 55Mn      | 0.006    | 0.020         | 100            | 89             | 75             | 38             | 94             |
| 57Fe      | 1.5      | 5.0           | 3,069          | 1,541          | 706            | 216            | 1,495          |
| 59Co      | 0.009    | 0.030         | 3.1            | 2.3            | 1.2            | 0.745          | 1.9            |
| 60Ni      | 0.030    | 0.100         | 94             | 84             | 50             | 18             | 68             |
| 63Cu      | 0.149    | 0.497         | 20             | 15             | 16             | 7.5            | 16             |
| 66Zn      | 0.335    | 1.1           | 249            | 199            | 179            | 83             | 251            |
| 75As      | 0.453    | 1.5           | 1.7            | 1.6            | 0.854          | 0.468          | 0.909          |
| 77Se      | 0.381    | 1.3           | 15             | 10             | 12             | 8.3            | 15             |
| 88Sr      | 0.001    | 0.003         | 18             | 9.3            | 7.5            | 2.0            | 7.7            |
| 95Mo      | 0.014    | 0.047         | 1.1            | 0.659          | 0.685          | 0.264          | 0.765          |
| 107Ag     | 0.001    | 0.003         | 0.275          | 0.223          | 0.254          | 0.062          | 0.223          |
| 111Cd     | 0.036    | 0.120         | 2.7            | 1.9            | 2.1            | 0.804          | 2.5            |
| 118Sn     | 0.019    | 0.063         | 0.413          | 0.331          | 0.344          | 0.050          | 0.398          |
| 121Sb     | 0.004    | 0.013         | 0.498          | 0.229          | 0.124          | 0.046          | 0.207          |
| 137Ba     | 0.001    | 0.003         | 298            | 168            | 121            | 30             | 144            |
| 202Hg     | 0.025    | 0.083         | 0.163          | 0.114          | 0.120          | 0.060          | 0.154          |
| 205TI     | 0.001    | 0.003         | 0.196          | 0.072          | 0.048          | 0.023          | 0.074          |
| 208Pb     | 0.002    | 0.007         | 1.7            | 0.808          | 0.486          | 0.112          | 0.753          |
| 238U      | 0.001    | 0.003         | 0.407          | 0.226          | 0.131          | 0.031          | 0.188          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DCEF_INV-   | LC_DCEF_INV-   | LC_DCEF_INV-   | LC_DCEF_INV-   | LC_DCEF_INV- |
|-----------|----------|---------------|----------------|----------------|----------------|----------------|--------------|
|           |          | Client ID     | 1_2022-09-12_N | 2_2022-09-13_N | 3_2022-09-13_N | 4_2022-09-13_N |              |
|           |          |               |                |                |                |                |              |
|           |          | Lab ID        | 444            | 445            | 446            | 447            | 448          |
|           |          | et Weight (g) | 0.3793         | 0.2747         | 0.2072         | 0.2528         | 0.3388       |
|           | Di       | y Weight (g)  | 0.0822         | 0.0645         | 0.0411         | 0.0498         | 0.0669       |
|           |          | Moisture (%)  | 78.3           | 76.5           | 80.2           | 80.3           | 80.3         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)          | (ppm)          | (ppm)          | (ppm)          | (ppm)        |
| 7Li       | 0.025    | 0.083         | 0.574          | 0.574          | 0.929          | 0.516          | 1.0          |
| 11B       | 0.074    | 0.247         | 2.1            | 0.641          | 2.3            | 1.1            | 2.4          |
| 23Na      | 3.2      | 11            | 2,928          | 2,784          | 3,197          | 1,986          | 3,052        |
| 24Mg      | 0.050    | 0.167         | 1,278          | 1,364          | 1,460          | 932            | 1,349        |
| 27Al      | 0.053    | 0.177         | 138            | 181            | 939            | 340            | 1,434        |
| 31P       | 63       | 210           | 12,378         | 12,221         | 12,332         | 9,679          | 9,809        |
| 39K       | 3.1      | 10            | 11,775         | 10,396         | 10,235         | 8,039          | 11,559       |
| 44Ca      | 13       | 43            | 2,755          | 2,838          | 2,944          | 1,528          | 3,462        |
| 49Ti      | 0.001    | 0.003         | 10             | 11             | 74             | 20             | 117          |
| 51V       | 0.025    | 0.083         | 1.3            | 1.1            | 4.1            | 1.7            | 5.3          |
| 52Cr      | 0.153    | 0.510         | 8.7            | 7.1            | 15             | 6.8            | 17           |
| 55Mn      | 0.006    | 0.020         | 28             | 15             | 28             | 14             | 31           |
| 57Fe      | 1.5      | 5.0           | 237            | 230            | 664            | 247            | 817          |
| 59Co      | 0.009    | 0.030         | 0.453          | 0.321          | 0.836          | 0.445          | 1.1          |
| 60Ni      | 0.030    | 0.100         | 11             | 10             | 24             | 11             | 24           |
| 63Cu      | 0.149    | 0.497         | 22             | 20             | 16             | 12             | 16           |
| 66Zn      | 0.335    | 1.1           | 263            | 179            | 136            | 107            | 144          |
| 75As      | 0.453    | 1.5           | 0.744          | 0.702          | 2.6            | 1.3            | 2.3          |
| 77Se      | 0.381    | 1.3           | 5.9            | 5.9            | 5.4            | 5.4            | 5.7          |
| 88Sr      | 0.001    | 0.003         | 2.7            | 3.1            | 4.2            | 2.1            | 5.4          |
| 95Mo      | 0.014    | 0.047         | 0.448          | 0.475          | 0.422          | 0.264          | 0.525        |
| 107Ag     | 0.001    | 0.003         | 0.124          | 0.137          | 0.103          | 0.117          | 0.117        |
| 111Cd     | 0.036    | 0.120         | 1.9            | 2.1            | 2.4            | 1.6            | 3.9          |
| 118Sn     | 0.019    | 0.063         | 0.356          | 0.379          | 0.556          | 0.171          | 0.699        |
| 121Sb     | 0.004    | 0.013         | 0.058          | 0.044          | 0.097          | 0.045          | 0.120        |
| 137Ba     | 0.001    | 0.003         | 247            | 51             | 106            | 39             | 129          |
| 202Hg     | 0.025    | 0.083         | 0.084          | 0.084          | 0.084          | 0.096          | 0.066        |
| 205Tl     | 0.001    | 0.003         | 0.007          | 0.009          | 0.024          | 0.012          | 0.031        |
| 208Pb     | 0.002    | 0.007         | 0.080          | 0.098          | 0.334          | 0.121          | 0.388        |
| 238U      | 0.001    | 0.003         | 0.115          | 0.069          | 0.090          | 0.033          | 0.118        |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_FRB_INV-<br>1_2022-09-10_N | LC_FRB_INV-<br>2_2022-09-10_N | LC_FRB_INV-<br>3_2022-09-10_N | LC_FRB_INV-<br>4_2022-09-10_N | LC_FRB_INV-<br>5_2022-09-10_N |
|-----------|----------|---------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|           |          | Cilotte 15    | 1_2022 03 10_11               |                               | 3_2022 03 10_11               | 1_2022 03 10_11               | 3_2022 03 10_11               |
|           |          | Lab ID        | 449                           | 450                           | 451                           | 452                           | 453                           |
|           | We       | et Weight (g) | 0.4700                        | 0.1917                        | 0.3821                        | 0.4954                        | 0.4292                        |
|           |          | ry Weight (g) | 0.0914                        | 0.0398                        | 0.0691                        | 0.0998                        | 0.1115                        |
|           |          | Moisture (%)  | 80.6                          | 79.2                          | 81.9                          | 79.9                          | 74.0                          |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         | (ppm)                         |
| 7Li       | 0.025    | 0.083         | 1.2                           | 1.3                           | 0.857                         | 1.2                           | 1.2                           |
| 11B       | 0.074    | 0.247         | 0.826                         | 1.5                           | 0.513                         | 1.4                           | 2.2                           |
| 23Na      | 3.2      | 11            | 2,622                         | 2,193                         | 2,340                         | 2,823                         | 3,144                         |
| 24Mg      | 0.050    | 0.167         | 1,246                         | 1,442                         | 1,136                         | 1,396                         | 1,983                         |
| 27Al      | 0.053    | 0.177         | 381                           | 845                           | 229                           | 715                           | 1,312                         |
| 31P       | 63       | 210           | 9,117                         | 9,106                         | 10,035                        | 10,008                        | 12,894                        |
| 39K       | 3.1      | 10            | 8,675                         | 9,462                         | 8,936                         | 10,758                        | 13,257                        |
| 44Ca      | 13       | 43            | 3,279                         | 4,851                         | 2,440                         | 5,016                         | 5,617                         |
| 49Ti      | 0.001    | 0.003         | 25                            | 167                           | 15                            | 50                            | 96                            |
| 51V       | 0.025    | 0.083         | 1.0                           | 4.0                           | 0.648                         | 2.0                           | 3.2                           |
| 52Cr      | 0.153    | 0.510         | 12                            | 48                            | 4.8                           | 7.5                           | 14                            |
| 55Mn      | 0.006    | 0.020         | 64                            | 54                            | 34                            | 51                            | 54                            |
| 57Fe      | 1.5      | 5.0           | 532                           | 1,405                         | 252                           | 654                           | 1,026                         |
| 59Co      | 0.009    | 0.030         | 0.900                         | 2.8                           | 0.729                         | 1.3                           | 2.1                           |
| 60Ni      | 0.030    | 0.100         | 19                            | 78                            | 8.7                           | 16                            | 28                            |
| 63Cu      | 0.149    | 0.497         | 17                            | 16                            | 11                            | 18                            | 19                            |
| 66Zn      | 0.335    | 1.1           | 173                           | 171                           | 158                           | 158                           | 286                           |
| 75As      | 0.453    | 1.5           | 0.482                         | 0.716                         | 0.523                         | 0.551                         | 1.0                           |
| 77Se      | 0.381    | 1.3           | 12                            | 11                            | 9.6                           | 9.7                           | 13                            |
| 88Sr      | 0.001    | 0.003         | 3.7                           | 6.1                           | 2.6                           | 5.6                           | 7.9                           |
| 95Mo      | 0.014    | 0.047         | 0.593                         | 0.554                         | 0.422                         | 0.409                         | 0.814                         |
| 107Ag     | 0.001    | 0.003         | 0.131                         | 0.158                         | 0.096                         | 0.210                         | 0.157                         |
| 111Cd     | 0.036    | 0.120         | 2.0                           | 2.8                           | 2.3                           | 2.1                           | 3.5                           |
| 118Sn     | 0.019    | 0.063         | 0.257                         | 0.632                         | 0.387                         | 0.537                         | 0.695                         |
| 121Sb     | 0.004    | 0.013         | 0.027                         | 0.059                         | 0.020                         | 0.053                         | 0.055                         |
| 137Ba     | 0.001    | 0.003         | 36                            | 39                            | 18                            | 41                            | 55                            |
| 202Hg     | 0.025    | 0.083         | 0.060                         | 0.054                         | 0.060                         | 0.063                         | 0.039                         |
| 205Tl     | 0.001    | 0.003         | 0.013                         | 0.026                         | 0.010                         | 0.019                         | 0.028                         |
| 208Pb     | 0.002    | 0.007         | 0.214                         | 0.398                         | 0.096                         | 0.357                         | 0.371                         |
| 238U      | 0.001    | 0.003         | 0.058                         | 0.074                         | 0.036                         | 0.067                         | 0.099                         |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_FRUS_INV-   | LC_FRUS_INV-   | LC_FRUS_INV-   | LC_FRUS_INV-   | LC_FRUS_INV-   |
|-----------|----------|---------------|----------------|----------------|----------------|----------------|----------------|
|           |          | Client ID     | 1_2022-09-10_N | 2_2022-09-10_N | 3_2022-09-10_N | 4_2022-09-10_N | 5_2022-09-10_N |
|           |          |               |                |                |                |                |                |
|           |          | Lab ID        | 454            | 455            | 456            | 457            | 458            |
|           |          | et Weight (g) | 0.6246         | 0.2170         | 0.2562         | 0.5051         | 0.5845         |
|           |          | y Weight (g)  | 0.1330         | 0.0463         | 0.0538         | 0.1283         | 0.1305         |
|           |          | Moisture (%)  | 78.7           | 78.7           | 79.0           | 74.6           | 77.7           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)          | (ppm)          | (ppm)          | (ppm)          | (ppm)          |
| 7Li       | 0.025    | 0.083         | 1.3            | 1.0            | 1.1            | 1.1            | 0.938          |
| 11B       | 0.074    | 0.247         | 3.2            | 2.8            | 2.4            | 1.9            | 1.7            |
| 23Na      | 3.2      | 11            | 2,488          | 2,681          | 1,888          | 2,251          | 2,430          |
| 24Mg      | 0.050    | 0.167         | 1,745          | 1,509          | 1,333          | 1,360          | 1,334          |
| 27Al      | 0.053    | 0.177         | 1,482          | 981            | 1,404          | 1,047          | 1,044          |
| 31P       | 63       | 210           | 9,361          | 10,340         | 7,464          | 9,551          | 8,705          |
| 39K       | 3.1      | 10            | 10,269         | 11,806         | 8,498          | 10,051         | 9,465          |
| 44Ca      | 13       | 43            | 6,032          | 6,222          | 4,485          | 5,067          | 3,913          |
| 49Ti      | 0.001    | 0.003         | 84             | 80             | 111            | 30             | 72             |
| 51V       | 0.025    | 0.083         | 3.6            | 2.6            | 3.4            | 1.1            | 2.3            |
| 52Cr      | 0.153    | 0.510         | 11             | 15             | 17             | 5.7            | 10             |
| 55Mn      | 0.006    | 0.020         | 64             | 51             | 47             | 67             | 61             |
| 57Fe      | 1.5      | 5.0           | 1,082          | 849            | 1,145          | 427            | 746            |
| 59Co      | 0.009    | 0.030         | 2.3            | 2.0            | 2.5            | 1.1            | 1.8            |
| 60Ni      | 0.030    | 0.100         | 21             | 24             | 31             | 10             | 18             |
| 63Cu      | 0.149    | 0.497         | 18             | 18             | 17             | 18             | 17             |
| 66Zn      | 0.335    | 1.1           | 194            | 235            | 215            | 203            | 284            |
| 75As      | 0.453    | 1.5           | 0.854          | 0.569          | 0.840          | 0.527          | 0.683          |
| 77Se      | 0.381    | 1.3           | 11             | 9.6            | 8.0            | 10             | 9.9            |
| 88Sr      | 0.001    | 0.003         | 14             | 9.3            | 6.7            | 5.9            | 4.8            |
| 95Mo      | 0.014    | 0.047         | 0.575          | 0.589          | 0.533          | 0.449          | 0.631          |
| 107Ag     | 0.001    | 0.003         | 0.103          | 0.097          | 0.073          | 0.091          | 0.103          |
| 111Cd     | 0.036    | 0.120         | 4.3            | 2.8            | 3.8            | 2.0            | 3.5            |
| 118Sn     | 0.019    | 0.063         | 0.460          | 0.959          | 1.0            | 0.188          | 0.476          |
| 121Sb     | 0.004    | 0.013         | 0.055          | 0.051          | 0.044          | 0.028          | 0.035          |
| 137Ba     | 0.001    | 0.003         | 60             | 53             | 44             | 59             | 48             |
| 202Hg     | 0.025    | 0.083         | 0.050          | 0.033          | 0.028          | 0.044          | 0.072          |
| 205TI     | 0.001    | 0.003         | 0.031          | 0.019          | 0.025          | 0.016          | 0.022          |
| 208Pb     | 0.002    | 0.007         | 0.436          | 0.327          | 0.369          | 0.200          | 0.309          |
| 238U      | 0.001    | 0.003         | 0.179          | 0.149          | 0.095          | 0.131          | 0.102          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

TrichAnalytics Inc.

Project No: 2022-393

Page 9 of 23

|           |          |               | LC_GRCK_COMP    |                 | LC_GRCK_INV-   | LC_GRCK_INV-   | LC_GRCK_INV-   |
|-----------|----------|---------------|-----------------|-----------------|----------------|----------------|----------------|
|           |          | Client ID     | NOLI-1_2022-09- | NOLI-2_2022-09- | 3_2022-09-14_N | 4_2022-09-14_N | 5_2022-09-14_N |
|           |          |               | 14_N            | 14_N            |                |                |                |
|           |          | Lab ID        | 459             | 460             | 461            | 462            | 463            |
|           |          | et Weight (g) | 0.1929          | 0.1823          | 0.0342         | 0.0735         | 0.2062         |
|           |          | y Weight (g)  | 0.0431          | 0.0413          | 0.0089         | 0.0133         | 0.0458         |
|           |          | Moisture (%)  | 77.7            | 77.3            | 74.0           | 81.9           | 77.8           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)           | (ppm)           | (ppm)          | (ppm)          | (ppm)          |
| 7Li       | 0.025    | 0.083         | 1.7             | 3.8             | 1.4            | 3.2            | 1.2            |
| 11B       | 0.074    | 0.247         | 5.5             | 12              | 5.7            | 11             | 5.1            |
| 23Na      | 3.2      | 11            | 2,401           | 2,564           | 1,857          | 2,254          | 2,455          |
| 24Mg      | 0.050    | 0.167         | 1,542           | 1,825           | 823            | 1,973          | 1,876          |
| 27Al      | 0.053    | 0.177         | 3,281           | 7,085           | 2,937          | 6,575          | 2,671          |
| 31P       | 63       | 210           | 9,460           | 9,265           | 5,753          | 7,509          | 8,721          |
| 39K       | 3.1      | 10            | 9,721           | 12,525          | 7,500          | 11,558         | 9,187          |
| 44Ca      | 13       | 43            | 2,835           | 4,426           | 3,426          | 4,903          | 3,114          |
| 49Ti      | 0.001    | 0.003         | 296             | 705             | 182            | 689            | 216            |
| 51V       | 0.025    | 0.083         | 6.0             | 13              | 4.5            | 12             | 5.6            |
| 52Cr      | 0.153    | 0.510         | 28              | 56              | 31             | 50             | 32             |
| 55Mn      | 0.006    | 0.020         | 68              | 117             | 40             | 101            | 93             |
| 57Fe      | 1.5      | 5.0           | 2,243           | 4,576           | 1,988          | 4,255          | 1,857          |
| 59Co      | 0.009    | 0.030         | 2.2             | 4.0             | 1.8            | 2.8            | 2.3            |
| 60Ni      | 0.030    | 0.100         | 45              | 94              | 45             | 79             | 51             |
| 63Cu      | 0.149    | 0.497         | 21              | 23              | 15             | 19             | 15             |
| 66Zn      | 0.335    | 1.1           | 198             | 216             | 149            | 169            | 155            |
| 75As      | 0.453    | 1.5           | 1.2             | 1.7             | 0.683          | 1.7            | 1.1            |
| 77Se      | 0.381    | 1.3           | 7.3             | 7.8             | 4.8            | 8.7            | 7.3            |
| 88Sr      | 0.001    | 0.003         | 8.8             | 16              | 11             | 13             | 8.9            |
| 95Mo      | 0.014    | 0.047         | 0.646           | 1.1             | 0.519          | 1.6            | 0.758          |
| 107Ag     | 0.001    | 0.003         | 0.085           | 0.079           | 0.085          | 0.048          | 0.054          |
| 111Cd     | 0.036    | 0.120         | 1.7             | 1.8             | 1.3            | 4.2            | 1.4            |
| 118Sn     | 0.019    | 0.063         | 0.726           | 0.577           | 0.941          | 0.837          | 0.983          |
| 121Sb     | 0.004    | 0.013         | 0.063           | 0.111           | 0.074          | 0.089          | 0.050          |
| 137Ba     | 0.001    | 0.003         | 65              | 125             | 56             | 104            | 72             |
| 202Hg     | 0.025    | 0.083         | 0.106           | 0.081           | 0.056          | 0.072          | 0.067          |
| 205Tl     | 0.001    | 0.003         | 0.055           | 0.099           | 0.045          | 0.081          | 0.053          |
| 208Pb     | 0.002    | 0.007         | 0.839           | 1.6             | 0.667          | 1.4            | 0.713          |
| 238U      | 0.001    | 0.003         | 0.134           | 0.276           | 0.120          | 0.257          | 0.120          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_GRCK_INVOLI- | LC_GRCK_INVOLI- | LC_DC4_INVOLI- |
|-----------|----------|---------------|-----------------|-----------------|----------------|
|           |          | Client ID     | 1_2022-09-14_N  | 2_2022-09-14_N  | 1_2022-09-12_N |
|           |          |               |                 |                 |                |
|           |          | Lab ID        | 464             | 465             | 466            |
|           |          | et Weight (g) | 0.0038          | 0.0057          | 0.0341         |
|           | Dı       | y Weight (g)  | 0.0018          | 0.0011          | 0.0137         |
|           |          | Moisture (%)  | 52.6            | 80.7            | 59.8           |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)           | (ppm)           | (ppm)          |
| 7Li       | 0.025    | 0.083         | 0.099           | 0.046           | 0.625          |
| 11B       | 0.074    | 0.247         | < 0.074         | 0.097           | < 0.074        |
| 23Na      | 3.2      | 11            | 3,185           | 1,647           | 2,116          |
| 24Mg      | 0.050    | 0.167         | 596             | 670             | 872            |
| 27Al      | 0.053    | 0.177         | 2.2             | 16              | 17             |
| 31P       | 63       | 210           | 5,919           | 3,944           | 5,058          |
| 39K       | 3.1      | 10            | 5,555           | 2,533           | 3,361          |
| 44Ca      | 13       | 43            | 1,361           | 2,358           | 3,022          |
| 49Ti      | 0.001    | 0.003         | 0.408           | 0.816           | 0.816          |
| 51V       | 0.025    | 0.083         | <0.025          | 0.036           | 0.138          |
| 52Cr      | 0.153    | 0.510         | 1.2             | 3.3             | 6.0            |
| 55Mn      | 0.006    | 0.020         | 2.0             | 3.8             | 4.6            |
| 57Fe      | 1.5      | 5.0           | 22              | 57              | 97             |
| 59Co      | 0.009    | 0.030         | 0.035           | 0.052           | 0.198          |
| 60Ni      | 0.030    | 0.100         | 0.073           | 2.4             | 6.8            |
| 63Cu      | 0.149    | 0.497         | 7.3             | 4.8             | 9.1            |
| 66Zn      | 0.335    | 1.1           | 95              | 100             | 64             |
| 75As      | 0.453    | 1.5           | < 0.453         | < 0.453         | < 0.453        |
| 77Se      | 0.381    | 1.3           | 6.6             | 3.6             | 7.5            |
| 88Sr      | 0.001    | 0.003         | 4.2             | 9.9             | 4.2            |
| 95Mo      | 0.014    | 0.047         | 0.112           | 0.112           | 0.196          |
| 107Ag     | 0.001    | 0.003         | 0.091           | 0.042           | 0.079          |
| 111Cd     | 0.036    | 0.120         | 3.4             | 1.6             | 2.1            |
| 118Sn     | 0.019    | 0.063         | 0.080           | 0.097           | 0.037          |
| 121Sb     | 0.004    | 0.013         | < 0.004         | 0.005           | 0.007          |
| 137Ba     | 0.001    | 0.003         | 3.3             | 55              | 36             |
| 202Hg     | 0.025    | 0.083         | 0.078           | 0.056           | 0.067          |
| 205Tl     | 0.001    | 0.003         | 0.003           | 0.003           | 0.004          |
| 208Pb     | 0.002    | 0.007         | 0.006           | 0.013           | 0.010          |
| 238U      | 0.001    | 0.003         | 0.001           | 0.002           | 0.002          |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

# Teck Coal Limited Tissue QA/QC Relative Percent Difference Results

| (         | Client ID   | LC_DC1_         | INV-1_2022-                  | 09-12_N    | LC_DC2_         | INV-4_2022-                  | -09-14_N   | LC_DCEF         | _INV-1_2022-                 | -09-12_N   |
|-----------|-------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|
|           | Lab ID      |                 | 419                          |            |                 | 427                          |            |                 | 444                          |            |
| Parameter | DL<br>(ppm) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |
| 7Li       | 0.025       | 2.5             | 2.0                          | 22         | 2.1             | 1.9                          | 8.2        | 0.574           | 0.529                        | 8.2        |
| 11B       | 0.074       | 5.3             | 4.2                          | 23         | 4.2             | 4.7                          | 10         | 2.1             | 1.7                          | 21         |
| 23Na      | 3.2         | 3,778           | 3,577                        | 5.5        | 2,684           | 2,761                        | 2.8        | 2,928           | 2,454                        | 18         |
| 24Mg      | 0.050       | 1,660           | 1,662                        | 0.1        | 773             | 856                          | 10         | 1,278           | 1,097                        | 15         |
| 27AI      | 0.053       | 4,628           | 3,476                        | 28         | 3,706           | 4,909                        | 28         | 138             | 196                          | 35         |
| 31P       | 63          | 12,991          | 14,744                       | 13         | 9,601           | 9,605                        | 0.0        | 12,378          | 9,767                        | 24         |
| 39K       | 3.1         | 17,444          | 15,010                       | 15         | 11,072          | 10,555                       | 4.8        | 11,775          | 10,416                       | 12         |
| 44Ca      | 13          | 4,911           | 4,206                        | 16         | 2,779           | 3,026                        | 8.5        | 2,755           | 3,176                        | 14         |
| 49Ti      | 0.001       | 350             | 238                          | 38         | 239             | 282                          | 17         | 10              | 13                           | 26         |
| 51V       | 0.025       | 13              | 10                           | 26         | 10              | 13                           | 23         | 1.3             | 1.3                          | 0.0        |
| 52Cr      | 0.153       | 27              | 35                           | 26         | 43              | 63                           | 38         | 8.7             | 7.5                          | 15         |
| 55Mn      | 0.006       | 67              | 51                           | 27         | 64              | 64                           | 0.4        | 28              | 27                           | 3.6        |
| 57Fe      | 1.5         | 2,396           | 1,757                        | 31         | 1,726           | 2,116                        | 20         | 237             | 264                          | 11         |
| 59Co      | 0.009       | 1.8             | 1.8                          | 0.0        | 2.4             | 3.1                          | 27         | 0.453           | 0.412                        | 9.5        |
| 60Ni      | 0.030       | 63              | 63                           | 0.0        | 86              | 116                          | 29         | 11              | 10                           | 9.5        |
| 63Cu      | 0.149       | 18              | 15                           | 18         | 18              | 16                           | 12         | 22              | 19                           | 15         |
| 66Zn      | 0.335       | 155             | 166                          | 6.9        | 247             | 217                          | 13         | 263             | 206                          | 24         |
| 75As      | 0.453       | 1.4             | 1.2                          | -          | 1.2             | 1.1                          | 7.2        | 0.744           | 0.689                        | -          |
| 77Se      | 0.381       | 8.3             | 8.4                          | 1.2        | 8.9             | 9.8                          | 10         | 5.9             | 5.1                          | 15         |
| 88Sr      | 0.001       | 10              | 7.9                          | 24         | 8.8             | 8.9                          | 1.5        | 2.7             | 2.8                          | 3.6        |
| 95Mo      | 0.014       | 0.776           | 0.617                        | 23         | 0.959           | 0.891                        | 7.4        | 0.448           | 0.448                        | 0.0        |
| 107Ag     | 0.001       | 0.132           | 0.108                        | 20         | 0.132           | 0.168                        | 24         | 0.124           | 0.103                        | 19         |
| 111Cd     | 0.036       | 1.9             | 1.7                          | 11         | 3.5             | 3.1                          | 11         | 1.9             | 2.0                          | 5.1        |
| 118Sn     | 0.019       | 0.400           | 0.322                        | 22         | 0.513           | 0.539                        | 4.8        | 0.356           | 0.470                        | 28         |
| 121Sb     | 0.004       | 0.165           | 0.162                        | 1.8        | 0.187           | 0.179                        | 4.6        | 0.058           | 0.060                        | 3.4        |
| 137Ba     | 0.001       | 167             | 124                          | 30         | 145             | 150                          | 3.3        | 247             | 223                          | 10         |
| 202Hg     | 0.025       | 0.056           | 0.056                        | =-         | 0.107           | 0.153                        | 35         | 0.084           | 0.090                        |            |
| 205TI     | 0.001       | 0.063           | 0.055                        | 14         | 0.077           | 0.073                        | 5.9        | 0.007           | 0.009                        | -          |
| 208Pb     | 0.002       | 0.861           | 0.779                        | 10         | 0.893           | 0.814                        | 9.2        | 0.080           | 0.106                        | 28         |
| 238U      | 0.001       | 0.221           | 0.152                        | 37         | 0.219           | 0.251                        | 14         | 0.115           | 0.112                        | 2.6        |

### Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

Project No: 2022-393

Teck Coal Limited
Tissue QA/QC Relative Percent Difference Results

|           | Jilent ID   | LC_FRB_         | INV-5_2022-                  | 09-10_N    | LC_GRCK         | _INV-5_2022                  | -09-14_N   |
|-----------|-------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|
|           | Lab ID      |                 | 453                          |            |                 | 463                          |            |
| Parameter | DL<br>(ppm) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |
| 7Li       | 0.025       | 1.2             | 1.2                          | 0.0        | 1.2             | 1.2                          | 0.0        |
| 11B       | 0.074       | 2.2             | 1.8                          | 20         | 5.1             | 4.7                          | 8.2        |
| 23Na      | 3.2         | 3,144           | 2,825                        | 11         | 2,455           | 2,808                        | 13         |
| 24Mg      | 0.050       | 1,983           | 2,162                        | 8.6        | 1,876           | 1,557                        | 19         |
| 27Al      | 0.053       | 1,312           | 1,149                        | 13         | 2,671           | 2,723                        | 1.9        |
| 31P       | 63          | 12,894          | 13,380                       | 3.7        | 8,721           | 9,412                        | 7.6        |
| 39K       | 3.1         | 13,257          | 12,826                       | 3.3        | 9,187           | 10,921                       | 17         |
| 44Ca      | 13          | 5,617           | 5,961                        | 5.9        | 3,114           | 3,123                        | 0.3        |
| 49Ti      | 0.001       | 96              | 106                          | 9.9        | 216             | 230                          | 6.3        |
| 51V       | 0.025       | 3.2             | 3.0                          | 6.5        | 5.6             | 5.6                          | 0.0        |
| 52Cr      | 0.153       | 14              | 13                           | 7.4        | 32              | 35                           | 9.0        |
| 55Mn      | 0.006       | 54              | 51                           | 5.7        | 93              | 86                           | 7.8        |
| 57Fe      | 1.5         | 1,026           | 845                          | 19         | 1,857           | 2,067                        | 11         |
| 59Co      | 0.009       | 2.1             | 1.9                          | 10         | 2.3             | 2.5                          | 8.3        |
| 60Ni      | 0.030       | 28              | 24                           | 15         | 51              | 60                           | 16         |
| 63Cu      | 0.149       | 19              | 21                           | 10         | 15              | 19                           | 24         |
| 66Zn      | 0.335       | 286             | 301                          | 5.1        | 155             | 174                          | 12         |
| 75As      | 0.453       | 1.0             | 0.797                        | -          | 1.1             | 1.2                          | -          |
| 77Se      | 0.381       | 13              | 14                           | 7.4        | 7.3             | 8.0                          | 9.2        |
| 88Sr      | 0.001       | 7.9             | 8.0                          | 1.3        | 8.9             | 10                           | 12         |
| 95Mo      | 0.014       | 0.814           | 0.730                        | 11         | 0.758           | 0.870                        | 14         |
| 107Ag     | 0.001       | 0.157           | 0.206                        | 27         | 0.054           | 0.067                        | 22         |
| 111Cd     | 0.036       | 3.5             | 3.6                          | 2.8        | 1.4             | 1.8                          | 25         |
| 118Sn     | 0.019       | 0.695           | 0.600                        | 15         | 0.983           | 0.907                        | 8.0        |
| 121Sb     | 0.004       | 0.055           | 0.054                        | 1.8        | 0.050           | 0.057                        | 13         |
| 137Ba     | 0.001       | 55              | 46                           | 18         | 72              | 74                           | 2.7        |
| 202Hg     | 0.025       | 0.039           | 0.072                        | -          | 0.067           | 0.069                        | -          |
| 205TI     | 0.001       | 0.028           | 0.025                        | 11         | 0.053           | 0.057                        | 7.3        |
| 208Pb     | 0.002       | 0.371           | 0.331                        | 11         | 0.713           | 0.796                        | 11         |

6.8

### Notes:

238U

ppm = parts per million

RPD = relative percent difference

0.001

0.099

Client ID

DL = detection limit

< = less than detection limit

% = percent

### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

0.106

0.120

0.153

24

## Teck Coal Limited Tissue QA/QC Accuracy and Precision Results

|           | Sa       | ample Group ID           |                                  | 01              |                      |                                  | 02              |                      |
|-----------|----------|--------------------------|----------------------------------|-----------------|----------------------|----------------------------------|-----------------|----------------------|
| Parameter | DL (ppm) | Certified<br>Conc. (ppm) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) |
| 7Li       | 0.025    | 1.21                     | 1.3                              | 111             | 11                   | 1.3                              | 111             | 8.5                  |
| 11B       | 0.074    | 4.5                      | 4.8                              | 107             | 1.5                  | 4.8                              | 107             | 4.4                  |
| 23Na      | 3.2      | 14,000                   | 14,409                           | 103             | 5.6                  | 16,153                           | 115             | 7.4                  |
| 24Mg      | 0.050    | 910                      | 1,012                            | 111             | 5.7                  | 996                              | 110             | 8.2                  |
| 27Al      | 0.053    | 197.2                    | 193                              | 98              | 6.1                  | 198                              | 100             | 3.5                  |
| 31P       | 63       | 8,000                    | 8,232                            | 103             | 5.9                  | 9,153                            | 114             | 6.8                  |
| 39K       | 3.1      | 15,500                   | 16,308                           | 105             | 3.7                  | 17,459                           | 113             | 12                   |
| 44Ca      | 13       | 2,360                    | 2,462                            | 104             | 6.7                  | 2,610                            | 111             | 5.6                  |
| 49Ti      | 0.001    | 12.24                    | 13                               | 105             | 10                   | 14                               | 116             | 10                   |
| 51V       | 0.025    | 1.57                     | 1.6                              | 101             | 2.8                  | 1.9                              | 120             | 10                   |
| 52Cr      | 0.153    | 1.87                     | 2.0                              | 105             | 6.8                  | 2.1                              | 112             | 5.8                  |
| 55Mn      | 0.006    | 3.17                     | 3.4                              | 108             | 5.3                  | 3.4                              | 107             | 4.2                  |
| 57Fe      | 1.5      | 343                      | 356                              | 104             | 5.8                  | 384                              | 112             | 4.3                  |
| 59Co      | 0.009    | 0.25                     | 0.299                            | 120             | 6.3                  | 0.293                            | 117             | 2.8                  |
| 60Ni      | 0.030    | 1.34                     | 1.4                              | 103             | 6.1                  | 1.5                              | 113             | 5.5                  |
| 63Cu      | 0.149    | 15.7                     | 18                               | 117             | 4.9                  | 18                               | 112             | 5.1                  |
| 66Zn      | 0.335    | 51.6                     | 55                               | 106             | 8.5                  | 58                               | 113             | 7.8                  |
| 75As      | 0.453    | 6.87                     | 7.4                              | 108             | 5.7                  | 7.7                              | 113             | 7.2                  |
| 77Se      | 0.381    | 3.45                     | 3.8                              | 109             | 8.1                  | 3.7                              | 107             | 3.0                  |
| 88Sr      | 0.001    | 10.1                     | 11                               | 106             | 5.0                  | 12                               | 117             | 7.1                  |
| 95Mo      | 0.014    | 0.29                     | 0.302                            | 104             | 3.4                  | 0.335                            | 116             | 3.6                  |
| 107Ag     | 0.001    | 0.0252                   | 0.031                            | 124             | 16                   | 0.028                            | 113             | 11                   |
| 111Cd     | 0.036    | 0.299                    | 0.338                            | 113             | 12                   | 0.285                            | 95              | 16                   |
| 118Sn     | 0.019    | 0.061                    | 0.065                            | 107             | 9.1                  | 0.066                            | 108             | 14                   |
| 121Sb     | 0.004    | 0.011                    | 0.010                            | 89              | 8.5                  | 0.014                            | 127             | 8.7                  |
| 137Ba     | 0.001    | 8.6                      | 8.8                              | 102             | 4.6                  | 9.5                              | 111             | 6.5                  |
| 202Hg     | 0.025    | 0.412                    | 0.447                            | 108             | 5.8                  | 0.492                            | 119             | 6.6                  |
| 205Tl     | 0.001    | 0.0013                   | -                                | -               | -                    | -                                | -               | -                    |
| 208Pb     | 0.002    | 0.404                    | 0.407                            | 101             | 4.9                  | 0.511                            | 126             | 17                   |
| 238U      | 0.001    | 0.05                     | 0.050                            | 100             | 14                   | 0.054                            | 108             | 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.

TI certified concentration from NIST-2976.

Accuracy and precision for TI are not reported as the certified concentration is too close to the reportable detection limit.

## Teck Coal Limited Tissue QA/QC Accuracy and Precision Results

| Sample Group ID | 03 |
|-----------------|----|

| Parameter | DL (ppm) | Certified<br>Conc. (ppm) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) |
|-----------|----------|--------------------------|----------------------------------|-----------------|----------------------|
| 7Li       | 0.025    | 1.21                     | 1.3                              | 107             | 7.7                  |
| 11B       | 0.074    | 4.5                      | 5.0                              | 110             | 5.4                  |
| 23Na      | 3.2      | 14,000                   | 16,427                           | 117             | 2.4                  |
| 24Mg      | 0.050    | 910                      | 1,043                            | 115             | 3.4                  |
| 27Al      | 0.053    | 197.2                    | 204                              | 103             | 5.2                  |
| 31P       | 63       | 8,000                    | 9,253                            | 116             | 2.0                  |
| 39K       | 3.1      | 15,500                   | 18,539                           | 120             | 5.4                  |
| 44Ca      | 13       | 2,360                    | 2,806                            | 119             | 5.3                  |
| 49Ti      | 0.001    | 12.24                    | 15                               | 124             | 11                   |
| 51V       | 0.025    | 1.57                     | 1.9                              | 124             | 10                   |
| 52Cr      | 0.153    | 1.87                     | 2.2                              | 116             | 4.1                  |
| 55Mn      | 0.006    | 3.17                     | 3.7                              | 116             | 3.5                  |
| 57Fe      | 1.5      | 343                      | 409                              | 119             | 4.1                  |
| 59Co      | 0.009    | 0.25                     | 0.291                            | 116             | 9.0                  |
| 60Ni      | 0.030    | 1.34                     | 1.5                              | 113             | 5.5                  |
| 63Cu      | 0.149    | 15.7                     | 19                               | 122             | 4.4                  |
| 66Zn      | 0.335    | 51.6                     | 60                               | 116             | 3.5                  |
| 75As      | 0.453    | 6.87                     | 8.2                              | 119             | 2.7                  |
| 77Se      | 0.381    | 3.45                     | 3.7                              | 107             | 2.7                  |
| 88Sr      | 0.001    | 10.1                     | 12                               | 119             | 5.9                  |
| 95Mo      | 0.014    | 0.29                     | 0.359                            | 124             | 8.5                  |
| 107Ag     | 0.001    | 0.0252                   | 0.026                            | 105             | 12                   |
| 111Cd     | 0.036    | 0.299                    | 0.337                            | 113             | 12                   |
| 118Sn     | 0.019    | 0.061                    | 0.070                            | 115             | 16                   |
| 121Sb     | 0.004    | 0.011                    | 0.009                            | 84              | 18                   |
| 137Ba     | 0.001    | 8.6                      | 9.8                              | 114             | 2.2                  |
| 202Hg     | 0.025    | 0.412                    | 0.456                            | 111             | 4.7                  |
| 205Tl     | 0.001    | 0.0013                   | -                                | -               | -                    |
| 208Pb     | 0.002    | 0.404                    | 0.481                            | 119             | 2.5                  |
| 238U      | 0.001    | 0.05                     | 0.057                            | 113             | 8.8                  |

### Notes:

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

### Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

TI certified concentration from NIST-2976.

Accuracy and precision for TI are not reported as the certified concentration is too close to the reportable detection limit.

# Teck Coal Limited Sample Group Information

| Sample<br>Group ID | Client ID   | Lab ID     | Date of<br>Analysis |
|--------------------|---|------------|---------------------|
| 01                 | LC_DC1_INV-1_2022-09-12_N                                 | 419        | 05 Oct 2022         |
|                    | LC_DC1_INV-2_2022-09-12_N                                 | 420        |                     |
|                    | LC_DC1_INV-3_2022-09-12_N                                 | 421        |                     |
|                    | LC_DC1_INV-4_2022-09-12_N                                 | 422        |                     |
|                    | LC_DC1_INV-5_2022-09-12_N                                 | 423        |                     |
|                    | LC_DC2_INV-1_2022-09-14_N                                 | 424        |                     |
|                    | LC_DC2_INV-2_2022-09-14_N                                 | 425        |                     |
|                    | LC_DC2_INV-3_2022-09-14_N                                 | 426        |                     |
|                    | LC_DC2_INV-4_2022-09-14_N                                 | 427        |                     |
|                    | LC_DC2_INV-5_2022-09-14_N                                 | 428        |                     |
|                    | LC_DC3_INV-1_2022-09-13_N                                 | 429        |                     |
|                    | LC_DC3_INV-2_2022-09-13_N                                 | 430        |                     |
|                    | LC_DC3_INV-3_2022-09-13_N                                 | 431        |                     |
|                    | LC_DC3_INV-4_2022-09-13_N                                 | 432        |                     |
|                    | LC_DC3_INV-5_2022-09-13_N                                 | 433        |                     |
|                    | LC_DC4_COMPNOLI-1_2022-09-12_N                            | 434        |                     |
|                    | LC_DC4_INV-2_2022-09-12_N                                 | 435        |                     |
| 02                 | LC_DC4_INV-3_2022-09-12_N                                 | 436        | 05 Oct 2022         |
|                    | LC_DC4_INV-4_2022-09-12_N                                 | 437        |                     |
|                    | LC_DC4_INV-5_2022-09-12_N                                 | 438        |                     |
|                    | LC_DCDS_INV-1_2022-09-13_N                                | 439        |                     |
|                    | LC_DCDS_INV-2_2022-09-13_N                                | 440        |                     |
|                    | LC_DCDS_INV-3_2022-09-13_N                                | 441        |                     |
|                    | LC_DCDS_INV-4_2022-09-13_N                                | 442        |                     |
|                    | LC_DCDS_INV-5_2022-09-13_N                                | 443        |                     |
|                    | LC_DCEF_INV-1_2022-09-12_N                                | 444        |                     |
|                    | LC_DCEF_INV-2_2022-09-13_N                                | 445        |                     |
|                    | LC_DCEF_INV-3_2022-09-13_N                                | 446        |                     |
|                    | LC_DCEF_INV-4_2022-09-13_N                                | 447        |                     |
|                    | LC_DCEF_INV-5_2022-09-13_N                                | 448        |                     |
|                    | LC_FRB_INV-1_2022-09-10_N                                 | 449        |                     |
|                    | LC_FRB_INV-2_2022-09-10_N                                 | 450<br>451 |                     |
|                    | LC_FRB_INV-3_2022-09-10_N                                 | 451<br>452 |                     |
| 03                 | LC_FRB_INV-4_2022-09-10_N                                 | 452<br>452 | 05 Oct 2022         |
| 03                 | LC_FRB_INV-5_2022-09-10_N<br>LC_FRUS_INV-1_2022-09-10_N   | 453<br>454 | US OCT 2022         |
|                    | LC_FRUS_INV-1_2022-09-10_N<br>LC_FRUS_INV-2_2022-09-10_N  | 454<br>455 |                     |
|                    | LC_FRUS_INV-3_2022-09-10_N<br>LC_FRUS_INV-3_2022-09-10_N  | 456<br>456 |                     |
|                    | LC_FRUS_INV-3_2022-09-10_N<br>LC_FRUS_INV-4_2022-09-10_N  | 450<br>457 |                     |
|                    | LC_FRUS_INV-4_2022-09-10_IN<br>LC_FRUS_INV-5_2022-09-10_N | 457<br>458 |                     |
|                    | LC_LUO2_1111.1-7_7055-02-10_1/                            | 430        |                     |

# Teck Coal Limited Sample Group Information

| Sample   |   |            | Date of     |
|----------|---|------------|-------------|
| Group ID | Client ID   | Lab ID     | Analysis    |
| 03       | LC_GRCK_COMPNOLI-1_2022-09-14_N                             | 459        | 05 Oct 2022 |
|          | LC_GRCK_COMPNOLI-2_2022-09-14_N                             | 460        |             |
|          | LC_GRCK_INV-3_2022-09-14_N                                  | 461        |             |
|          | LC_GRCK_INV-4_2022-09-14_N                                  | 462<br>463 |             |
|          | LC_GRCK_INV-5_2022-09-14_N<br>LC_GRCK_INVOLI-1_2022-09-14_N | 463<br>464 |             |
|          | LC_GRCK_INVOLI-1_2022-09-14_N                               | 465        |             |
|          | LC_DC4_INVOLI-1_2022-09-12_N                                | 466        |             |
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|  | COC ID:   | LCO_LAEMP_DRY 09 TRICH               | AEMP<br>09 TR        | IP_DRY      | _2022-             | TURN                        | TURNAROUND TIME:                   | IME:                           |   |   |             |                         |          | RUSH:   |               |            |
|--|---|--------------------------------------|----------------------|-------------|--------------------|-----------------------------|------------------------------------|--------------------------------|---|---|-------------|-------------------------|----------|---|---------------|------------|
|  | PROJECT/CLIENT INFO   |                                      | 1                    |             |                    |                             | LA                                 | LABORATORY                     | ORY                                     | のなるのは                                   |             |                         |          | OTHER INEO  |               |            |
| Facility Name / Job                              | Facility Name / Job# Line Creek Operation                         |                                      |                      |             |                    |                             | Lab                                | Lab Name TrichAnalytics Inc.   | chAnalyt                                | ics Inc.                                |             | Rer                     | ort Form | Report Format / Distribution                          | Even DI       | pne Enn    |
| Project Manag                                    | Project Manager Nicole Zathey                                     |                                      |                      |             |                    |                             | Lab Co                             | Lab Contact Jennie Christensen | mie Chris                               | stensen                                 |             | Email 1:                |          | Acres Coll ab@Tack com                                | 1,000         | 18         |
| Ema  | Email Nicole.Zathey@teck.com                                      | ш                                    |                      |             |                    |                             | I                                  | mail jen                       | nie.christ                              | Email jennie.christensen@trichanalytics | chanalyti   |                         |          | teckcosl@equisonline.com                              |               | < >        |
| Addre  | Address 421 Pine Ave  |                                      |                      |             |                    |                             | Ad                                 | dress 20                       | 7-1753 Se                               | Address 207-1753 Sean Heights           | s           |                         |          | Teck I ah Results@teck.com                            | A             | * *        |
|  |   |                                      |                      |             |                    |                             |                                    |                                |   |   |             | Email 4:                |          | lbowron@minnow ca                                     | v A           | 4 ×        |
| City   |   | po                                   | Province             |             | BC                 |                             |                                    | City Saanichton                | anichton                                | Pro                                     | Province BC |                         |          | Rohin Valleau@mipnow.ca                               | e A           | ( A        |
| Postal Code                                      | le V0B 2G0  | 0                                    | Country              |             | Canada             |                             | Postal Code                        | Code                           |   |   |             | Email 5:                | Г        | Inceica DitroTack com                                 |               | ( )        |
| Phone Numb                                       | Phone Number 1-250-865-3048                                       |                                      |                      |             |                    |                             | Phone Number                       | nber                           |   |   |             | PO number               | 1        | VPO00818999   |               | *          |
|  | SAMP  | SAMPLE DETAILS                       |                      |             | Sample of the same |                             |                                    |                                | THE STATE OF                            | ANALYS                                  | SIS REO     | ANALYSIS REQUESTED      |          | Filtered - F. Field, L. Lab, FL: Field & Lab, N: None | L: Lab, FL: F | eld & Lab. |
|  |   | (Or                                  | (0)                  | 8           |                    |                             |                                    | PRESERV. FIIL.                 |   |   |             |                         |          |   |               |            |
|  |   | (Yes/Y) And (Yes/I                   | LICO I ) MUNOMINI CO |             | 3782.5             |                             | \$100mm                            | SISATYNY                       |   | ota by CRC<br>and dry)                  | routine)    |                         |          |   |               |            |
| Sample ID  | Sample Location<br>(sys loc code)                                 | Field and Matrix H                   |                      | Date        | Time Ti            | Tissue Ti                   | Tissue Sample<br>Species Structure | ARTHUR PROPERTY.               | Vumber of                               | CPMS (wet                               | wet, dry &  | Fravimetry              |          |   |               |            |
| LC_DC1_INV-1_2022-09-12_N                        | IZ_DC1  | TA                                   | 12-5                 | 12-Sep-22   | 00:6               | INV Cor                     |                                    | osite                          | -                                       |   |             |                         |          |   |               |            |
| LC_DC1_INV-2_2022-09-12_N                        | LC_DC1  | TA                                   | 12-8                 | 12-Sep-22   | 10:00              | INV Cor                     | Composite Composite                | osite                          | -                                       | ×                                       | ×           | ×                       |          |   |               |            |
| LC_DC1_INV-3_2022-09-12_N                        | LC_DC1  | TA                                   | 12-8                 | 12-Sep-22   | 11:00              | INV Cor                     | Composite Composite                | osite                          | -                                       | X                                       | ×           | ×                       |          |   | -             |            |
| LC_DC1_INV-4_2022-09-12_N                        | LC_DC1  | TA                                   | 12-S                 | 12-Sep-22   | 12:00              | INV Con                     | Composite Composite                | osite                          | -                                       | ×                                       | ×           | ×                       |          |   |               |            |
| LC_DC1_INV-5_2022-09-12_N                        | LC_DC1  | TA                                   | 12-S                 | 12-Sep-22   | 13:00              | INV Con                     | Composite Composite                | site                           | -                                       | ×                                       | x           |                         |          |   |               | +          |
| LC_DC2_INV-1_2022-09-14_N                        | LC_DC2  | TA                                   | 14-8                 | 14-Sep-22   | 00:6               | INV Con                     | Composite Composite                | site                           | -                                       | ×                                       | x           |                         |          |   |               |            |
| LC_DC2_INV-2_2022-09-14_N                        | LC_DC2  | TA                                   | 14-8                 | 14-Sep-22   | 10:00              | INV Con                     | Composite Composite                | site                           | -                                       | ×                                       | x           |                         |          |   |               |            |
| LC_DC2_INV-3_2022-09-14_N                        | LC_DC2  | TA                                   | 14-S                 | 14-Sep-22   | 11:00              | INV Con                     | Composite Composite                | site                           | 1                                       | ×                                       | х           |                         |          |   |               | -          |
| LC_DC2_INV-4_2022-09-14_N                        | LC_DC2  | TA                                   | 14-S                 | 14-Sep-22   | 12:00 I            | INV Con                     | Composite Composite                | site                           | -                                       | ×                                       | x           |                         |          |   |               | +          |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | ECIAL INSTRUCTIONS  |                                      |                      | RELINQU     | ISHED BY           | RELINQUISHED BY/AFFILIATION | NOI                                | D                              | DATE/TIME                               |   | ACCEPT      | ACCEPTED BY/AFFILIATION | LIATIO   |   | DATE/TIME     |            |
| FO 818999  | ,   |                                      |                      |             | Jennifer Ings      | sgu                         |                                    | #                              | ####################################### | Y                                       | sumi sumi   | ie Cal                  | Sine     | 39 840 202  | 7             | 08:40      |
| SERVICE REOUEST (rush - subject to availability) | subject to availability)  |                                      |                      |             |                    |                             |                                    |                                |   |   |             |                         |          | (Project # 2022                                       | 2-393         | 100        |
| Priority (                                       | Regular (default)<br>Priority (2-3 business days) - 50% surcharge | Regular (default)<br>- 50% surcharge | Sampl                | pler's Name |                    |                             | Jennif                             | Jennifer Ings                  |   |   |             | Mobile #                |          | 5195003444  |               |            |
| Fmergency  | Emargancy (1 Business Day) 1000/ aughana                          | - Paralosino                         |                      |             |                    |                             |                                    |                                |   |   | +           | İ                       |          |   |               |            |

(coc Redd: 29 sprow)

|  | COC ID:   | COOT                  | LAEMP<br>09 TR | LCO_LAEMP_DRY 09 TRICH | _2022         | II                          | URNAROL   | TURNAROUND TIME:               |   |                   |   |                       |                         | RUSH                         | H   |               |           |
|--|---|-----------------------|----------------|------------------------|---------------|-----------------------------|-----------|--------------------------------|---|-------------------|---|-----------------------|-------------------------|------------------------------|---|---------------|-----------|
|  | PROJECT/CLIENT INFO   |                       |                |                        |               |                             |           | LABORATORY                     | ATORY                                   |                   | The second                              |                       |                         | OTH                          | OTHER INFO  |               |           |
| Facility Name / Jo                               | Facility Name / Job# Line Creek Operation                         |                       |                |                        |               |                             |           | Lab Name TrichAnalytics Inc.   | TrichAna                                | ulytics Inc       |   |                       | Report Fo               | Report Format / Distribution |   | Excel P       | PDF FDD   |
| Project Manag                                    | Project Manager Nicole Zathey                                     |                       |                |                        |               |                             |           | Lab Contact Jennie Christensen | Jennie C.                               | hristensen        |   |                       | Email 1:                | AquaScil ah@Teck com         |   | 100           | 30        |
| Em   | Email Nicole.Zathey@teck.com                                      | _                     |                |                        |               |                             |           | Email                          | jennie.ch                               | ristensen(        | Email jennie.christensen@trichanalytics | ytics                 | Email 2:                | teckcoal@aquisonline com     | line com  |               | 4 >       |
| Addre  | Address 421 Pine Ave  |                       |                |                        |               |                             |           | Address                        | Address 207-1753 Sean Heights           | Sean He           | ights                                   |                       | Email 3:                | Teck Lab.Results@teck.com    | ateck com   | X X           | X         |
| . i.C  | Poormon   |                       | -              |                        | 0             |                             |           |                                |   |                   |   |                       | Email 4:                | Ibowron@minnow.ca            | /,ca  | X X           | X         |
| Poetal Code                                      |   |                       | 2 2            | Province               | BC<br>Grant   |                             |           | City                           | City Saanichton                         |                   | Province BC                             | BC                    | Email 5:                | Robin Valleau@minnow.ca      | innow.ca  | X X           | X         |
| Dhona Mumh                                       | 1-250.865.304   |                       | 3              | Country                | Canada        |                             | 2         | Postal Code                    |   |                   |   |                       | Email 5:                | Jessica Ritz@Teck.com        | k.com   | K X           |           |
| Luone Nume                                       |   | T PETAT               | 9              |                        |               |                             | Phc       | Phone Number                   |   |                   |   | -                     | PO number               |                              | VPO00818999   | 66681         |           |
|  | SAMIL   | SAMPLE DETAILS        | 3              |                        |               |                             |           |                                |   | ANA               | YSIS RE                                 | ANALYSIS REQUESTED    | D                       | EII.                         | Filtered - F: Field, L.: Lab, FL: Field & Lab, N: Non | L: Lab, FL: F | leld & La |
|  |   |                       | (oN)           |                        |               |                             |           |                                | PRESERV. FIIL.                          |                   |   |                       |                         |                              |   |               |           |
|  |   |                       | ial (Yes       |                        |               |                             |           |                                | s                                       | Э                 | SVVA                                    |                       |                         |                              |   |               |           |
|  | Sample Location   | F.:                   | zardous Mater  |                        | T.            | Ticena                      | L.        | 2                              | ANALYSIS<br>Der of Container            | s in Biota by CRO | Ory in Biota by C<br>dry & routine)     | ure Content by        |                         |                              |   |               |           |
| Sample ID  | (sys loc code)  | Matrix                | Haz            | Date                   | (24hr)        | type                        | Species   | Structure                      | lmuN                                    |                   |   | tsioM<br>ivra<br>ivra |                         |                              |   |               |           |
| LC_DC2_INV-5_2022-09-14_N                        | LC_DC2  | TA                    |                | 14-Sep-22              | 13:00         | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC3_INV-1_2022-09-13_N                        | LC_DC3  | TA                    |                | 13-Sep-22              | 9:00          | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC3_INV-2_2022-09-13_N                        | LC_DC3  | TA                    |                | 13-Sep-22              | 10:00         | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC3_INV-3_2022-09-13_N                        | LC_DC3  | TA                    |                | 13-Sep-22              | 11:00         | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC3_INV-4_2022-09-13_N                        | LC_DC3  | TA                    |                | 13-Sep-22              | 12:00         | INV                         | Composite | Composite                      | 1                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC3_INV-5_2022-09-13_N                        | LC_DC3  | TA                    |                | 13-Sep-22              | 13:00         | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC4_COMPNOLI-1_2022-09-12_N                   | LC_DC4  | TA                    | Fair           | 12-Sep-22              | 9:00          | INV                         | compnoli  | Composite                      | -                                       | x                 | ×                                       | ×                     |                         |                              |   |               | +         |
| LC_DC4_INV-2_2022-09-12_N                        | LC_DC4  | TA                    |                | 12-Sep-22              | 10:00         | INV                         | Composite | Composite                      | 1                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| LC_DC4_INV-3_2022-09-12_N                        | LC_DC4  | TA                    |                | 12-Sep-22              | 11:00         | INV                         | Composite | Composite                      | -                                       | ×                 | ×                                       | ×                     |                         |                              |   |               |           |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | ECIAL INSTRUCTIONS  |                       |                | RELINC                 | UISHED I      | RELINQUISHED BY/AFFILIATION | IATION    |                                | DATE/TIME                               | TIME              | ACCE                                    | PTED BY               | ACCEPTED BY/AFFILIATION | NOI                          | DAT   | DATE/TIME     |           |
| FO 818999<br>Reade: 七色                           | 99  |                       |                |                        | Jennifer Ings | er Ings                     |           |                                | ####################################### | #######           | Sen                                     | ienerie l             | 4 Brie                  | 295                          | 2207025   | 0/2           | 06:40     |
|  |   |                       |                |                        |               |                             |           |                                |   |                   |   |                       | )                       | (Pro.                        | Propert # 2007 - 393                                  | 07-39         | 7         |
| SERVICE REQUEST (rush - subject to availability) | subject to availability)  |                       |                |                        |               |                             |           |                                |   |                   |   |                       |                         | 611                          | 7   | 1             | 1         |
| Priority (                                       | Regular (default)<br>Priority (2-3 business days) - 50% surcharge | (default)<br>rrcharge | Sal            | Sampler's Name         | 9             |                             |           | Jennifer Ings                  | SS                                      |                   |   | Mobile #              | #                       | 15                           | 5195003444  |               |           |
|  |   |                       |                |                        |               |                             |           |                                |   |                   |   |                       |                         |                              |   |               |           |

Filtered - F: Field, L: Lab, FL: Field & Lab, N: Non-EDD 06:80 Project # 2022-393 PDF Excel VPO00818999 September 19, 2022 29 800 2022 5195003444 OTHER INFO Feck Lab. Results@teck.com Robin. Valleau@minnow.ca teckcoal@equisonline.com ssica Ritz@Teck.com Report Format / Distribution wron@minnow.ca RUSH: ral ACCEPTED BY/AFFILIATION PO number Email 1: Email 2: Email 4: Email 5: Email 3: Email 5: 0 ANALYSIS REQUESTED Date/Time Mobile # rellene **Ста**чітету Email jennie.christensen@trichanalytics × × × × × × × × Moisture Content by Province BC Mercury in Biota by CVAAS (wet, dry & routine) × × × × × × × × Address 207-1753 Sean Heights Lab Name TrichAnalytics Inc. Lab Contact Jennie Christensen ICPMS (wet and dry) ################ DATE/TIME X × × × × × × × × Metals in Biota by CRC Saanichton Number of Containers ----3 of Filt PRESERV. SISATVNY Jennifer Ings TURNAROUND TIME: City Postal Code Phone Number Sample Structure Composite Composite Composite Composite Composite Composite Composite Composite Composite Composite Tissue Composite Composite Composite Species Composite Composite Composite Composite RELINQUISHED BY/AFFILIATION Page Tissue type N N N N Jennifer Ings N N N N N LCO LAEMP DRY 2022 BC Canada Time (24hr) 10:00 12:00 13:00 10:00 11:00 12:00 13:00 9:00 9:00 Sampler's Signature Sampler's Name 13-Sep-22 13-Sep-22 12-Sep-22 12-Sep-22 13-Sep-22 13-Sep-22 13-Sep-22 13-Sep-22 12-Sep-22 Date Province Country Hazardous Material (Yes/No) SAMPLE DETAILS Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge For Emergency <1 Day, ASAP or Weekend Matrix Regular (default) Field LA LA LA TA LA TA TA LA TA Email Nicole.Zathey@teck.com Sparwood V0B 2G0 PROJECT/CLIENT INFO ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS Facility Name / Job# Line Creek Operation Sample Location (sys loc code) SERVICE REQUEST (rush - subject to availability) COC ID: Phone Number 1-250-865-3048 Project Manager Nicole Zathey Address 421 Pine Ave LC\_DCDS LC\_DCDS LC\_DCDS LC\_DCEF C DCDS LC\_DCDS LC DCEF LC DC4 LC\_DC4 PO 818999 City Postal Code > > Sample ID | LC\_DCEF\_INV-1\_2022-09-12\_N HO LC\_DCDS\_INV-2\_2022-09-13\_N 142 LC\_DCDS\_INV-4\_2022-09-13\_N |45 LC\_DCEF\_INV-2\_2022-09-13\_N LC\_DCDS\_INV-1\_2022-09-13\_N (41) LC\_DCDS\_INV-3\_2022-09-13\_N LC\_DCDS\_INV-5\_2022-09-13\_N LC\_DC4\_INV-4\_2022-09-12\_N LC\_DC4\_INV-5\_2022-09-12\_N 300 137 138 139 143

Filtered - F: Field, L. Lab, FL: Field & Lab, N: Non EDD 06:80 -363 PDF Project # 2022 VPO00818999 Excel September 19, 2022 29 540 2022 5195003444 OTHER INFO Teck Lab. Results@teck.com Robin. Valleau@minnow.ca Jessica. Ritz@Teck.com Report Format / Distribution innow.ca Sur ACCEPTED BY/AFFILIATION PO number Email 4: Email 1: Email 5: Email 5: Email 2: Email 3: Cal ANALYSIS REQUESTED reviene Date/Time Mobile # Fravimetry Email jennie.christensen@trichanalytics × × × × × × × × × Moisture Content by BC Province wet, dry & routine) × × × × × × × × Address 207-1753 Sean Heights Mercury in Biota by CVAAS Lab Name TrichAnalytics Inc. Lab Contact Jennie Christensen Metals in Biota by CRC (wet and dry) ############### DATE/TIME × X × × × X × × City Saanichton Number of Containers -EHF PRESERV. 4 of SISATYNY lound Bro Jennifer Ings TURNAROUND TIME: Postal Code Phone Number Structure Sample Composite Composite Composite Composite Composite Species Composite Composite Composite Composite Composite Composite Composite Tissue RELINQUISHED BY/AFFILIATION Page Tissue type Jennifer Ings N N N N N N N N N LCO LAEMP DRY 2022 Canada Time (24hr) 11:00 12:00 13:00 10:00 11:00 12:00 13:00 00:6 9:00 BC Sampler's Signature Sampler's Name 09 TRICH 13-Sep-22 10-Sep-22 10-Sep-22 13-Sep-22 13-Sep-22 10-Sep-22 10-Sep-22 10-Sep-22 10-Sep-22 Date Province Country Hazardous Material (Yes/No) SAMPLE DETAILS Regular (default) Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge Matrix For Emergency <1 Day, ASAP or Weekend Field TA TA TA TA TA LA LA TA TA Email Nicole.Zathey@teck.com Sparwood V0B 2G0 PROJECT/CLIENT INFO ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS Facility Name / Job# Line Creek Operation Sample Location (sys loc code) SERVICE REQUEST (rush - subject to availability) COC ID: Phone Number 1-250-865-3048 Project Manager Nicole Zathey Address 421 Pine Ave LC\_DCEF LC\_DCEF LC\_DCEF LC\_FRUS LC\_FRB LC\_FRB LC\_FRB LC\_FRB LC\_FRB PO 818999 City Postal Code > > > Sample ID 446 LC\_DCEF\_INV-3\_2022-09-13\_N 147 LC\_DCEF\_INV-4\_2022-09-13\_N LC\_DCEF\_INV-5\_2022-09-13\_N SH LC FRUS INV-1 2022-09-10 N | HQ | LC\_FRB\_INV-1\_2022-09-10\_N LC\_FRB\_INV-5\_2022-09-10\_N LC\_FRB\_INV-2\_2022-09-10\_N LC\_FRB\_INV-3\_2022-09-10\_N LC\_FRB\_INV-4\_2022-09-10\_N Sich B 宁 150 151 125 153

Filtered - F: Field, L. Lab, FL: Field & Lab, N: Non. EDD 02:80 -393 PDF Project # 2022 VPO00818999 Excel September 19, 2022 29 8-62 5195003444 OTHER INFO Feck. Lab. Results@teck.com Robin, Valleau@minnow.ca Fessica Ritz@Teck.com Report Format / Distribution now.ca ACCEPTED BY/AFFILIATION PO number Email 4: Email 5: Email 1: Email 5: Email 2: Email 3: retiene (a ANALYSIS REQUESTED Date/Time Mobile # Fravimetry Email jennie.christensen@trichanalytics × × × × × × × × × Moisture Content by BC Province wet, dry & routine) × × × × × × × × Address 207-1753 Sean Heights Mercury in Biota by CVAAS Lab Name TrichAnalytics Inc. Lab Contact Jennie Christensen Metals in Biota by CRC (wet and dry) ############## DATE/TIME × × × X × × × × Saanichton Number of Containers PRESERV. 5 of BHF SISATVNV land And Jennifer Ings TURNAROUND TIME: City Postal Code Phone Number Sample Structure Composite Composite Composite Composite Composite Species Composite Composite Composite Composite Composite Tissue compnoli compnoli RELINQUISHED BY/AFFILIATION Page Tissue type Jennifer Ings N N N N Š N N N N LCO LAEMP DRY 2022 Canada Time (24hr) 11:00 10:00 12:00 13:00 00:6 10:00 11:00 12:00 13:00 BC Sampler's Signature Sampler's Name 09 TRICH 14-Sep-22 14-Sep-22 10-Sep-22 10-Sep-22 10-Sep-22 10-Sep-22 14-Sep-22 14-Sep-22 14-Sep-22 Date Province Country Hazardous Material (Yes/No) SAMPLE DETAILS Emergency (1 Business Day) - 100% surcharge Field Matrix Regular (default) Priority (2-3 business days) - 50% surcharge For Emergency <1 Day, ASAP or Weekend TA LA TA TA TA TA TA TA LA Email Nicole.Zathey@teck.com Sparwood V0B 2G0 ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS Facility Name / Job# Line Creek Operation Sample Location (sys loc code) SERVICE REQUEST (rush - subject to availability) COC ID: Phone Number 1-250-865-3048 Project Manager Nicole Zathey Address 421 Pine Ave LC\_GRCK LC\_GRCK LC\_GRCK LC GRCK LC\_FRUS LC\_FRUS LC\_GRCK LC\_FRUS LC\_FRUS PO 818999 Postal Code 1 4to LC\_GRCK\_COMPNOLI-2\_2022-09-14\_N LC\_GRCK\_COMPNOLI-1\_2022-09-14\_N Sample ID LC\_GRCK\_INV-3\_2022-09-14\_N LC\_GRCK\_INV-4\_2022-09-14\_N 463 LC\_GRCK\_INV-5\_2022-09-14\_N LC\_FRUS\_INV-2\_2022-09-10\_N 458 LC\_FRUS\_INV-5\_2022-09-10\_N 156 LC\_FRUS\_INV-3\_2022-09-10\_N LC\_FRUS\_INV-4\_2022-09-10\_N STATE TO 25 ts 55 191 19

|   | COCID   | TOOT                   | AEMP_DRY       | LY_2022        |                             | TURNAROUND TIME:  | UND TIME                       | ,,                                      |   |   |                              |                         | HSIIA                        | H  |              |        |
|---|---|------------------------|----------------|----------------|-----------------------------|-------------------|--------------------------------|---|---|---|------------------------------|-------------------------|------------------------------|--|--------------|--------|
|   | PRO IECTICI IENT INEO   |                        | 09 TRICH       |                |                             | No.               | TABOUT                         | ADOL ADOL                               |   |   |                              |                         | WO                           | 2116   |              |        |
| Facility Name / Jobs                            | Facility Name / Job# Line Creek Operation                         |                        |                |                |                             |                   | Lab Name Trich Analytics Inc   | TrichA                                  | nalytics Inc                            |   |                              | Donort E.               | Dancet Formet / Distribution | INFO   | Parent In    | TO L   |
| Project Manage                                  | Project Manager Nicole Zathey                                     |                        |                |                |                             |                   | Lab Contact Jennie Christensen | Jennie                                  | Christenser                             |   |                              | Fmail 1                 | Illiat / Disti ID            |  | 100          | 1      |
| Emai  | Email Nicole.Zathey@teck.com                                      |                        |                |                |                             |                   | Email                          | jennie.                                 | hristensen                              | Email jennie.christensen@trichanalytics | so                           | Email 2:                | Aquascil abia leck.com       | eck com  | *            |        |
| Addres  | Address 421 Pine Ave  |                        |                |                |                             |                   | Address                        | 207-17                                  | Address 207-1753 Sean Heights           | ights                                   |                              | Email 3:                | Teck Lab Results@teck.com    | s@teck com   | *            |        |
|   |   |                        |                |                |                             |                   |                                |   |   |   |                              | Email 4:                | lbowron@minnow.ca            | w.ca X   | ×            |        |
| City  |   |                        | Province       | BC             |                             |                   | City                           | City Saanichton                         | ton                                     | Province BC                             | 0                            | Email 5:                | Robin Valleau@minnow.ca      | minnow.ca X  | X            |        |
| Postal Code                                     | e V0B 2G0   |                        | Country        | Canada         |                             |                   | Postal Code                    |   |   |   |                              | Email 5:                | Jessica Ritz@Teck.com        | ck.com X   | ×            |        |
| Phone Numbe                                     | Phone Number 1-230-863-3048                                       |                        |                |                |                             | Pho               | Phone Number                   |   |   |   | _                            | PO number               |                              | VPO00818999  | 6668         |        |
|   | SAMPLE  | SAMPLE DETAILS         | _              |                |                             |                   |                                |   | ANA                                     | ANALYSIS REQUESTED                      | UESTEI                       |                         |                              | Filtered - F: Field, L.: Lab, FL: Field & Lab, N: Non- | : Lab, FL: F | leld & |
|   | :   | (o)                    | (0)            |                |                             |                   | -                              | PRESERV, FILL                           |   |   |                              |                         |                              |  |              |        |
|   |   | Material (Yes/         |                |                |                             |                   |                                | ALYSIS<br>ontainers                     | a by CRC                                | (anitine)                               | fa ma                        |                         |                              |  |              |        |
| Sample ID                                       | Sample Location (sys loc code)                                    | Field Matrix Hazardons | Date           | Time<br>(24hr) | Tissue<br>type              | Tissue<br>Species | Sample<br>Structure            | Number of Co                            | Metals in Biota<br>ICPMS (wet an        | Mercury in Bio<br>(wet, dry & rou       | Moisture Conto<br>Gravimetry |                         |                              |  |              |        |
| LC_GRCK_INV0LI-1_2022-09-14_N                   | LC_GRCK   | TA                     | 14-Sep-22      | 9:01           | INV                         | INVOLI            | Composite                      | -                                       | ×                                       | ×                                       | ×                            |                         |                              |  |              |        |
| LC_GRCK_INVOLI-2_2022-09-14_N                   | LC_GRCK   | TA                     | 14-Sep-22      | 10:01          | INV                         | INVOLI            | Composite                      | -                                       | ×                                       | ×                                       | ×                            |                         |                              |  |              |        |
| LC_DC4_INVOLI-1_2022-09-12_N                    | LC_DC4  | TA                     | 12-Sep-22      | 9:01           | INV                         | INVOLI            | Composite                      | -                                       | ×                                       | ×                                       | ×                            |                         |                              |  |              |        |
|   |   |                        |                |                |                             |                   |                                |   |   |   |                              |                         |                              |  |              |        |
|   |   |                        |                |                |                             |                   |                                |   |   |   |                              |                         |                              |  |              |        |
|   |   |                        |                |                |                             |                   |                                |   |   |   |                              |                         |                              |  |              |        |
|   |   |                        |                |                |                             |                   |                                |   |   |   | +                            |                         |                              |  |              |        |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS        | ECIAL INSTRUCTIONS  |                        | REL            | NOUISHE        | RELINQUISHED BY/AFFILIATION | IATION            |                                | DATE                                    | DATE/TIME                               | ACCEP                                   | TED BY                       | ACCEPTED BY/AFFILIATION | ION                          | DAT  | DATE/TIME    |        |
| FO 818999                                       | 66  |                        |                | Jenn           | Jennifer Ings               |                   |                                | ####################################### | ####################################### | Gumi                                    | . 3                          | La Brie                 | 52                           | 22020456   | 1            | 02:80  |
| SERVICE PROTECT (ruch, subject to availabilite) | orking to availability)   |                        |                |                |                             |                   |                                |   |   |   |                              |                         | (R                           | Roject #: 202-39                                       | 202          | 80     |
| SERVICE REQUEST (TUSH-                          | subject to availability)  |                        |                |                |                             |                   |                                |   |   |   |                              |                         |                              |  |              |        |
| Priority (2                                     | Regular (default)<br>Priority (2-3 business days) - 50% surcharge | efault)<br>charge      | Sampler's Name | ame            |                             |                   | Jennifer Ings                  | Sä                                      |   |   | Mobile #                     |                         |                              | 5195003444   |              |        |
| Emergency                                       | Emergency (1 Business Day) - 100% surcharge                       | ohoros                 |                |                |                             |                   |                                |   |   |   |                              | +                       |                              |  |              |        |

## **BENTHIC TISSUE CHEMISTRY**

TrichAnalytics Laboratory Report 2022-445 (Finalized 12-Dec-22)



## Trich Analytics Inc.

### Tissue Microchemistry Analysis Report

Date Received: **Client:** Nicole Zathey Date of Analysis:

Project Manager Teck Coal Limited Phone: 250-425-8449

Email: nicole.zathey@teck.com; mike.pope@teck.com; jessica.ritz@teck.com;

Line Creek Operation (PO 818999)

teckcoal@equisonline.com; aquascilab@teck.com; robin.valleau@minnow.ca

Analytical Request: Composite Benthic Invertebrate Tissue Microchemistry (total metals & moisture) - 35 samples.

See chain of custody form provided for sample identification numbers.

### Notes:

Client Project:

Analytical results are expressed in parts per million (ppm) dry weight (equivalent to mg/kg).

Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.

Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.

RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

Client specific DQO for Selenium accuracy is 90-110% of the certified value; result achieved 100% (ranging from 97-102%).

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

[The analytical report shall not be reproduced except in full under the expressed written consent of TrichAnalytics Inc.]

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



12 Dec 2022

Project No: 2022-445

06 Dec 2022

09 Dec 2022

12 Dec 2022

MET-002.06

2022-445

Final Report Date:

Project No.:

Method No.:

|           |          | Client ID     | LC_FRB_INV-<br>1_2022-11_N | LC_FRB_INV-<br>2_2022-11_N | LC_FRB_INV-<br>3_2022-11_N | LC_FRB_INV-<br>4_2022-11_N | LC_FRB_INV-<br>5_2022-11_N |
|-----------|----------|---------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|           |          | Lab ID        | 047                        | 048                        | 049                        | 050                        | 051                        |
|           | \\/      | et Weight (g) | 0.0964                     | 0.2839                     | 0.5065                     | 0.4348                     | 0.4411                     |
|           |          | ry Weight (g) | 0.0258                     | 0.2633                     | 0.1114                     | 0.0996                     | 0.0975                     |
|           |          | Moisture (%)  | 73.2                       | 77.2                       | 78.0                       | 77.1                       | 77.9                       |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      |
| 7Li       | 0.023    | 0.077         | 1.8                        | 1.2                        | 1.0                        | 1.4                        | 1.1                        |
| 11B       | 0.107    | 0.357         | 4.3                        | 1.2                        | 1.6                        | 1.8                        | 2.1                        |
| 23Na      | 2.7      | 9.0           | 5,444                      | 8,433                      | 5,368                      | 6,452                      | 5,250                      |
| 24Mg      | 0.089    | 0.297         | 2,179                      | 1,763                      | 1,439                      | 1,636                      | 1,778                      |
| 27AI      | 0.142    | 0.473         | 2,940                      | 561                        | 501                        | 1,318                      | 1,369                      |
| 31P       | 73       | 243           | 19,115                     | 18,018                     | 14,910                     | 15,405                     | 13,895                     |
| 39K       | 4.3      | 14            | 16,836                     | 15,257                     | 9,496                      | 12,035                     | 10,374                     |
| 44Ca      | 53       | 177           | 6,921                      | 3,971                      | 2,093                      | 3,027                      | 6,469                      |
| 49Ti      | 0.001    | 0.003         | 140                        | 39                         | 40                         | ,<br>78                    | 100                        |
| 51V       | 0.033    | 0.110         | 5.5                        | 1.8                        | 1.9                        | 3.1                        | 3.8                        |
| 52Cr      | 0.174    | 0.580         | 29                         | 13                         | 5.6                        | 12                         | 29                         |
| 55Mn      | 0.007    | 0.023         | 59                         | 43                         | 81                         | 57                         | 69                         |
| 57Fe      | 0.872    | 2.9           | 1,690                      | 661                        | 568                        | 602                        | 1,155                      |
| 59Co      | 0.017    | 0.057         | 0.925                      | 0.790                      | 0.713                      | 0.655                      | 1.7                        |
| 60Ni      | 0.086    | 0.287         | 41                         | 19                         | 8.0                        | 15                         | 43                         |
| 63Cu      | 0.018    | 0.060         | 34                         | 20                         | 13                         | 24                         | 15                         |
| 66Zn      | 0.313    | 1.0           | 248                        | 233                        | 150                        | 227                        | 243                        |
| 75As      | 0.327    | 1.1           | 0.951                      | 0.533                      | 0.533                      | 0.457                      | 0.723                      |
| 77Se      | 0.448    | 1.5           | 11                         | 8.9                        | 10                         | 9.3                        | 7.9                        |
| 88Sr      | 0.001    | 0.003         | 9.7                        | 5.1                        | 4.3                        | 5.3                        | 9.7                        |
| 95Mo      | 0.001    | 0.003         | 0.832                      | 0.340                      | 0.303                      | 0.378                      | 0.303                      |
| 107Ag     | 0.001    | 0.003         | 0.302                      | 0.248                      | 0.108                      | 0.194                      | 0.151                      |
| 111Cd     | 0.106    | 0.353         | 1.5                        | 2.1                        | 1.2                        | 1.7                        | 2.6                        |
| 118Sn     | 0.022    | 0.073         | 1.7                        | 0.695                      | 0.339                      | 0.244                      | 0.430                      |
| 121Sb     | 0.004    | 0.013         | 0.102                      | 0.038                      | 0.056                      | 0.050                      | 0.062                      |
| 137Ba     | 0.001    | 0.003         | 75                         | 33                         | 38                         | 67                         | 69                         |
| 202Hg     | 0.023    | 0.077         | 0.049                      | 0.030                      | 0.030                      | 0.036                      | 0.042                      |
| 205Tl     | 0.001    | 0.003         | 0.051                      | 0.020                      | 0.028                      | 0.031                      | 0.033                      |
| 208Pb     | 0.002    | 0.007         | 0.973                      | 0.305                      | 0.303                      | 0.343                      | 0.467                      |
| 238U      | 0.001    | 0.003         | 0.147                      | 0.048                      | 0.062                      | 0.076                      | 0.090                      |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC3_INV-<br>1_2022-11_N | LC_DC3_INV-<br>2_2022-11_N | LC_DC3_INV-<br>3_2022-11_N | LC_DC3_INV-<br>4_2022-11_N | LC_DC3_INV-<br>5_2022-11_N |
|-----------|----------|---------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|           |          | Lab ID        | 052                        | 053                        | 054                        | 055                        | 056                        |
|           | We       | et Weight (g) | 0.0988                     | 0.7005                     | 0.2121                     | 0.3413                     | 0.0788                     |
|           |          | y Weight (g)  | 0.0176                     | 0.1870                     | 0.0463                     | 0.0679                     | 0.0138                     |
|           |          | Moisture (%)  | 82.2                       | 73.3                       | 78.2                       | 80.1                       | 82.5                       |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      |
| 7Li       | 0.023    | 0.077         | 1.1                        | 0.932                      | 1.4                        | 1.4                        | 0.800                      |
| 11B       | 0.107    | 0.357         | 2.9                        | 3.6                        | 5.4                        | 4.2                        | 2.0                        |
| 23Na      | 2.7      | 9.0           | 2,971                      | 3,090                      | 2,330                      | 4,669                      | 3,848                      |
| 24Mg      | 0.089    | 0.297         | 1,344                      | 1,424                      | 1,383                      | 1,770                      | 1,636                      |
| 27Al      | 0.142    | 0.473         | 1,690                      | 2,285                      | 3,307                      | 2,266                      | 1,047                      |
| 31P       | 73       | 243           | 10,598                     | 11,270                     | 9,356                      | 13,686                     | 12,104                     |
| 39K       | 4.3      | 14            | 7,447                      | 8,829                      | 6,875                      | 11,369                     | 8,490                      |
| 44Ca      | 53       | 177           | 4,515                      | 3,668                      | 4,025                      | 3,131                      | 3,326                      |
| 49Ti      | 0.001    | 0.003         | 120                        | 147                        | 335                        | 171                        | 78                         |
| 51V       | 0.033    | 0.110         | 5.3                        | 5.6                        | 9.6                        | 7.3                        | 3.1                        |
| 52Cr      | 0.174    | 0.580         | 27                         | 17                         | 34                         | 21                         | 20                         |
| 55Mn      | 0.007    | 0.023         | 39                         | 37                         | 33                         | 44                         | 34                         |
| 57Fe      | 0.872    | 2.9           | 968                        | 938                        | 1,267                      | 1,126                      | 596                        |
| 59Co      | 0.017    | 0.057         | 1.1                        | 1.8                        | 1.7                        | 1.6                        | 0.824                      |
| 60Ni      | 0.086    | 0.287         | 54                         | 55                         | 65                         | 46                         | 36                         |
| 63Cu      | 0.018    | 0.060         | 24                         | 14                         | 11                         | 14                         | 16                         |
| 66Zn      | 0.313    | 1.0           | 185                        | 179                        | 141                        | 216                        | 172                        |
| 75As      | 0.327    | 1.1           | 0.609                      | 1.0                        | 1.0                        | 0.951                      | 0.457                      |
| 77Se      | 0.448    | 1.5           | 6.9                        | 5.3                        | 4.4                        | 8.5                        | 7.1                        |
| 88Sr      | 0.001    | 0.003         | 8.2                        | 5.9                        | 10                         | 8.9                        | 6.2                        |
| 95Mo      | 0.001    | 0.003         | 0.757                      | 0.340                      | 0.416                      | 0.378                      | 0.567                      |
| 107Ag     | 0.001    | 0.003         | 0.140                      | 0.130                      | 0.130                      | 0.130                      | 0.108                      |
| 111Cd     | 0.106    | 0.353         | 2.5                        | 2.4                        | 1.5                        | 1.2                        | 1.1                        |
| 118Sn     | 0.022    | 0.073         | 1.7                        | 0.355                      | 0.326                      | 0.434                      | 0.800                      |
| 121Sb     | 0.004    | 0.013         | 0.114                      | 0.102                      | 0.141                      | 0.158                      | 0.071                      |
| 137Ba     | 0.001    | 0.003         | 75                         | 90                         | 89                         | 97                         | 50                         |
| 202Hg     | 0.023    | 0.077         | 0.061                      | 0.058                      | 0.042                      | 0.079                      | 0.055                      |
| 205Tl     | 0.001    | 0.003         | 0.072                      | 0.082                      | 0.099                      | 0.097                      | 0.046                      |
| 208Pb     | 0.002    | 0.007         | 0.637                      | 0.546                      | 0.852                      | 0.911                      | 0.323                      |
| 238U      | 0.001    | 0.003         | 0.264                      | 0.116                      | 0.162                      | 0.183                      | 0.106                      |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          | Client ID     | LC_DC4_INV-<br>1_2022-11_N | LC_DC4_INV-<br>2_2022-11_N | LC_DC4_INV-<br>3_2022-11_N | LC_DC4_INV-<br>4_2022-11_N | LC_DC4_INV-<br>5_2022-11_N |
|-----------|----------|---------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|           |          | Lab ID        | 057                        | 058                        | 059                        | 060                        | 061                        |
|           | We       | et Weight (g) | 0.0313                     | 0.7176                     | 0.8149                     | 0.5904                     | 0.2990                     |
|           |          | y Weight (g)  | 0.0080                     | 0.1846                     | 0.1888                     | 0.1248                     | 0.0693                     |
|           |          | Moisture (%)  | 74.4                       | 74.3                       | 76.8                       | 78.9                       | 76.8                       |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      | (ppm)                      |
| 7Li       | 0.023    | 0.077         | 0.335                      | 0.445                      | 0.460                      | 0.402                      | 0.603                      |
| 11B       | 0.107    | 0.357         | 0.911                      | 0.781                      | 1.0                        | 0.933                      | 1.3                        |
| 23Na      | 2.7      | 9.0           | 1,453                      | 3,451                      | 4,073                      | 3,026                      | 3,353                      |
| 24Mg      | 0.089    | 0.297         | 633                        | 939                        | 1,026                      | 801                        | 1,230                      |
| 27Al      | 0.142    | 0.473         | 442                        | 483                        | 689                        | 566                        | 614                        |
| 31P       | 73       | 243           | 4,872                      | 14,631                     | 14,515                     | 11,268                     | 11,452                     |
| 39K       | 4.3      | 14            | 3,740                      | 8,466                      | 10,121                     | 6,486                      | 9,076                      |
| 44Ca      | 53       | 177           | 1,625                      | 1,282                      | 2,429                      | 1,267                      | 2,979                      |
| 49Ti      | 0.001    | 0.003         | 29                         | 26                         | 40                         | 40                         | 59                         |
| 51V       | 0.033    | 0.110         | 1.6                        | 1.7                        | 1.9                        | 2.1                        | 2.9                        |
| 52Cr      | 0.174    | 0.580         | 6.2                        | 9.9                        | 8.5                        | 11                         | 17                         |
| 55Mn      | 0.007    | 0.023         | 7.7                        | 20                         | 16                         | 20                         | 21                         |
| 57Fe      | 0.872    | 2.9           | 558                        | 590                        | 614                        | 539                        | 827                        |
| 59Co      | 0.017    | 0.057         | 0.323                      | 0.434                      | 0.453                      | 0.438                      | 0.443                      |
| 60Ni      | 0.086    | 0.287         | 9.6                        | 15                         | 18                         | 17                         | 29                         |
| 63Cu      | 0.018    | 0.060         | 5.7                        | 12                         | 11                         | 8.8                        | 11                         |
| 66Zn      | 0.313    | 1.0           | 113                        | 148                        | 137                        | 83                         | 148                        |
| 75As      | 0.327    | 1.1           | 0.628                      | 0.647                      | 1.0                        | 0.647                      | 0.932                      |
| 77Se      | 0.448    | 1.5           | 3.1                        | 7.6                        | 6.9                        | 5.5                        | 5.7                        |
| 88Sr      | 0.001    | 0.003         | 2.2                        | 2.1                        | 2.7                        | 2.7                        | 3.8                        |
| 95Mo      | 0.001    | 0.003         | 0.378                      | 0.567                      | 0.416                      | 0.303                      | 0.530                      |
| 107Ag     | 0.001    | 0.003         | 0.043                      | 0.076                      | 0.097                      | 0.076                      | 0.108                      |
| 111Cd     | 0.106    | 0.353         | 1.9                        | 1.1                        | 1.7                        | 1.0                        | 1.6                        |
| 118Sn     | 0.022    | 0.073         | 0.411                      | 0.310                      | 0.193                      | 0.160                      | 0.734                      |
| 121Sb     | 0.004    | 0.013         | 0.038                      | 0.037                      | 0.049                      | 0.044                      | 0.074                      |
| 137Ba     | 0.001    | 0.003         | 35                         | 54                         | 72                         | 64                         | 64                         |
| 202Hg     | 0.023    | 0.077         | < 0.023                    | 0.036                      | 0.042                      | 0.036                      | 0.030                      |
| 205Tl     | 0.001    | 0.003         | 0.028                      | 0.018                      | 0.022                      | 0.024                      | 0.042                      |
| 208Pb     | 0.002    | 0.007         | 0.189                      | 0.178                      | 0.246                      | 0.234                      | 0.404                      |
| 238U      | 0.001    | 0.003         | 0.045                      | 0.054                      | 0.071                      | 0.053                      | 0.065                      |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_GRCK_INV- | LC_GRCK_INV- | LC_GRCK_INV- | LC_GRCK_INV- | LC_GRCK_INV- |
|-----------|----------|---------------|--------------|--------------|--------------|--------------|--------------|
|           |          | Client ID     | 1_2022-11_N  | 2_2022-11_N  | 3_2022-11_N  | 4_2022-11_N  | 5_2022-11_N  |
|           |          |               |              |              |              |              |              |
|           |          | Lab ID        | 062          | 063          | 064          | 065          | 066          |
|           |          | et Weight (g) | 0.0367       | 0.1443       | 0.0873       | 0.1051       | 0.1457       |
|           | Di       | y Weight (g)  | 0.0085       | 0.0367       | 0.0189       | 0.0243       | 0.0306       |
|           |          | Moisture (%)  | 76.8         | 74.6         | 78.4         | 76.9         | 79.0         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)        | (ppm)        | (ppm)        | (ppm)        | (ppm)        |
| 7Li       | 0.023    | 0.077         | 1.2          | 0.254        | 0.557        | 0.660        | 1.0          |
| 11B       | 0.107    | 0.357         | 5.3          | 1.1          | 2.5          | 4.9          | 6.2          |
| 23Na      | 2.7      | 9.0           | 2,479        | 3,530        | 2,862        | 5,246        | 5,565        |
| 24Mg      | 0.089    | 0.297         | 1,106        | 1,549        | 1,968        | 2,303        | 1,966        |
| 27Al      | 0.142    | 0.473         | 1,033        | 242          | 875          | 1,176        | 1,507        |
| 31P       | 73       | 243           | 6,476        | 13,342       | 12,333       | 16,133       | 16,463       |
| 39K       | 4.3      | 14            | 6,938        | 10,484       | 8,738        | 14,398       | 15,856       |
| 44Ca      | 53       | 177           | 3,312        | 2,008        | 4,165        | 4,057        | 3,410        |
| 49Ti      | 0.001    | 0.003         | 170          | 11           | 65           | 77           | 150          |
| 51V       | 0.033    | 0.110         | 4.1          | 0.521        | 2.1          | 2.1          | 3.7          |
| 52Cr      | 0.174    | 0.580         | 25           | 6.6          | 11           | 11           | 13           |
| 55Mn      | 0.007    | 0.023         | 101          | 59           | 68           | 78           | 94           |
| 57Fe      | 0.872    | 2.9           | 1,486        | 304          | 643          | 823          | 1,204        |
| 59Co      | 0.017    | 0.057         | 2.1          | 1.5          | 1.3          | 2.0          | 1.5          |
| 60Ni      | 0.086    | 0.287         | 32           | 9.7          | 15           | 17           | 18           |
| 63Cu      | 0.018    | 0.060         | 8.2          | 24           | 15           | 23           | 22           |
| 66Zn      | 0.313    | 1.0           | 140          | 582          | 269          | 414          | 234          |
| 75As      | 0.327    | 1.1           | 1.7          | 0.602        | 1.0          | 2.0          | 1.8          |
| 77Se      | 0.448    | 1.5           | 5.3          | 8.9          | 7.8          | 9.6          | 6.9          |
| 88Sr      | 0.001    | 0.003         | 10           | 5.1          | 8.2          | 10           | 11           |
| 95Mo      | 0.001    | 0.003         | 0.454        | 0.532        | 0.580        | 0.725        | 0.580        |
| 107Ag     | 0.001    | 0.003         | 0.032        | 0.076        | 0.022        | 0.119        | 0.108        |
| 111Cd     | 0.106    | 0.353         | 3.2          | 6.9          | 3.6          | 8.3          | 2.6          |
| 118Sn     | 0.022    | 0.073         | 0.977        | 0.355        | 0.839        | 0.289        | 0.505        |
| 121Sb     | 0.004    | 0.013         | 0.056        | 0.023        | 0.040        | 0.052        | 0.113        |
| 137Ba     | 0.001    | 0.003         | 60           | 16           | 31           | 40           | 56           |
| 202Hg     | 0.023    | 0.077         | < 0.023      | 0.085        | 0.043        | 0.050        | 0.057        |
| 205TI     | 0.001    | 0.003         | 0.059        | 0.046        | 0.049        | 0.070        | 0.060        |
| 208Pb     | 0.002    | 0.007         | 1.0          | 0.110        | 0.315        | 0.457        | 0.711        |
| 238U      | 0.001    | 0.003         | 0.139        | 0.056        | 0.121        | 0.164        | 0.196        |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

|           |          |               | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- | LC_DCEF_INV- |
|-----------|----------|---------------|--------------|--------------|--------------|--------------|--------------|
|           |          | Client ID     | 1_2022-11_N  | 2_2022-11_N  | 3_2022-11_N  | 4_2022-11_N  | 5_2022-11_N  |
|           |          |               |              |              |              |              |              |
|           |          | Lab ID        | 067          | 068          | 069          | 070          | 071          |
|           |          | et Weight (g) | 0.0654       | 0.1022       | 0.1046       | 0.1467       | 0.0343       |
|           | Di       | ry Weight (g) | 0.0107       | 0.0235       | 0.0246       | 0.0275       | 0.0068       |
|           |          | Moisture (%)  | 83.6         | 77.0         | 76.5         | 81.3         | 80.2         |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)        | (ppm)        | (ppm)        | (ppm)        | (ppm)        |
| 7Li       | 0.023    | 0.077         | 0.422        | 0.660        | 0.465        | 0.957        | 0.379        |
| 11B       | 0.107    | 0.357         | 0.385        | 1.8          | 1.0          | 4.3          | 1.2          |
| 23Na      | 2.7      | 9.0           | 4,011        | 4,196        | 2,541        | 3,842        | 1,731        |
| 24Mg      | 0.089    | 0.297         | 935          | 1,171        | 1,480        | 1,280        | 597          |
| 27Al      | 0.142    | 0.473         | 84           | 746          | 429          | 1,276        | 591          |
| 31P       | 73       | 243           | 11,484       | 12,854       | 13,189       | 13,418       | 5,424        |
| 39K       | 4.3      | 14            | 8,326        | 10,851       | 7,777        | 10,922       | 6,200        |
| 44Ca      | 53       | 177           | 2,919        | 2,639        | 5,571        | 2,762        | 1,416        |
| 49Ti      | 0.001    | 0.003         | 7.3          | 65           | 23           | 94           | 43           |
| 51V       | 0.033    | 0.110         | 0.413        | 3.6          | 1.5          | 5.5          | 2.5          |
| 52Cr      | 0.174    | 0.580         | 8.1          | 19           | 18           | 36           | 10           |
| 55Mn      | 0.007    | 0.023         | 13           | 22           | 20           | 23           | 31           |
| 57Fe      | 0.872    | 2.9           | 169          | 703          | 484          | 1,279        | 453          |
| 59Co      | 0.017    | 0.057         | 0.267        | 0.918        | 0.534        | 1.6          | 0.564        |
| 60Ni      | 0.086    | 0.287         | 9.8          | 29           | 26           | 53           | 15           |
| 63Cu      | 0.018    | 0.060         | 12           | 18           | 17           | 15           | 7.4          |
| 66Zn      | 0.313    | 1.0           | 108          | 116          | 163          | 109          | 84           |
| 75As      | 0.327    | 1.1           | 0.387        | 1.9          | 1.1          | 2.6          | 0.752        |
| 77Se      | 0.448    | 1.5           | 2.5          | 3.8          | 3.5          | 3.8          | 3.3          |
| 88Sr      | 0.001    | 0.003         | 3.1          | 3.9          | 6.9          | 6.5          | 2.4          |
| 95Mo      | 0.001    | 0.003         | 0.242        | 0.532        | 0.628        | 0.483        | 0.387        |
| 107Ag     | 0.001    | 0.003         | 0.054        | 0.097        | 0.076        | 0.065        | 0.032        |
| 111Cd     | 0.106    | 0.353         | 1.2          | 2.4          | 4.0          | 2.4          | 3.1          |
| 118Sn     | 0.022    | 0.073         | 0.662        | 0.332        | 0.682        | 0.731        | 0.478        |
| 121Sb     | 0.004    | 0.013         | 0.035        | 0.215        | 0.086        | 0.231        | 0.154        |
| 137Ba     | 0.001    | 0.003         | 49           | 110          | 127          | 118          | 163          |
| 202Hg     | 0.023    | 0.077         | < 0.023      | 0.043        | 0.036        | 0.043        | <0.023       |
| 205TI     | 0.001    | 0.003         | 0.006        | 0.025        | 0.020        | 0.050        | 0.024        |
| 208Pb     | 0.002    | 0.007         | 0.082        | 0.366        | 0.154        | 0.591        | 0.240        |
| 238U      | 0.001    | 0.003         | 0.022        | 0.122        | 0.071        | 0.163        | 0.131        |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

TrichAnalytics Inc.

Project No: 2022-445

Page 6 of 16

|           |          | Client ID     | LC_DCDS_INV-<br>1_2022-11_N | LC_DCDS_INV-<br>2_2022-11_N | LC_DCDS_INV-<br>3_2022-11_N | LC_DCDS_INV-<br>4_2022-11_N | LC_DCDS_INV-<br>5_2022-11_N |
|-----------|----------|---------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|           |          | Lab ID        | 072                         | 073                         | 074                         | 075                         | 076                         |
|           | We       | et Weight (g) | 0.1058                      | 0.2908                      | 0.1429                      | 0.4021                      | 0.1961                      |
|           |          | y Weight (g)  | 0.0243                      | 0.0521                      | 0.0250                      | 0.0756                      | 0.0414                      |
|           |          | Moisture (%)  | 77.0                        | 82.1                        | 82.5                        | 81.2                        | 78.9                        |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       |
| 7Li       | 0.023    | 0.077         | 1.3                         | 1.7                         | 1.6                         | 1.4                         | 0.920                       |
| 11B       | 0.107    | 0.357         | 4.9                         | 5.3                         | 26                          | 3.2                         | 2.1                         |
| 23Na      | 2.7      | 9.0           | 3,892                       | 5,586                       | 4,309                       | 5,287                       | 5,661                       |
| 24Mg      | 0.089    | 0.297         | 1,851                       | 1,655                       | 1,511                       | 1,551                       | 1,203                       |
| 27Al      | 0.142    | 0.473         | 2,953                       | 3,481                       | 3,281                       | 2,227                       | 1,153                       |
| 31P       | 73       | 243           | 13,686                      | 15,529                      | 12,066                      | 14,199                      | 15,815                      |
| 39K       | 4.3      | 14            | 11,049                      | 14,371                      | 10,486                      | 11,565                      | 11,976                      |
| 44Ca      | 53       | 177           | 4,888                       | 5,157                       | 4,997                       | 4,016                       | 2,604                       |
| 49Ti      | 0.001    | 0.003         | 244                         | 260                         | 256                         | 179                         | 82                          |
| 51V       | 0.033    | 0.110         | 7.9                         | 10                          | 9.8                         | 6.5                         | 3.8                         |
| 52Cr      | 0.174    | 0.580         | 25                          | 30                          | 30                          | 15                          | 11                          |
| 55Mn      | 0.007    | 0.023         | 116                         | 91                          | 105                         | 93                          | 102                         |
| 57Fe      | 0.872    | 2.9           | 1,429                       | 1,616                       | 2,012                       | 1,063                       | 644                         |
| 59Co      | 0.017    | 0.057         | 2.4                         | 1.8                         | 2.6                         | 1.7                         | 1.2                         |
| 60Ni      | 0.086    | 0.287         | 78                          | 78                          | 92                          | 55                          | 37                          |
| 63Cu      | 0.018    | 0.060         | 16                          | 24                          | 18                          | 16                          | 13                          |
| 66Zn      | 0.313    | 1.0           | 284                         | 216                         | 152                         | 206                         | 197                         |
| 75As      | 0.327    | 1.1           | 0.795                       | 1.2                         | 0.860                       | 0.989                       | 0.602                       |
| 77Se      | 0.448    | 1.5           | 15                          | 12                          | 12                          | 10                          | 12                          |
| 88Sr      | 0.001    | 0.003         | 15                          | 12                          | 12                          | 8.5                         | 5.0                         |
| 95Mo      | 0.001    | 0.003         | 0.773                       | 0.918                       | 0.822                       | 0.628                       | 0.773                       |
| 107Ag     | 0.001    | 0.003         | 0.151                       | 0.454                       | 0.205                       | 0.259                       | 0.194                       |
| 111Cd     | 0.106    | 0.353         | 6.3                         | 3.3                         | 2.5                         | 2.5                         | 1.9                         |
| 118Sn     | 0.022    | 0.073         | 0.830                       | 0.947                       | 0.689                       | 0.319                       | 0.363                       |
| 121Sb     | 0.004    | 0.013         | 0.303                       | 0.255                       | 0.223                       | 0.205                       | 0.132                       |
| 137Ba     | 0.001    | 0.003         | 332                         | 134                         | 130                         | 105                         | 84                          |
| 202Hg     | 0.023    | 0.077         | 0.089                       | 0.107                       | 0.085                       | 0.100                       | 0.071                       |
| 205Tl     | 0.001    | 0.003         | 0.189                       | 0.138                       | 0.104                       | 0.083                       | 0.051                       |
| 208Pb     | 0.002    | 0.007         | 0.916                       | 1.2                         | 1.1                         | 0.766                       | 0.453                       |
| 238U      | 0.001    | 0.003         | 0.260                       | 0.197                       | 0.215                       | 0.140                       | 0.111                       |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

TrichAnalytics Inc.

Project No: 2022-445

Page 7 of 16

|           |          | Client ID     | LC_FRUS_INV-<br>1_2022-11_N | LC_FRUS_INV-<br>2_2022-11_N | LC_FRUS_INV-<br>3_2022-11_N | LC_FRUS_INV-<br>4_2022-11_N | LC_FRUS_INV-<br>5_2022-11_N |
|-----------|----------|---------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|           |          | Lab ID        | 077                         | 078                         | 079                         | 080                         | 081                         |
|           | We       | et Weight (g) | 0.1366                      | 0.3863                      | 0.3766                      | 0.6683                      | 0.3434                      |
|           |          | y Weight (g)  | 0.0294                      | 0.0624                      | 0.0745                      | 0.1765                      | 0.0707                      |
|           |          | Moisture (%)  | 78.5                        | 83.8                        | 80.2                        | 73.6                        | 79.4                        |
| Parameter | DL (ppm) | LOQ (ppm)     | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       | (ppm)                       |
| 7Li       | 0.023    | 0.077         | 3.1                         | 1.8                         | 1.2                         | 1.2                         | 1.1                         |
| 11B       | 0.107    | 0.357         | 11                          | 4.7                         | 2.7                         | 2.0                         | 3.7                         |
| 23Na      | 2.7      | 9.0           | 3,133                       | 4,460                       | 3,697                       | 4,148                       | 2,548                       |
| 24Mg      | 0.089    | 0.297         | 2,091                       | 1,759                       | 1,711                       | 1,196                       | 1,403                       |
| 27Al      | 0.142    | 0.473         | 4,133                       | 2,008                       | 1,538                       | 1,365                       | 1,474                       |
| 31P       | 73       | 243           | 11,161                      | 12,466                      | 12,280                      | 13,364                      | 10,682                      |
| 39K       | 4.3      | 14            | 11,172                      | 9,670                       | 10,251                      | 10,463                      | 7,561                       |
| 44Ca      | 53       | 177           | 4,207                       | 6,984                       | 4,978                       | ,<br>1,872                  | 4,484                       |
| 49Ti      | 0.001    | 0.003         | 604                         | 181                         | 118                         | 93                          | 107                         |
| 51V       | 0.033    | 0.110         | 20                          | 5.2                         | 3.5                         | 2.9                         | 3.3                         |
| 52Cr      | 0.174    | 0.580         | 61                          | 20                          | 15                          | 8.8                         | 15                          |
| 55Mn      | 0.007    | 0.023         | 99                          | 58                          | 58                          | 97                          | 43                          |
| 57Fe      | 0.872    | 2.9           | 4,247                       | 1,531                       | 994                         | 871                         | 944                         |
| 59Co      | 0.017    | 0.057         | 2.6                         | 1.2                         | 1.5                         | 0.848                       | 0.639                       |
| 60Ni      | 0.086    | 0.287         | 103                         | 30                          | 24                          | 14                          | 22                          |
| 63Cu      | 0.018    | 0.060         | 17                          | 21                          | 16                          | 15                          | 13                          |
| 66Zn      | 0.313    | 1.0           | 177                         | 136                         | 205                         | 123                         | 140                         |
| 75As      | 0.327    | 1.1           | 1.5                         | 0.903                       | 0.946                       | 0.602                       | 0.774                       |
| 77Se      | 0.448    | 1.5           | 7.6                         | 6.9                         | 8.9                         | 8.9                         | 5.6                         |
| 88Sr      | 0.001    | 0.003         | 14                          | 8.8                         | 6.8                         | 3.3                         | 6.2                         |
| 95Mo      | 0.001    | 0.003         | 1.3                         | 0.387                       | 0.387                       | 0.580                       | 0.435                       |
| 107Ag     | 0.001    | 0.003         | 0.097                       | 0.130                       | 0.108                       | 0.130                       | 0.097                       |
| 111Cd     | 0.106    | 0.353         | 3.2                         | 1.1                         | 2.4                         | 1.1                         | 1.3                         |
| 118Sn     | 0.022    | 0.073         | 0.703                       | 0.617                       | 0.411                       | 0.176                       | 0.326                       |
| 121Sb     | 0.004    | 0.013         | 0.256                       | 0.093                       | 0.081                       | 0.063                       | 0.083                       |
| 137Ba     | 0.001    | 0.003         | 132                         | 70                          | 62                          | 58                          | 50                          |
| 202Hg     | 0.023    | 0.077         | 0.064                       | 0.028                       | 0.043                       | 0.036                       | 0.046                       |
| 205TI     | 0.001    | 0.003         | 0.112                       | 0.051                       | 0.039                       | 0.030                       | 0.034                       |
| 208Pb     | 0.002    | 0.007         | 1.8                         | 0.724                       | 0.575                       | 0.551                       | 0.507                       |
| 238U      | 0.001    | 0.003         | 0.299                       | 0.144                       | 0.113                       | 0.068                       | 0.095                       |

### Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

Teck Coal Limited
Tissue QA/QC Relative Percent Difference Results

| (         | Client ID   | LC_FRE          | 3_INV-4_202                  | 22-11_N    | LC_DC           | 3_INV-2_202                  | 22-11_N    | LC_DC           | 3_INV-4_202                  | 22-11_N    |
|-----------|-------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|-----------------|------------------------------|------------|
|           | Lab ID      |                 | 050                          |            |                 | 053                          |            |                 | 055                          |            |
| Parameter | DL<br>(ppm) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |
| 7Li       | 0.023       | 1.4             | 1.7                          | 19         | 0.932           | 1.2                          | 25         | 1.4             | 1.2                          | 15         |
| 11B       | 0.107       | 1.8             | 2.5                          | 33         | 3.6             | 4.3                          | 18         | 4.2             | 3.7                          | 13         |
| 23Na      | 2.7         | 6,452           | 8,920                        | 32         | 3,090           | 3,325                        | 7.3        | 4,669           | 4,383                        | 6.3        |
| 24Mg      | 0.089       | 1,636           | 1,780                        | 8.4        | 1,424           | 1,535                        | 7.5        | 1,770           | 2,166                        | 20         |
| 27Al      | 0.142       | 1,318           | 1,293                        | 1.9        | 2,285           | 2,279                        | 0.3        | 2,266           | 1,894                        | 18         |
| 31P       | 73          | 15,405          | 16,128                       | 4.6        | 11,270          | 13,192                       | 16         | 13,686          | 14,427                       | 5.3        |
| 39K       | 4.3         | 12,035          | 13,089                       | 8.4        | 8,829           | 9,929                        | 12         | 11,369          | 10,382                       | 9.1        |
| 44Ca      | 53          | 3,027           | 3,668                        | 19         | 3,668           | 4,576                        | 22         | 3,131           | 3,228                        | 3.1        |
| 49Ti      | 0.001       | 78              | 95                           | 20         | 147             | 150                          | 2.0        | 171             | 131                          | 27         |
| 51V       | 0.033       | 3.1             | 3.5                          | 12         | 5.6             | 6.9                          | 21         | 7.3             | 5.9                          | 21         |
| 52Cr      | 0.174       | 12              | 15                           | 22         | 17              | 18                           | 5.7        | 21              | 26                           | 21         |
| 55Mn      | 0.007       | 57              | 51                           | 11         | 37              | 46                           | 22         | 44              | 47                           | 6.6        |
| 57Fe      | 0.872       | 602             | 665                          | 9.9        | 938             | 1,073                        | 13         | 1,126           | 1,033                        | 8.6        |
| 59Co      | 0.017       | 0.655           | 0.814                        | 22         | 1.8             | 1.9                          | 5.4        | 1.6             | 1.9                          | 17         |
| 60Ni      | 0.086       | 15              | 19                           | 24         | 55              | 62                           | 12         | 46              | 54                           | 16         |
| 63Cu      | 0.018       | 24              | 17                           | 34         | 14              | 17                           | 19         | 14              | 13                           | 7.4        |
| 66Zn      | 0.313       | 227             | 202                          | 12         | 179             | 187                          | 4.4        | 216             | 190                          | 13         |
| 75As      | 0.327       | 0.457           | 0.533                        | -          | 1.0             | 1.4                          | -          | 0.951           | 1.1                          | -          |
| 77Se      | 0.448       | 9.3             | 11                           | 17         | 5.3             | 6.1                          | 14         | 8.5             | 7.5                          | 13         |
| 88Sr      | 0.001       | 5.3             | 6.2                          | 16         | 5.9             | 9.8                          | 50         | 8.9             | 8.7                          | 2.3        |
| 95Mo      | 0.001       | 0.378           | 0.303                        | 22         | 0.340           | 0.378                        | 11         | 0.378           | 0.340                        | 11         |
| 107Ag     | 0.001       | 0.194           | 0.194                        | 0.0        | 0.130           | 0.151                        | 15         | 0.130           | 0.119                        | 8.8        |
| 111Cd     | 0.106       | 1.7             | 1.5                          | 13         | 2.4             | 2.1                          | 13         | 1.2             | 1.2                          | 0.0        |
| 118Sn     | 0.022       | 0.244           | 0.332                        | 31         | 0.355           | 0.362                        | 2.0        | 0.434           | 0.410                        | 5.7        |
| 121Sb     | 0.004       | 0.050           | 0.047                        | 6.2        | 0.102           | 0.141                        | 32         | 0.158           | 0.162                        | 2.5        |
| 137Ba     | 0.001       | 67              | 62                           | 7.8        | 90              | 98                           | 8.5        | 97              | 109                          | 12         |
| 202Hg     | 0.023       | 0.036           | 0.036                        | -          | 0.058           | 0.055                        | -          | 0.079           | 0.079                        | -          |
| 205TI     | 0.001       | 0.031           | 0.038                        | 20         | 0.082           | 0.102                        | 22         | 0.097           | 0.086                        | 12         |
| 208Pb     | 0.002       | 0.343           | 0.386                        | 12         | 0.546           | 0.727                        | 28         | 0.911           | 0.630                        | 37         |
| 238U      | 0.001       | 0.076           | 0.063                        | 19         | 0.116           | 0.151                        | 26         | 0.183           | 0.142                        | 25         |

#### Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

Project No: 2022-445

## Teck Coal Limited Tissue QA/QC Relative Percent Difference Results

| (         | Client ID   | LC_GRC          | K_INV-2_20                   | 22-11_N    |
|-----------|-------------|-----------------|------------------------------|------------|
|           | Lab ID      |                 | 063                          |            |
| Parameter | DL<br>(ppm) | Sample<br>(ppm) | Sample<br>Duplicate<br>(ppm) | RPD<br>(%) |
| 7Li       | 0.023       | 0.254           | 0.368                        | 37         |
| 11B       | 0.107       | 1.1             | 1.6                          | 37         |
| 23Na      | 2.7         | 3,530           | 3,860                        | 8.9        |
| 24Mg      | 0.089       | 1,549           | 1,686                        | 8.5        |
| 27Al      | 0.142       | 242             | 348                          | 36         |
| 31P       | 73          | 13,342          | 15,313                       | 14         |
| 39K       | 4.3         | 10,484          | 12,138                       | 15         |
| 44Ca      | 53          | 2,008           | 2,520                        | 23         |
| 49Ti      | 0.001       | 11              | 12                           | 8.7        |
| 51V       | 0.033       | 0.521           | 0.492                        | 5.7        |
| 52Cr      | 0.174       | 6.6             | 8.7                          | 28         |
| 55Mn      | 0.007       | 59              | 69                           | 16         |
| 57Fe      | 0.872       | 304             | 403                          | 28         |
| 59Co      | 0.017       | 1.5             | 1.6                          | 6.5        |
| 60Ni      | 0.086       | 9.7             | 11                           | 13         |
| 63Cu      | 0.018       | 24              | 29                           | 19         |
| 66Zn      | 0.313       | 582             | 604                          | 3.7        |
| 75As      | 0.327       | 0.602           | 0.602                        | -          |
| 77Se      | 0.448       | 8.9             | 9.6                          | 7.6        |
| 88Sr      | 0.001       | 5.1             | 6.4                          | 23         |
| 95Mo      | 0.001       | 0.532           | 0.580                        | 8.6        |
| 107Ag     | 0.001       | 0.076           | 0.101                        | 28         |
| 111Cd     | 0.106       | 6.9             | 6.4                          | 7.5        |
| 118Sn     | 0.022       | 0.355           | 0.440                        | 21         |
| 121Sb     | 0.004       | 0.023           | 0.030                        | -          |
| 137Ba     | 0.001       | 16              | 22                           | 32         |
| 202Hg     | 0.023       | 0.085           | 0.085                        | -          |
| 205TI     | 0.001       | 0.046           | 0.047                        | 2.2        |
| 208Pb     | 0.002       | 0.110           | 0.159                        | 36         |
| 238U      | 0.001       | 0.056           | 0.078                        | 33         |

#### Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

### Data Quality Objectives:

Laboratory Duplicates - RPD  $\leq$ 40% for all elements, except Ca and Sr, which are  $\leq$ 60% Minimum DQOs apply to individual samples at concentrations above 10x DL

## Teck Coal Limited Tissue QA/QC Accuracy and Precision Results

|           | S        | ample Group ID           |                                  | 01              |                      |                                  | 02              |                      |
|-----------|----------|--------------------------|----------------------------------|-----------------|----------------------|----------------------------------|-----------------|----------------------|
| Parameter | DL (ppm) | Certified<br>Conc. (ppm) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) | Mean<br>Estimated<br>Conc. (ppm) | Accuracy<br>(%) | Precision<br>RSD (%) |
| 7Li       | 0.023    | 1.21                     | 1.2                              | 96              | 9.8                  | 1.2                              | 96              | 10                   |
| 11B       | 0.107    | 4.5                      | 4.1                              | 92              | 3.2                  | 4.3                              | 96              | 2.5                  |
| 23Na      | 2.7      | 14,000                   | 14,074                           | 100             | 4.0                  | 12,422                           | 89              | 5.6                  |
| 24Mg      | 0.089    | 910                      | 920                              | 101             | 8.1                  | 838                              | 92              | 4.7                  |
| 27Al      | 0.142    | 197.2                    | 186                              | 94              | 2.2                  | 193                              | 98              | 4.9                  |
| 31P       | 73       | 8,000                    | 7,970                            | 100             | 6.3                  | 7,163                            | 90              | 5.2                  |
| 39K       | 4.3      | 15,500                   | 16,154                           | 104             | 7.1                  | 14,521                           | 94              | 7.0                  |
| 44Ca      | 53       | 2,360                    | 2,350                            | 100             | 4.9                  | 2,262                            | 96              | 4.1                  |
| 49Ti      | 0.001    | 12.24                    | 12                               | 95              | 12                   | 11                               | 88              | 12                   |
| 51V       | 0.033    | 1.57                     | 1.5                              | 96              | 9.4                  | 1.4                              | 90              | 14                   |
| 52Cr      | 0.174    | 1.87                     | 2.0                              | 106             | 5.5                  | 1.8                              | 96              | 7.9                  |
| 55Mn      | 0.007    | 3.17                     | 3.2                              | 102             | 8.3                  | 3.2                              | 100             | 5.7                  |
| 57Fe      | 0.872    | 343                      | 349                              | 102             | 6.7                  | 338                              | 98              | 5.7                  |
| 59Co      | 0.017    | 0.25                     | 0.264                            | 106             | 5.8                  | 0.247                            | 99              | 2.7                  |
| 60Ni      | 0.086    | 1.34                     | 1.5                              | 109             | 3.8                  | 1.3                              | 98              | 11                   |
| 63Cu      | 0.018    | 15.7                     | 18                               | 112             | 6.5                  | 15                               | 96              | 6.7                  |
| 66Zn      | 0.313    | 51.6                     | 49                               | 95              | 4.4                  | 47                               | 92              | 6.9                  |
| 75As      | 0.327    | 6.87                     | 6.9                              | 100             | 3.7                  | 6.3                              | 92              | 4.6                  |
| 77Se      | 0.448    | 3.45                     | 3.4                              | 97              | 2.7                  | 3.5                              | 102             | 2.4                  |
| 88Sr      | 0.001    | 10.1                     | 10                               | 102             | 5.9                  | 9.5                              | 94              | 3.8                  |
| 95Mo      | 0.001    | 0.29                     | 0.295                            | 102             | 11                   | 0.314                            | 108             | 7.6                  |
| 107Ag     | 0.001    | 0.0252                   | 0.026                            | 103             | 20                   | 0.024                            | 95              | 19                   |
| 111Cd     | 0.106    | 0.299                    | 0.359                            | 120             | 18                   | 0.269                            | 90              | 11                   |
| 118Sn     | 0.022    | 0.061                    | 0.078                            | 128             | 16                   | 0.049                            | 80              | 15                   |
| 121Sb     | 0.004    | 0.011                    | 0.013                            | 114             | 16                   | 0.015                            | 136             | 14                   |
| 137Ba     | 0.001    | 8.6                      | 7.7                              | 90              | 3.4                  | 7.8                              | 91              | 2.6                  |
| 202Hg     | 0.023    | 0.412                    | 0.416                            | 101             | 7.5                  | 0.427                            | 104             | 3.2                  |
| 205Tl     | 0.001    | 0.0013                   | -                                | -               | -                    | -                                | -               | -                    |
| 208Pb     | 0.002    | 0.404                    | 0.369                            | 91              | 18                   | 0.425                            | 105             | 13                   |
| 238U      | 0.001    | 0.05                     | 0.046                            | 92              | 10                   | 0.045                            | 90              | 13                   |

### 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.

TI certified concentration from NIST-2976.

Accuracy and precision for TI are not reported as the certified concentration is too close to the reportable detection limit.

# Teck Coal Limited Sample Group Information

| Sample<br>Group ID | Client ID               | Lab ID | Date of<br>Analysis |
|--------------------|-------------------------|--------|---------------------|
| 01                 | LC_FRB_INV-1_2022-11_N  | 047    | 09 Dec 2022         |
|                    | LC_FRB_INV-2_2022-11_N  | 048    |                     |
|                    | LC_FRB_INV-3_2022-11_N  | 049    |                     |
|                    | LC_FRB_INV-4_2022-11_N  | 050    |                     |
|                    | LC_FRB_INV-5_2022-11_N  | 051    |                     |
|                    | LC_DC3_INV-1_2022-11_N  | 052    |                     |
|                    | LC_DC3_INV-2_2022-11_N  | 053    |                     |
|                    | LC_DC3_INV-3_2022-11_N  | 054    |                     |
|                    | LC_DC3_INV-4_2022-11_N  | 055    |                     |
|                    | LC_DC3_INV-5_2022-11_N  | 056    |                     |
|                    | LC_DC4_INV-1_2022-11_N  | 057    |                     |
|                    | LC_DC4_INV-2_2022-11_N  | 058    |                     |
|                    | LC_DC4_INV-3_2022-11_N  | 059    |                     |
|                    | LC_DC4_INV-4_2022-11_N  | 060    |                     |
|                    | LC_DC4_INV-5_2022-11_N  | 061    |                     |
|                    | LC_GRCK_INV-1_2022-11_N | 062    |                     |
| 02                 | LC_GRCK_INV-2_2022-11_N | 063    | 09 Dec 2022         |
|                    | LC_GRCK_INV-3_2022-11_N | 064    |                     |
|                    | LC_GRCK_INV-4_2022-11_N | 065    |                     |
|                    | LC_GRCK_INV-5_2022-11_N | 066    |                     |
|                    | LC_DCEF_INV-1_2022-11_N | 067    |                     |
|                    | LC_DCEF_INV-2_2022-11_N | 068    |                     |
|                    | LC_DCEF_INV-3_2022-11_N | 069    |                     |
|                    | LC_DCEF_INV-4_2022-11_N | 070    |                     |
|                    | LC_DCEF_INV-5_2022-11_N | 071    |                     |
|                    | LC_DCDS_INV-1_2022-11_N | 072    |                     |
|                    | LC_DCDS_INV-2_2022-11_N | 073    |                     |
|                    | LC_DCDS_INV-3_2022-11_N | 074    |                     |
|                    | LC_DCDS_INV-4_2022-11_N | 075    |                     |
|                    | LC_DCDS_INV-5_2022-11_N | 076    |                     |
|                    | LC_FRUS_INV-1_2022-11_N | 077    |                     |
|                    | LC_FRUS_INV-2_2022-11_N | 078    |                     |
|                    | LC_FRUS_INV-3_2022-11_N | 079    |                     |
|                    | LC_FRUS_INV-4_2022-11_N | 080    |                     |
|                    | LC_FRUS_INV-5_2022-11_N | 081    |                     |
|                    |                         |        |                     |
|                    |                         |        |                     |
|                    |                         |        |                     |
|                    |                         |        |                     |
|                    |                         |        |                     |

|  | COC ID:                                      |  |           |                |                | П                           | TURNAROUND TIME:  | ND TIME:                       |                |                               |   |                           |                         | RI                           | RUSH:  |                |            |
|--|--|--|-----------|----------------|----------------|-----------------------------|-------------------|--------------------------------|----------------|-------------------------------|---|---------------------------|-------------------------|------------------------------|--|----------------|------------|
| P  | PROJECT/CLIENT INFO                          |  | EAST OF   |                |                |                             | の日本のできる           | LABORATORY                     | ATORY          |                               |   |                           |                         | 0.                           | OTHER INFO   |                |            |
| Facility Name / Jobs                             | Facility Name / Job# Line Creek Operation    |  |           |                |                |                             |                   | Lab Name TrichAnalytics Inc.   | TrichAn        | alytics Inc                   |   |                           | Report I                | Report Format / Distribution |  | Excel PDF      | OF EDD     |
| Project Manager Nicole Zathey                    | Nicole Zathey                                |  |           |                |                |                             | L                 | Lab Contact Jennie Christensen | Jennie C       | hristenser                    |   |                           | Email 1:                | mike.pope@teck.com           | teck.com   | X              | ×          |
| Emai   | Email nicole.zathey@teck.com                 | 200 18-  |           |                |                |                             |                   | Email                          | jennie.c.      | nristensen                    | Email jennie.christensen@trichanalytics | ytics                     | Email 2:                | jessica.Ritz@teck.com        | gteck.com  | X              | ×          |
| Address  | Address 421 Pine Ave                         |  |           |                |                |                             |                   | Address                        | 207-175        | Address 207-1753 Sean Heights | ights                                   |                           | Email 3:                | teckcoal@equisonline.com     | isonline.com   | X 2            | ×          |
|  |  |  | 1.8       |                |                |                             |                   |                                |                |                               |   |                           | Email 4:                | AquaSciLab@teck.com          | reck.com   | X              | X          |
| City   | Sparwood                                     |  | P         | Province       | BC             |                             |                   |                                | Saanichton     | uo                            | Province                                | BC                        | Email 5:                | Robin.vallea                 | Robin.valleau@minnow.ca                              | X )            | X          |
| Postal Code                                      | e V0B 2G0                                    |  |           |                |                |                             | P                 | Postal Code                    |                |                               |   |                           |                         |                              |  |                |            |
| Phone Number                                     | Phone Number 250-425-8449                    |  |           |                |                |                             | Phor              | Phone Number                   |                |                               |   |                           | PO number               | ı                            | 818999   |                |            |
|  |  | SAMPLE DETAILS   | LS        |                |                |                             |                   |                                |                | ANA                           | ANALYSIS REQUESTED                      | COUEST                    | ED                      |                              | Filtered - F. Field, L. Lab, FL. Field & Lab, N. Non | L: Lab, FL: Fi | ield & Lab |
|  |  |  |           |                |                |                             |                   |                                | SERV. FILL     |                               |   |                           |                         |                              |  |                |            |
|  |  |  | (oN       |                |                |                             |                   |                                | Баяа           |                               |   |                           |                         |                              |  |                |            |
|  |  |  | Yes/      |                |                |                             |                   |                                |                |                               | sv                                      |                           |                         |                              |  |                |            |
|  |  |  | ) lsir    |                |                |                             |                   |                                | Lancer 1       |                               |   | 7                         |                         |                              |  |                |            |
|  |  |  | s Mate    |                |                |                             |                   |                                | NALYSIS        |                               |   | ntent by                  |                         |                              |  |                |            |
| Sample ID  | Sample Location (svs. loc code)              | Field<br>Matrix  | Hazardous | Date           | Time<br>(24hr) | Tissue                      | Tissue<br>Species | Sample<br>Structure            | A<br>Number of | Metals in Bio<br>ICPMS (wet   | Mercury in I<br>(wet, dry & 1           | Moisture Co<br>Gravimetry |                         |                              |  | į.             |            |
| 244 LC_FRB_INV-1_2022-11_N /                     | LC_FRB                                       | TA   | z         | 29-Nov-22      | 10:30          | INV                         | Composite         | Composite                      | 1              | x                             | x                                       | ×                         |                         |                              |  |                |            |
| JUS IC_FRB_INV-2_2022-11_N /                     | LC_FRB                                       | TA   | z         | 29-Nov-22      | 10:35          | INV                         | Composite         | Composite                      | -              | ×                             | ×                                       | ×                         |                         |                              |  |                |            |
| DUG LC_FRB_INV-3_2022-11_N                       | LC_FRB                                       | TA   | z         | 29-Nov-22      | 10:40          | INA                         | Composite         | Composite                      | -              | ×                             | x                                       | х                         |                         |                              |  |                |            |
| 256 LC_FRB_INV-4_2022-11_N /                     | LC_FRB                                       | TA   | z         | 29-Nov-22      | 10:45          | INV                         | Composite         | Composite                      | -              | ×                             | ×                                       | ×                         |                         |                              |  | 7              |            |
| LC_FRB_INV-5_2022-11_N ,                         | LC_FRB                                       | TA   | z         | 29-Nov-22      | 10:50          | INV                         | Composite         | Composite                      | -              | х                             | х                                       | x                         |                         |                              |  |                |            |
| OS2 LC_DC3_INV-1_2022-11_N ,                     | LC_DC3                                       | TA   | z         | 29-Nov-22      | 10:00          | INV                         | Composite         | Composite                      | -              | x                             | x                                       | x                         |                         |                              |  |                |            |
| LC_DC3_INV-2_2022-11_N ,                         | LC_DC3                                       | TA   | z         | 29-Nov-22      | 10:05          | INV                         | Composite         | Composite                      | -              | x                             | x                                       | x                         |                         |                              |  |                |            |
| LC_DC3_INV-3_2022-11_N ,                         | EDG_DC3                                      | TA   | Z         | 29-Nov-22      | 10:10          | INV                         | Composite         | Composite                      | -              | x                             | x                                       | x                         |                         |                              |  |                |            |
| LC_DC3_INV-4_2022-11_N                           | LC_DC3                                       | TA   | z         | 29-Nov-22      | 10:15          | INV                         | Composite         | Composite                      | -              | x                             | x                                       | ×                         |                         |                              |  |                |            |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | ECIAL INSTRUCTIONS                           |  |           | RELIN          | QUISHED        | RELINQUISHED BY/AFFILIATION | IATION            |                                | DATI           | DATE/TIME                     | ACC                                     | EPTED                     | ACCEPTED BY/AFFILIATION | ATION                        | DA   | DATE/TIME      |            |
| PO 818999  | 66   |  |           |                | Robin          | Robin Valleau               |                   |                                | Decemb         | December 2, 2022              | Alex                                    | 7                         | Wade                    |                              | 07 Dec 2022  | 7              | 1:00       |
|  |  |  |           |                |                |                             |                   |                                |                |                               | 5                                       | 7                         |                         | 1                            |  |                |            |
|  |  | and the same of th |           |                |                | The second second           |                   |                                |                |                               | (1/10)eut                               | ent #                     | +: 5077- H              | 143)                         |  |                |            |
| SERVICE REQUEST (rush - subject to availability) | subject to availability)                     | ity) Regular (default)   |           |                |                |                             |                   |                                |                |                               |   |                           | -                       |                              |  |                |            |
| Priority (                                       | Priority (2-3 business days) - 50% surcharge | urcharge   |           | Sampler's Name | me             |                             |                   | Robin Valleau                  | ean            |                               |   | Mobile #                  | le#                     |                              | 416-970-7535   | 35             |            |
| 1  |  |  |           |                |                |                             |                   |                                |                |                               |   |                           |                         |                              |  |                |            |

|  | COC ID:                                   |                 |                             |                |             | TU                          | RNAROU    | TURNAROUND TIME:               |  | 104   | (401 06 Welter-  | 25           |                         | RUSH:   |                   |      |
|--|---|-----------------|-----------------------------|----------------|-------------|-----------------------------|-----------|--------------------------------|--|---|--|--------------|-------------------------|---|-------------------|------|
|  | PROJECT/CLIENT INFO                       |                 |                             |                |             |                             |           | LABOR                          | LABORATORY                                   |   |  |              |                         | OTHER INFO  |                   |      |
| Facility Name / Job                              | Facility Name / Job# Line Creek Operation |                 |                             |                |             |                             |           | Lab Name TrichAnalytics Inc.   | TrichAnal                                    | ytics Inc.                                    |  | R            | sport Forma             | Report Format / Distribution                          | Excel PDF         | EDD  |
| Project Manage                                   | Project Manager Nicole Zathey             |                 |                             |                |             |                             | Г         | Lab Contact Jennie Christensen | Jennie Chr                                   | istensen                                      |  |              | Email 1: m              | mike.pope@teck.com                                    | X                 | ×    |
| Ema  | Email nicole.zathey@teck.com              |                 |                             |                |             |                             |           | Email                          | Email jennie.christensen@trichanalytics      | stensen@t                                     | richanalytie   |              |                         | jessica.Ritz@teck.com                                 | X                 | *    |
| Addres   | Address 421 Pine Ave                      |                 |                             |                |             |                             |           | Address                        | Address 207-1753 Sean Heights                | Sean Heigh                                    | ıts  | E            |                         | teckcoal@equisonline.com                              | X                 | ×    |
| i  |   |                 |                             |                |             |                             |           |                                |  |   |  | +            |                         | AquaSciLab@teck.com                                   | X                 | ×    |
| City   |   |                 | -F                          | Province       | BC          |                             |           |                                | Saanichton                                   |   | Province BC  |              | Email 5: R              | Robin.valleau@minnow.ca                               | X                 | *    |
| Postal Code                                      | e V0B 2G0                                 |                 |                             |                |             |                             | Ь         | Postal Code                    |  |   |  |              |                         |   |                   |      |
| Phone Numbe                                      | Phone Number 250-425-8449                 |                 |                             |                |             |                             | Pho       | Phone Number                   |  |   |  | PO           | PO number               | 818999  |                   |      |
|  | SAMPLE DETAILS                            | DETAIL          | rs                          |                |             |                             |           |                                |  | ANALY   | ANALYSIS REOUESTED   | UESTED       |                         | Filtered - F: Field, L: Lab, FL: Field & Lab, N: None | L: Lab, FL: Field | & L3 |
| Tree_19 Sample ID                                | Sample Location (sys loc code)            | Field<br>Matrix | Hazardous Material (Yes/No) | Date           | Time (24hr) | Tissue                      | Tissue    | Sample                         | ANALYSIS PRESERY, FIIL. Number of Containers | Metals in Biota by CRC<br>ICPMS (wet and dry) | Mercury in Biota by CVAAS (wet, dry & routine) Moisture Content by | Стачітейту   |                         |   |                   |      |
| JG6 LC_DC3_INV-5_2022-11_N ,                     | EDG_DZ3                                   | TA              | z                           | 29-Nov-22      | 10:20       | INV                         | Composite | Composite                      | -  | ×   | ×  | ×            |                         |   |                   |      |
| 553 LC_DC4_INV-1_2022-11_N /                     | LC_DC4                                    | TA              | z                           | 29-Nov-22      | 12:30       | INV                         | Composite | Composite                      | -  | x   | x  | x            |                         |   |                   |      |
| LC_DC4_INV-2_2022-11_N· /                        | LC_DC4                                    | TA              | z                           | 29-Nov-22      | 12:35       | INV                         | Composite | Composite                      | -  | x   | x  | x            |                         |   |                   | +    |
| 554 LC_DC4_INV-3_2022-11_N ,                     | LC_DC4                                    | TA              | z                           | 29-Nov-22      | 12:40       | INV                         | Composite | Composite                      | -  | ×   | x  | x            |                         |   |                   |      |
| 360 LC_DC4_INV-4_2022-11_N ,                     | LC_DC4                                    | TA              | z                           | 29-Nov-22      | 12:45       | INV                         | Composite | Composite                      | -  | ×   | x  | x            |                         |   |                   |      |
| LC_DC4_INV-5_2022-11_N /                         | LC_DC4                                    | TA              | z                           | 29-Nov-22      | 12:50       | INV                         | Composite | Composite                      | 1  | х   | x  | x            |                         |   |                   |      |
| 261 LC_GRCK_INV-1_2022-11_N J                    | LC_GRCK                                   | TA              | Z                           | 30-Nov-22      | 9:30        | INV                         | Composite | Composite                      | -  | ×   | x  | x            |                         |   |                   |      |
| LC_GRCK_INV-2_2022-11_N ,                        | LC_GRCK                                   | TA              | z                           | 1-Dec-22       | 9:35        | INV                         | Composite | Composite                      | -  | x   | x  | x            |                         |   |                   |      |
| 364 I.C_GRCK_INV-3_2022-11_N /                   | LC_GRCK                                   | TA              | z                           | 2-Dec-22       | 9:40        | INV                         | Composite | Composite                      | -  | ×   | ×  | x            |                         |   |                   |      |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | ECIAL INSTRUCTIONS                        |                 |                             | RELINC         | UISHED      | RELINQUISHED BY/AFFILIATION | IATION    |                                | DATE/TIME                                    | IME   | ACCEP  | FED BY/AF    | ACCEPTED BY/AFFILIATION |   | DATE/TIME         |      |
| PO 818999  | 66  |                 |                             |                | Robin       | Robin Valleau               |           |                                | December 1, 2022                             | 1, 2022                                       | Alex   | Lunde        |                         | 0+Dec 70 72   | 00:11/2           | 0    |
|  |   |                 |                             |                |             |                             |           |                                |  | 3/  | mont   | Proce # 2003 | (ANN-                   |   |                   |      |
| SERVICE REQUEST (rush - subject to availability) | subject to availability)                  |                 |                             |                |             |                             |           |                                |  | -   |  | 2000         | 2                       |   |                   |      |
| Priority   | Regular (default)                         | default)        | Š                           | Sampler's Name | ne          |                             |           | Robin Valleau                  | an   |   |  | Mobile #     |                         | 416-970-7535  | 8                 |      |
| Emergency  | Emergency (1 Duciness Day) 1000 curchange | 0               |                             |                |             |                             |           |                                |  |   | -  |              |                         |   |                   |      |

|  |  |                   |                       |                |                |                |                   | 1                              |                       | 1 De Dectori                         | crors                                   |                         |            |                              |   |              |       |
|--|--|-------------------|-----------------------|----------------|----------------|----------------|-------------------|--------------------------------|-----------------------|--------------------------------------|---|-------------------------|------------|------------------------------|---|--------------|-------|
|  | COC ID:  |                   |                       |                |                | TU             | RNAROU            | TURNAROUND TIME:               |                       |                                      |   |                         |            | RUSH                         | H;  |              |       |
| Р  | PROJECT/CLIENT INFO  |                   |                       |                |                |                |                   | LABORATORY                     | LTORY                 |                                      |   |                         |            | OTHER                        | IER INFO  |              |       |
| Facility Name / Jobs                             | Facility Name / Job# Line Creek Operation                      |                   |                       |                |                |                |                   | Lab Name TrichAnalytics Inc    | TrichAnal             | ytics Inc.                           |   |                         | Report For | Report Format / Distribution |   | Excel PDF    | J.    |
| Project Manage                                   | Project Manager Nicole Zathey                                  |                   |                       |                |                |                | L                 | Lab Contact Jennie Christensen | Jennie Ch             | ristensen                            |   | I                       | Email 1:   | mike.pope@teck.com           | k.com X   | X            | R     |
| Emai   | Email nicole.zathey@teck.com                                   |                   |                       |                |                |                |                   | Email                          | ennie.chr             | stensen@                             | Email jennie.christensen@trichanalytics |                         | Email 2:   | jessica.Ritz@teck.com        | ck.com X  | X            | SY    |
| Addres   | Address 421 Pine Ave   |                   |                       |                |                |                |                   | Address 207-1753 Sean Heights  | 207-1753              | Sean Heig                            | ghts                                    | F                       | Email 3:   | teckcoal@equisonline.com     | nline.com X   | X            |       |
|  |  |                   |                       |                |                |                |                   |                                |                       | 100                                  |   | F                       | Email 4:   | AquaSciLab@teck.com          | k.com X   | X            |       |
| City   | Sparwood   |                   | Pr                    | Province       | BC             |                |                   | City                           | Saanichton            |                                      | Province BC                             |                         | Email 5:   | Robin.valleau@minnow.ca      | @minnow.ca X  | X            |       |
| Postal Code                                      | e V0B 2G0  |                   |                       |                |                |                | Ь                 | Postal Code                    |                       |                                      |   |                         |            |                              |   |              |       |
| Phone Numbe                                      | Phone Number 250-425-8449                                      |                   |                       |                |                |                | Phor              | Phone Number                   |                       |                                      |   | PC                      | PO number  | 8                            | 818999  |              |       |
|  | 130  | SAMPLE DETAILS    | S                     |                |                |                |                   |                                |                       | ANAL                                 | VSIS RE                                 | ANALYSIS REOLIESTED     |            | The second second second     | Filtered - F: Field, L: Lab. FL: Field & Lab. N: Non- | Lab. FL: Fie | ald & |
|  |  |                   | (oN                   |                |                |                |                   |                                | PRESERV. FILL         |                                      |   |                         |            |                              |   |              |       |
|  |  | 7<br>7<br>8       | ardous Material (Yes/ |                | Ë              | Ē              | į                 |                                | ANALYSIS stanianiners | s in Biota by CRC<br>S (wet and dry) | ary in Biota by CVAAS<br>dry & routine) | ure Content by          |            |                              |   |              |       |
| Sample ID  | Sample Location (sys loc code)                                 | Field             | Haza                  | Date           | Time<br>(24hr) | Tissue         | Tissue<br>Species | Sample<br>Structure            | quinN                 |                                      | (wet, d                                 |                         |            |                              |   |              |       |
| LC_GRCK_INV-4_2022-11_N~                         | LC_GRCK  | TA                | z                     | 30-Nov-22      | 9:45           | INV            | Composite         | Composite                      | -                     | ×                                    | ×                                       | ×                       |            |                              |   |              |       |
| LC_GRCK_INV-5_2022-11_N '                        | LC_GRCK  | TA                | z                     | 30-Nov-22      | 9:50           | INV            | Composite         | Composite                      | -                     | х                                    | х                                       | x                       |            |                              |   |              |       |
| LC_DCEF_INV-1_2022-11_N /                        | LC_DCEF  | TA                | Z                     | 29-Nov-22      | 10:30          | INV            | Composite         | Composite                      | -                     | x                                    | x                                       | ×                       |            |                              |   |              |       |
| LC_DCEF_INV-2_2022-11_N ,                        | LC_DCEF  | TA                | z                     | 29-Nov-22      | 10:35          | INV            | Composite         | Composite                      | -                     | х                                    | х                                       | ×                       |            |                              |   |              |       |
| LC_DCEF_INV-3_2022-11_N ,                        | LC_DCEF  | TA                | z                     | 29-Nov-22      | 10:40          | INV            | Composite         | Composite                      | -                     | х                                    | x                                       | x                       |            |                              |   |              |       |
| λλο LC_DCEF_INV-4_2022-11_N ,                    | LC_DCEF  | TA                | z                     | 29-Nov-22      | 10:45          | INV            | Composite         | Composite                      | -                     | x                                    | х                                       | x                       |            |                              |   |              |       |
| LC_DCEF_INV-5_2022-11_N /                        | LC_DCEF  | TA                | z                     | 29-Nov-22      | 10:50          | INV            | Composite         | Composite                      | -                     | x                                    | x                                       | x                       |            |                              |   |              |       |
| LC_DCDS_INV-1_2022-11_N /                        | rc_bcbs  | TA                | z                     | 30-Nov-22      | 12:00          | INV            | Composite         | Composite                      | -                     | ×                                    | х                                       | x                       |            |                              |   |              | 4 6 7 |
| LC_DCDS_INV-2_2022-11_N /                        | rc_bcbs  | TA                | z                     | 30-Nov-22      | 12:05          | INV            | Composite         | Composite                      | -                     | ×                                    | ×                                       | x                       |            |                              |   |              |       |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | ECIAL INSTRUCTIONS   |                   |                       | RELING         | RELINQUISHED   | BY/AFFILIATION | IATION            |                                | DATE/TIME             | IME                                  | ACCE                                    | ACCEPTED BY/AFFILIATION | VFFILIAT   | ION                          | DATI  | DATE/TIME    |       |
| PO 818999  | 60   |                   |                       |                | Robin          | Robin Valleau  |                   |                                | December 1, 2022      | 1, 2022                              | Alex                                    | ex wade                 | de         | Ö                            | 07 Dec 2011   | 111:00       | 0     |
|  |  |                   |                       |                |                |                |                   |                                |                       |                                      | Å                                       | 1                       | 1          |                              |   |              |       |
|  |  |                   |                       |                |                |                |                   |                                |                       |                                      | Project                                 | Project #: 2022         | 2-445      |                              |   |              |       |
| SERVICE REQUEST (rush - subject to availability) | subject to availability)                                       |                   |                       |                |                |                |                   |                                |                       |                                      |   |                         |            | ,                            |   |              |       |
| Priority (                                       | Regular (default) Priority (2-3 business days) - 50% surcharge | Regular (default) | S                     | Sampler's Name | ne             |                | 1                 | Robin Valleau                  | au                    |                                      |   | Mobile #                |            | 4                            | 416-970-7535  |              |       |
|  |  |                   |                       |                |                |                |                   |                                |                       |                                      |   |                         |            |                              |   |              |       |

|  | COC ID:  |                   |                       |                |                | Т                           | TURNAROUND TIME:  | ND TIME:                       |                              |                                    |   |                 |                         |  | RUSH:                    |  |            |
|--|--|-------------------|-----------------------|----------------|----------------|-----------------------------|-------------------|--------------------------------|------------------------------|------------------------------------|---|-----------------|-------------------------|--|--------------------------|--|------------|
| PI   | PROJECT/CLIENT INFO  |                   |                       |                |                |                             |                   | LABORATORY                     | ATOR                         | 1                                  |   |                 |                         |  | OTHER INFO               | 0  |            |
| Facility Name / Job#                             | Facility Name / Job# Line Creek Operation                      |                   |                       |                |                |                             |                   | Lab Name TrichAnalytics Inc.   | TrichA                       | nalytics I                         | JC.                                     | The contract    | Report                  | Report Format / Distribution   | Distribution             | Excel  | PDF        |
| Project Manager Nicole Zathey                    | Nicole Zathey  |                   |                       |                |                |                             | П                 | Lab Contact Jennie Christensen | Jennie (                     | Christens                          | Sn.                                     |                 | Email 1:                |  | mike.pope@teck.com       | X  | ×          |
| Email  | Email nicole.zathey@teck.com                                   |                   |                       |                |                |                             |                   | Email                          | jennie.c                     | hristense                          | Email jennie.christensen@trichanalytics | alytics         | Email 2:                |  | jessica.Ritz@teck.com    | X  | X          |
| Address  | Address 421 Pine Ave   |                   |                       |                |                |                             |                   | Address 207-1753 Sean Heights  | 207-17                       | 53 Sean I                          | leights                                 |                 | Email 3:                |  | teckcoal@equisonline.com | X  | ×          |
|  |  |                   |                       |                |                |                             |                   |                                |                              |                                    |   | No.             | Email 4:                |  | AquaSciLab@teck.com      | X  | ×          |
| City   |  |                   | H.                    | Province       | BC             |                             |                   | City                           | Saanichton                   | ton                                | Province BC                             | BC              | Email 5:                |  | Robin.valleau@minnow.ca  | × sa ×   | ×          |
| Postal Code                                      | V0B 2G0  |                   |                       |                |                |                             | P                 | Postal Code                    |                              |                                    |   |                 |                         |  |                          |  |            |
| Phone Number 250-425-8449                        | 250-425-8449   |                   |                       |                |                |                             | Pho               | Phone Number                   |                              |                                    |   |                 | PO number               | ver  | 818999                   |  |            |
|  |  | SAMPLE DETAILS    | TS                    |                |                |                             |                   |                                |                              | AN                                 | ANALYSIS REQUESTED                      | EQUEST          | ED                      | No. of the last of | Filtered - F: F          | Filtered - F: Field, L: Lab, FL: Field & Lab, N: No. | L. Field 8 |
|  |  |                   | (0)                   |                | 7              |                             |                   |                                | PRESERV. FILL                |                                    |   |                 |                         |  |                          |  |            |
|  |  |                   | rdous Material (Yes/l |                |                |                             |                   |                                | ANALYSIS<br>er of Containers | in Biota by CRC<br>5 (wet and dry) | ry in Biota by CVAAS                    | re Content by   |                         | **************************************   |                          |  |            |
| Sample ID  | Sample Location<br>(sys loc code)                              | Field             | Haza                  | Date           | Time<br>(24hr) | Tissue                      | Tissue<br>Species | Sample<br>Structure            |                              |                                    |   | Moistun         |                         |  |                          |  |            |
| LC_DCDS_INV-3_2022-11_N _                        | rc_bcds  | TA                | z                     | 30-Nov-22      | 12:10          | INV                         | Composite         | Composite                      | -                            | ×                                  | ×                                       | ×               |                         |  |                          |  |            |
| LC_DCDS_INV-4_2022-11_N ^                        | C_DCDS   | TA                | Z                     | 30-Nov-22      | 12:15          | INV                         | Composite         | Composite                      | -                            | x                                  | x                                       | ×               |                         |  |                          |  |            |
| LC_DCDS_INV-5_2022-11_N /                        | rc_bcbs  | TA                | z                     | 30-Nov-22      | 12:20          | INV                         | Composite         | Composite                      | -                            | х                                  | х                                       | x               |                         |  |                          |  |            |
| LC_FRUS_INV-1_2022-11_N ,                        | LC_FRUS  | TA                | z                     | 29-Nov-22      | 13:30          | INV                         | Composite         | Composite                      | -                            | x                                  | x                                       | х               |                         |  |                          |  |            |
| LC_FRUS_INV-2_2022-11_N ,                        | LC_FRUS  | TA                | z                     | 29-Nov-22      | 13:35          | INV                         | Composite         | Composite                      | -                            | х                                  | x                                       | x               |                         |  | (6)                      |  |            |
| LC_FRUS_INV-3_2022-11_N ,                        | LC_FRUS  | TA                | z                     | 29-Nov-22      | 13:40          | INV                         | Composite         | Composite                      | -                            | ×                                  | х                                       | x               |                         |  |                          |  |            |
| LC_FRUS_INV-4_2022-11_N ,                        | LC_FRUS  | TA                | z                     | 29-Nov-22      | 13:45          | INV                         | Composite         | Composite                      | -                            | х                                  | х                                       | x               |                         |  |                          |  |            |
| LC_FRUS_INV-5_2022-11_N ,                        | LC_FRUS  | TA                | Z                     | 29-Nov-22      | 13:50          | INV                         | Composite         | Composite                      | -                            | x                                  | ×                                       | ×               |                         |  |                          |  |            |
| ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS         | CIAL INSTRUCTIONS  |                   |                       | RELING         | UISHED         | RELINQUISHED BY/AFFILIATION | ATION             |                                | DATE                         | DATE/TIME                          | ACC                                     | EPTED           | ACCEPTED BY/AFFILIATION | ATION  |                          | DATE/TIME  | E          |
| PO 818999  | 0  |                   |                       |                | Robin          | Robin Valleau               |                   |                                | Decemb                       | December 1, 2022                   |   | Alex            | unde                    |  | 07 Dec 2022              |  | 00:11      |
|  |  |                   |                       |                |                |                             |                   |                                |                              |                                    |   |                 | Ø                       |  |                          |  |            |
|  |  |                   |                       |                |                |                             |                   |                                |                              |                                    | Prove                                   | Provent #: 2022 | 1022-4                  | -44S)  |                          |  |            |
| SERVICE REQUEST (rush - subject to availability) | ubject to availability)  |                   |                       |                | THE COLUMN     |                             |                   |                                |                              |                                    |   |                 |                         | -  |                          |  |            |
| Priority (2                                      | Regular (default) Priority (2-3 business days) - 50% surcharge | Regular (default) | <i>3</i> 2            | Sampler's Name | ne             |                             | -                 | Robin Valleau                  | eau                          |                                    |   | Mobile #        | # a                     |  | 416-970-7535             | 7535   |            |
|  |  |                   |                       |                |                |                             |                   |                                |                              |                                    |   |                 |                         |  |                          |  |            |