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Technical Report Overview

Report: Annual Water Treatment Performance Report - 2020

Overview: This report presents the 2020 results of the WLC AWTF and EVO SRF Phase 2 required under Permit 107517. This report summarizes the performance of the facilities and the selenium and nitrate removal for each facility.

This report was prepared by Teck.

For More Information

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



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March 31, 2021

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Subject: Annual Water Treatment Performance Report - 2020

Dear Liz, Jeanien, and Lowell

Please find enclosed the Annual Water Treatment Performance Report for 2020. This document satisfies the annual reporting requirements in Section 4A10 in Appendix 4 of Permit 107517.

As per Section 4A10 in Appendix 4 of Permit 107517 this report contains the following elements:

- i) A summary of facility performance compared to the key performance metrics listed in the Operations Plan;
- ii) Influent Sources and flow rates, including alternate sources;
- iii) Selenium and nitrate load removal;
- iv) Quantities of reagents used and residuals generated;
- v) Details on continuous improvement initiatives;
- vi) A descriptions of any incidents including process upsets, spills, issues with and bypasses of the Authorized Works, including recirculation events
- vii) A summary of all non-compliances with the requirements of Appendix 4, submitted in Annual Status Form
- viii) A map of monitoring locations with EMS and permittee descriptors;
- ix) A summary and evaluation of key operational and receiving environment monitoring data associated with the selenium and nitrate treatment facilities and all analytical results from the monitoring plans in Appendix 4 for the reporting year. Data must be suitably tabulated (i.e., excel spreadsheets), with appropriate graphs and comparison of results to limits, Approved and Working Water Quality Guidelines, Site Performance Objectives, or other criteria and benchmarks as specified by the director;
- x) If Site Performance Objectives in Appendix 4 are exceeded the permittee must provide an interpretation of significance, and the status of corrective action and/or ongoing investigations;
- xi) All acute toxicity test-specific reports from the laboratory and an interpreted summary and discussion of results, including recommendations and all subsequent actions;

- xii) All acute toxicity test lab reports must include data and/or observations for hardness, alkalinity, pH, temperature, and formation of precipitate either in the vessel or the organism;
- xiii) A summary of all QA/QC issues during the year.

Sincerely,

Marty Hafke
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Enclosed: Annual Water Treatment Performance Report - 2020

Annual Water Treatment Performance Report 2020

March 31, 2021



Teck

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List of Acronyms

AMP	Adaptive Management Plan
AWTF	Active Water Treatment Facility
BC	British Columbia
BCWQG	British Columbia Water Quality Guidelines
BOD	Biological oxygen demand
CAP	Compliance action plan
CMm	Coal Mountain Mine
D	Dissolved
DGIR	Dangerous Goods Incident Report
EMBC	Emergency Management BC
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
EMS	Environmental Management System
ENV	Ministry of Environment and Climate Change Strategy
EPH	Extractable petroleum hydrocarbons
EVO	Elkview Operations
EVO SRF	Elkview Operations Saturated Rock Fill
EVWQP	Elk Valley Water Quality Plan
EWT	Early warning triggers
FRO	Fording River Operations
FRO-S AWTF	Fording River South Active Water Treatment Facility
GHO	Greenhills Operations
KPI	Key Performance Indicator
LAEMP	Local Aquatic Effects Monitoring Plan
LCO	Line Creek Operations
NMP	Nitrate Management Plan
NST	No sample taken
NTU	Nephelometric turbidity unit
Q	Quarter (for example, Q1, Q3, Q3, Q4)
QA/QC	Quality assurance / quality control
RPD	Relative percent difference
SPO	Site performance objective
SRF	Saturated Rock Fill
T	Total
TDS	Total dissolved solids
TSS	Total suspended solids
WLC AWTF	West Line Creek Active Water Treatment Facility

West Line Creek Active Water Treatment Facility

Executive Summary

In 2020 the WLC AWTF improved on 2019 results, achieving higher selenium load removal, nitrate load removal and throughput than in 2019. The WLC AWTF removed a total of 540.17 kg of selenium in 2020, averaging 1.47 kg removed a day (as compared to 475 kg of selenium removed in 2019, averaging 1.30 kg removed per day). The WLC AWTF removed a total of 36,766 kg of nitrate in 2020, averaging 100 kg removed a day (as compared to 29,587 kg of nitrate removed in 2019, averaging 82.9 kg removed per day). The average throughput of the WLC AWTF was 6535 m³/day (as compared to 5604 m³/day in 2019) and treated a total volume of 2,391,853 m³ (as compared to 2,045,459 m³ in 2019). While improving throughput and load removal, effluent quality remained within all limits for the year.

Teck continues efforts to improve the performance of the WLC AWTF. In 2020, work conducted on the mini bioreactors identified the opportunity to optimize bioreactor performance by adjusting pH. Teck provided notification to ENV to be able to adjust pH adjustment at multiple locations within the facility and may implement these changes in 2021 in order to achieve this optimization. Teck is also conducting evaluations on identifying sources of high concentration mine impact water with the intent of bringing that water to the WLC AWTF to further improve load removal.

Facility Performance

This section summarizes the facility performance in 2020. The March 11, 2021 amendment to Permit 107517 requires Teck to develop key performance metrics for the EVO SRF and FRO-S AWTF. Key performance metrics are not currently defined in WLC AWTF Operations Plan. Teck will develop these metrics alongside the development of the metrics for FRO-S AWTF. For the purposes of this report the performance metrics included in this report include selenium and nitrate load removal and facility throughput.

Selenium and Nitrate Load Removal

This section provides a summary of the WLC AWTF selenium and nitrate load removal in 2020.

Nitrate Removal

The WLC AWTF daily average, daily maximum and total nitrate removal results for 2020 are summarized below in Table 1 and displayed in Figure 1 below.

Table 1. West Line Creek Active Water Treatment Facility Nitrate Removal

	Nitrate Load Removal
Daily Average	100 kg/day
Daily Maximum	150 kg/day
Total	36,766 kg

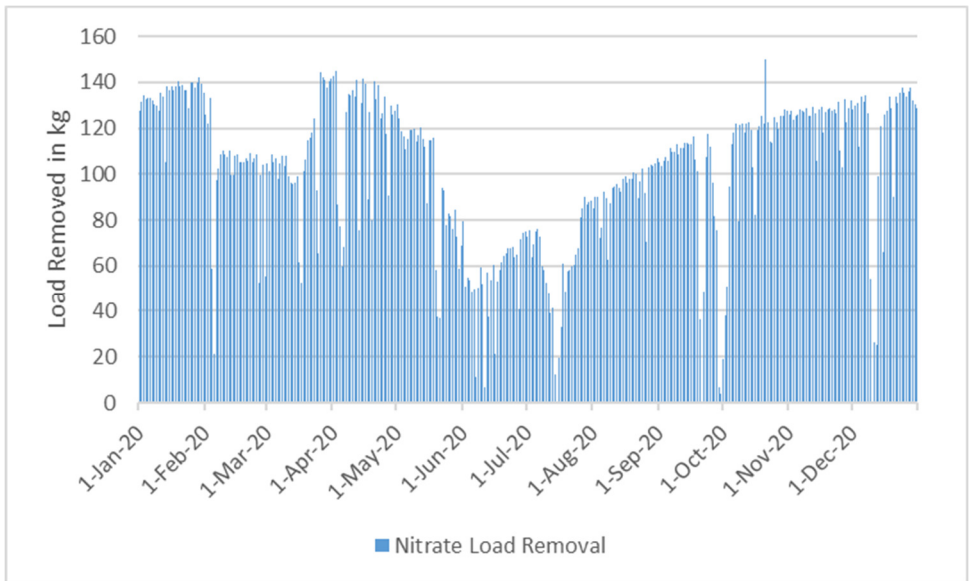


Figure 1. WLC AWTF Nitrate Load Removal

Load removal is a function of influent concentrations, effluent concentrations and facility throughput and availability. A decrease in load removal can occur due to any combination of lower influent concentrations, increased effluent concentrations and/or reduced throughput or availability. The average, minimum, and maximum blended influent concentrations during the 2020 operational phase were 16 mg/L, 7 mg/L, 20 mg/L. The influent and effluent nitrate concentrations are shown below in Figure 2.

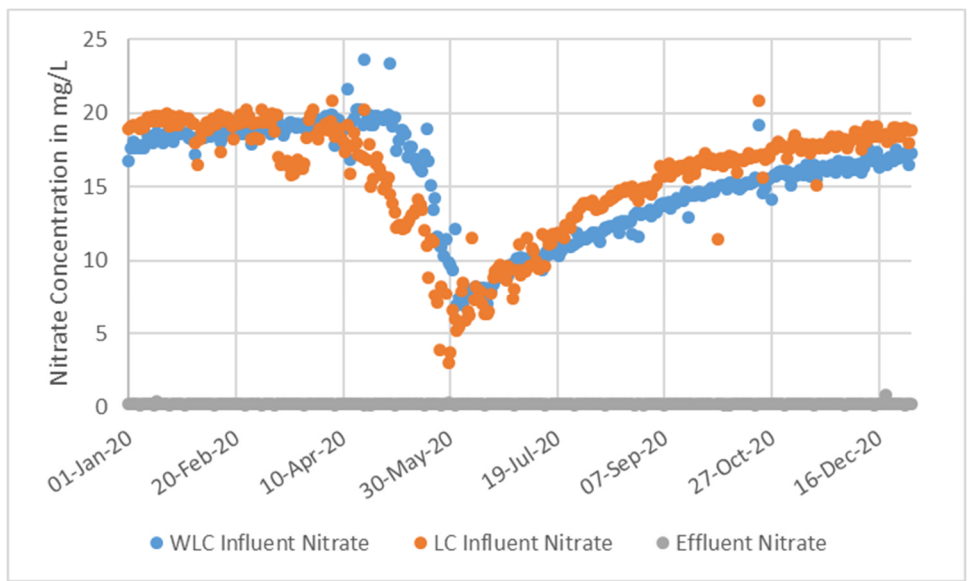


Figure 2. WLC AWTF Influent and Effluent Nitrate Concentrations

The historical influent nitrate concentrations for the facility are shown below in Figure 3. Since WLC AWTF began operating nitrate concentrations in the influent source have been trending down. If this trend continues it is expected that the lower influent nitrate concentrations may result in lower nitrate removal over time.

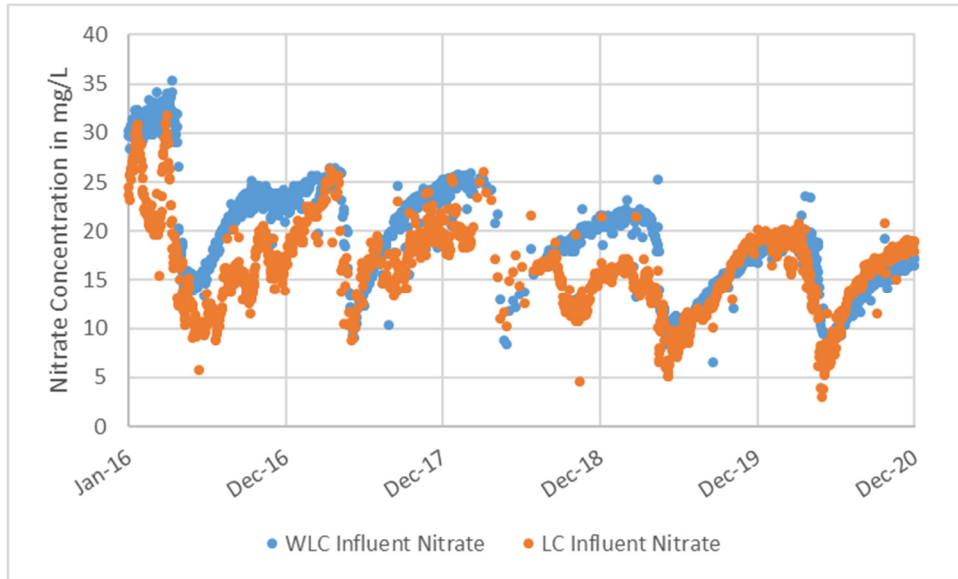


Figure 3. Seasonal WLC AWTF Nitrate Influent Concentrations

Selenium Removal

The WLC AWTF daily average, daily maximum and total selenium removal for 2020 are summarized below in Table 2 and displayed in Figure 4 below.

Table 2. West Line Creek Active Water Treatment Facility Selenium Removal

	Selenium Load Removal
Daily Average	1.47 kg/day
Daily Maximum	2.64 kg/day
Total	540.17 kg

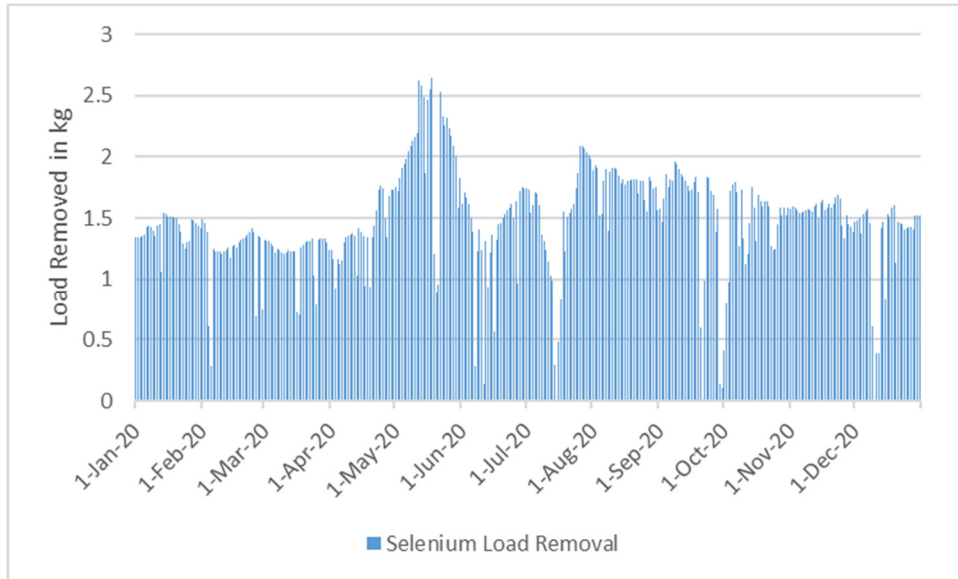


Figure 4. WLC AWTF 2020 Selenium Load Removal

Load removal is a function of influent concentrations, effluent concentrations and facility throughput and availability. A decrease in load removal can occur due to any combination of lower influent concentrations, increased effluent concentrations and/or reduced throughput or availability. The average, minimum, and maximum blended influent concentrations during the 2020 operational phase were 244 µg/L, 158 µg/L, 424 µg/L. The influent and effluent selenium concentrations are shown below in Figure 5.

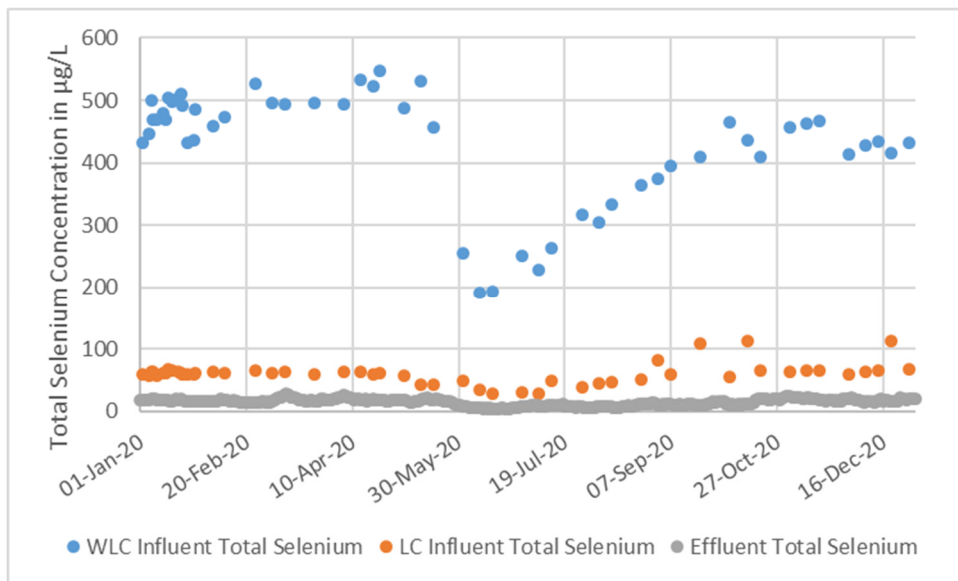


Figure 5. WLC AWTF Influent and Effluent Selenium Concentrations

The historical influent selenium concentrations for the facility are shown below in Figure 6. Since WLC AWTF began operating selenium concentrations in the WLC influent source have been trending down. If this trend continues it is expected that the lower influent selenium concentrations may result in lower selenium removal over time.

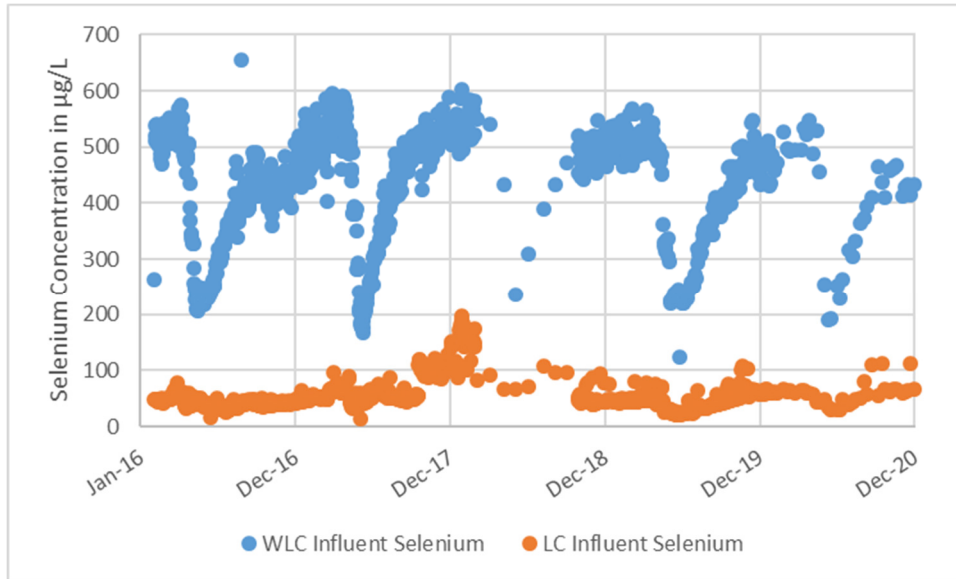


Figure 6. Seasonal WLC AWTF Influent Seleni- um Concentrations

Influent Sources and Flow Rates

The WLC AWTF treated WLC and LC in 2020. The WLC AWTF prioritizes WLC as the influent source for treatment because the selenium and nitrate concentrations are typically higher in WLC than in LC. During times of the year when WLC flows are lower than the design throughput of the facility, LC will be treated at rates that the target design throughput allows. The average daily WLC influent flow rate, average daily LC influent flow rate, average WLC AWTF total daily throughput and total volume of treated water during 2020 are summarized below in Table 3 and displayed in Figure 7 below.

Table 3. WLC AWTF 2020 Influent Sources and Flow Rates

Influent Source	Average Daily Throughput	Total Volume Treated
West Line Creek	3684 m ³ /day	1,348,362 m ³
Line Creek	2851 m ³ /day	1,043,491 m ³
Total Combined Influent	6535 m ³ /day	2,391,853 m ³

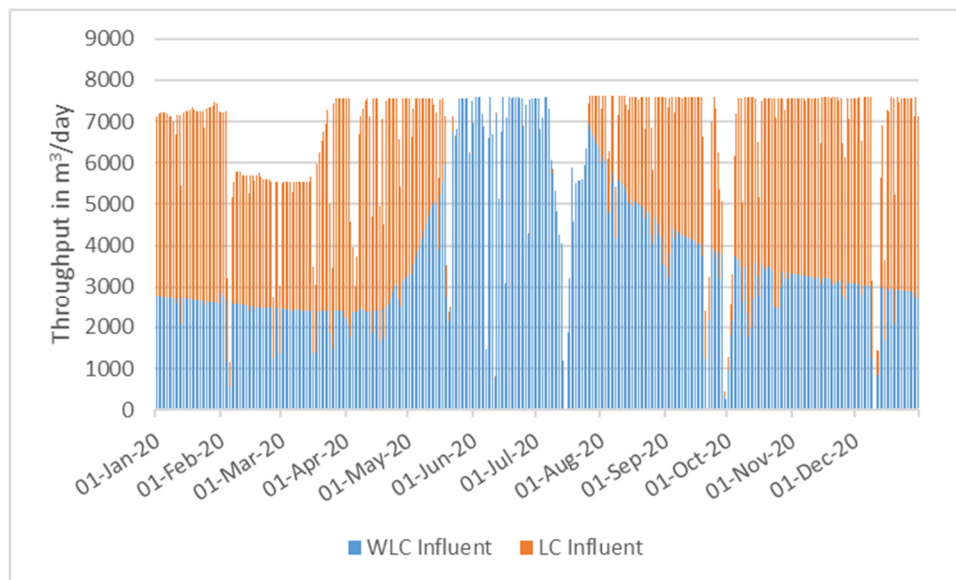


Figure 7. WLC AWTF 2020 Throughput

The design throughput of the facility is 7500 m³/day. During the 2020 operational phase the facility operated with an average throughput of 6535 m³/day. Throughput and availability at the facility was affected by a number of smaller events that caused either recirculation, or total shutdown of the facility. The majority of shutdown events were related to scheduled maintenance, minor power interruptions, or the AOP building. The two scheduled maintenance shutdowns that extended longer than 24 hours and two unscheduled shutdowns that extended longer than 24 hours are detailed below.

Facility throughput is also affected by the requirement to maintain minimum flows in the WLC AWTF fish bypass under Water License C133280. During low flows the facility throughput is reduced in order to maintain the required flows in the fish bypass.

July 14, 2020 and September 30, 2020 – WLC AWTF Scheduled Annual Maintenance

The WLC AWTF scheduled two extended shutdowns (longer than 24 hours) for annual maintenance on July 14, 2020 and September 30, 2020. These shutdowns were scheduled at these times to minimize impacts to the receiving environment. During these scheduled maintenance events the annual maintenance required for the AWTF and the ozone generators was done. While the facility was down for schedule maintenance, Teck also made updates to the facility Programmable Logic Control (PLC) and performed leak testing on the AOP unit to reduce ozone leaks from the AOP.

September 20, 2020 – WLC AWTF Unscheduled Extended Downtime

On September 20, 2020 one of the two power sources into the WLC AWTF lost power. The switch gear did not initiate the transfer from line power to the generator line as it was still detecting power from the secondary power line. This incident resulted in the facility being down for approximately 50 hours. Teck did not immediately notify the Director of this incident.

Investigation and Corrective Actions:

Teck investigated this incident and determined that the existing switch gear is designed with basic relay control and may not initiate the transfer to the generator when power is only lost from one of the two power sources to the facility. To prevent an incident of this nature from occurring again Teck has begun a project to upgrade the control system of the switch gear to a Programmable Logic Control based system. This should allow for more reliable switching between line power and generator power and should allow for better control during brownout

events. The preliminary design for the project is complete and Teck is targeting Q2/Q3 2021 for completing the upgrade.

December 9, 2020 – WLC AWTF Unscheduled Extended Downtime

On December 9th, 2020, at approximately 10:00 am, the WLC AWTF boiler faulted and the facility was put into recirculation. The function of the boiler is to warm the AWTF influent water to the temperatures required for the biology in the Fluidized Bed Reactors (FBRs) to be able to efficiently reduce nitrate and selenium. The WLC AWTF is not able to continuously run in forward flow without the boiler operating because the FBRs cannot operate effectively at cooler influent temperatures.

The WLC AWTF was able to bring the boiler back into operation and returned to continuous forward flow on December 12, 2020, at approximately 5:30 pm. The event spanned approximately 80 hours with the facility being in recirculation for approximately 72.5 hours. The facility ran in forward flow without the boiler for approximately 6.5 hours, beginning at 9:30 am and ending at 4:00 pm on December 11, 2020, to help mitigate biomass loss in the FBRs and increased chloride concentrations that can occur during recirculation events due to the addition of ferric chloride.

Investigation and Corrective Actions:

Through investigation and maintenance, Teck determined that the cause of the boiler fault was an electrical failure in the flue gas regulator (FGR) actuator at the boiler. This electrical component is within the safety system on the boiler and the replacement of the component requires a vendor supplied passcode and recalibration by a vendor certified technician. As the vendor did not have a certified technician with this expertise in the region, a technician was brought in from the lower mainland to complete the repair and recalibration. The vendor had to drive to the Elk Valley rather than fly, due to COVID restrictions, which further extended the downtime of the boiler. These repairs were successfully completed on December 12, 2020.

Future Preventative Actions:

Two comparable actuators in the boiler system were replaced during this repair to mitigate future recirculation events caused by a similar electrical failure on these actuators. Annual preventative maintenance is also completed on the boiler, although the vendor certified technician indicated that electrical failures of this nature may not present during this scheduled preventative maintenance.

Quantities of Reagents Used and Residuals Generated

The table below summarizes the quantity of reagents used in 2020.

Table 4. WLC AWTF 2020 Reagent Use

Reagent	Total Volume or Mass
Methanol	188,348 L
Acetic Acid	94,581 L
Ferric Chloride	441,643 L
Drewfloc 2205	6,749 L
Clearfloc CE5050	537 L
Ammonium Chloride	3,122 L

Reagent	Total Volume or Mass
Phosphoric Acid	7,900 L
Micronutrient	154 L
Hydrogen Peroxide	46,098 L
Sodium Sulphite	435,797 L
Liquid Oxygen	288,487 nm ³
Liquid Nitrogen	7,677 nm ³
Antiscalant	7,550 L
Sodium Nitrate	34,799 kg
Micro Sand	17,888 kg
Diatomaceous earth	5,902 kg
Citric Acid	500 kg

The following table is a monthly summary (including types and volumes) of residuals generated by the WLC AWTF in 2020.

Table 5. WLC AWTF 2020 Residual Volumes

Month	Waste Volume (m ³)	Waste Composition
Jan-20	41.7	Solid Residuals
Feb-20	49.5	Solid Residuals
Mar-20	61.7	Solid Residuals
Apr-20	52.8	Solid Residuals
May-20	44.5	Solid Residuals
Jun-20	58.8	Solid Residuals
Jul-20	49.1	Solid Residuals
Aug-20	57.0	Solid Residuals
Sep-20	85.8	Solid Residuals and Spent Treatment Plant Media
Oct-20	54.0	Solid Residuals
Nov-20	55.5	Solid Residuals
Dec-20	72.4	Solid Residuals

Month	Waste Volume (m ³)	Waste Composition
Total	682.8	

The volumes outlined above are the estimated loose material deposited in the WLC AWTF Landfill in 2020. A survey of the landfill conducted on December 7, 2020, indicates the compacted volume of material since the 2019 survey (November 8, 2019) is 413 m³.

Continuous Improvement Initiatives

Three skid-mounted sets of mini-bioreactors were operated at the WLC AWTF to allow for side-by-side testing of different variables. The mini FBR investigations of 2020 have identified the ability to adjust pH is important for optimization of bioreactors. Teck has provided ENV with a notification to include pH adjustment at multiple locations within the plant for WLC AWTF. For more details please reference the 2020 Annual Research and Technology Development Progress Report.

The influent concentrations for the WLC AWTF are continuing to decrease limiting the amount of load the facility is able to remove. In 2020 Teck began conducting evaluations on identifying sources of high concentration mine impact water with the intent of bringing that water to the WLC AWTF to further improve load removal.

Reportable Spills and Incidents

This sections summarizes process upsets, spills, issues with and bypasses of the Authorized Works, including recirculation events. Recirculation and downtime events included are greater than 24 hours in duration, consistent with the Draft Bypass Clauses 4C3.5 and 4D2.3 for the EVO SRF and FRO AWTF-S respectively in the March 11, 2021 Permit 107517 authorization.

Reportable Spills

There were no reportable spills at the WLC AWTF for 2020

Incidents resulting in bypasses of Authorized Works for greater than 24 hours

Recirculation and downtime events greater than 24 hours in duration are described in the Influent Sources and Flow Rates section of this report.

Noncompliances

A summary of all non-compliances is provided in Appendix A as an Annual Status Form. Additional detail on non-compliances from 2020 can be found below.

Missed Data Submission – July 30, 2020

Noncompliance Description

During data QA/QC review of the EMS submission file for Q2, prior to submission, it was noted that field turbidity measurements were missing. Teck had corrected the Q2 EMS submission file prior to submission; however, further investigation revealed that the Q1 EMS submission file was also missing field turbidity results. Field turbidity was reported for E291569 (Buffer Pond Outfall) in the Q1 2020 Elk Valley Water Quality Report (in *Appendix WLC1 – WLC Additional Sampling Q1 2020*), but it was not submitted to the EMS database. This noncompliance was reported to ENV on July 30, 2020.

Update on Corrective Actions

The field turbidity results for Q1 were uploaded to EMS on July 30, 2020. Teck has updated the configuration of the EMS submission file to include field turbidity for E293371 (WLC AWTF West Line Creek), E293370 (WLC AWTF Line Creek), and E291569 (Buffer Pond Outfall).

Hazardous Leachate Processing – November 11, 2020

Noncompliance Description

Appendix 4, Section 4B1 of Permit 107517 states that the WLC AWTF influent is comprised of contact water from waste rock piles and non-hazardous leachate from the WLC AWTF residual waste landfill.

During external lab data review on November 9, 2020 it was noted that two total selenium samples for leachate, E301611 (West Line Creek Monitoring Leachate Cell 1 A), collected on November 6, 2020 at 9:00 am and 9:30 am were 1010 µg/L and 1160 µg/L respectively. Both results exceed the criteria in Table 1, Schedule 4 of the *BC Hazardous Waste Regulations*. It was also identified that on November 6, 2020, the WLC AWTF processed 20 m³ of this leachate, and was non-compliant with the requirements for non-hazardous leachate outlined in Appendix 4, Section 4B1 of Permit 107517.

Update on Corrective Actions

While sampling of the leachate liquids was being completed in accordance with the WLC AWTF Leachate Handling Guidance Document, it was initially determined that the processes outlined in the document were not completely followed. Further investigation identified that the processes outlined in the document were not fully clear – the document has since been updated to provide additional clarity. The document outlines using total selenium results from the previous day to inform leachate handling and processing. Through investigation it was determined that the review of the previous day's total selenium results prior to processing leachate had not occurred.

The process for leachate monitoring when the incident occurred involves the liquid being pumped from the leachate holding cell into a tanker truck prior to sampling. Due to rainfall during the day, contributing to leachate levels in the landfill, and freezing temperatures at night, leachate was processed without following the steps outlined above to avoid equipment damage due to freezing and to maintain leachate levels at appropriate levels within the leachate holding cell. This resulted in the WLC AWTF processing 20 m³ of hazardous material on November 6, 2020. Processing the leachate did not have an operational impact on the WLC AWTF, effluent of the WLC AWTF remained on-spec when the leachate was processed. Teck has updated the process for leachate monitoring to mitigate incidents of this nature from occurring again.

The table below outlines the results and volumes processed from the event and prior to the event occurring.

Table 6. Summary of hazardous leachate processed at the WLC AWTF.

Sample Date	Result	Date Results were Received	Date Leachate was Processed	Volume of Leachate Processed
Oct 14 10:00	200 µg/L	Oct 15 15:39	Oct 14	10 m ³
Oct 23 10:30	381 µg/L	Oct 24 15:45	Oct 23	10 m ³
Nov 2 11:00	662 µg/L	Nov 3 16:32	Nov 2	10 m ³
Nov 3 08:00	650 µg/L	Nov 4 16:21	Nov 3	10 m ³
Nov 5 09:30	889 µg/L	Nov 6 16:41	Nov 5	10 m ³
Nov 6 09:00	1010 µg/L	Nov 7 17:24	Nov 6	10 m ³
Nov 6 09:30	1160 µg/L	Nov 7 17:24	Nov 6	10 m ³

Inspection Report 161140 – December 7, 2020

Noncompliance Description

On December 7, 2020 Teck received an inspection letter identifying that Teck failed to comply with the requirements outlined in Section 6.1 (Maintenance of Work and Emergency Procedures) of Permit 107517. On September 20, 2020 one of the two power sources into the WLC AWTF lost power. The switch gear did not

initiate the transfer from line power to the generator line as it was still detecting power from the secondary power line. This incident resulted in the facility being down for more than 24 hours. Teck did not immediately notify the Director of this incident.

Update on Corrective Actions

Teck investigated this incident and determined that the existing switch gear is designed with basic relay control and may not initiate the transfer to the generator when power is only lost from one of the two power sources to the facility. To prevent an incident of this nature from occurring again Teck has begun a project to upgrade the control system of the switch gear to a Programmable Logic Control based system. This should allow for more reliable switching between line power and generator power and should allow for better control during brownout events. The preliminary design for the project is complete and Teck is targeting Q2/Q3 2021 for completing the upgrade.

For future incidents, Teck will notify the Director any time the facility is down for greater than 24 hours, as required by Section 6.1 of Permit 107517. Notification of downtime of this duration (greater than 24 hours) is consistent with the Maintenance of Works, Emergency Procedures and Bypass Clauses 4C3.5 and 4D2.3 for the EVO SRF and FRO AWTF-S respectively in the March 11, 2021 Permit 107517 authorization.

Map

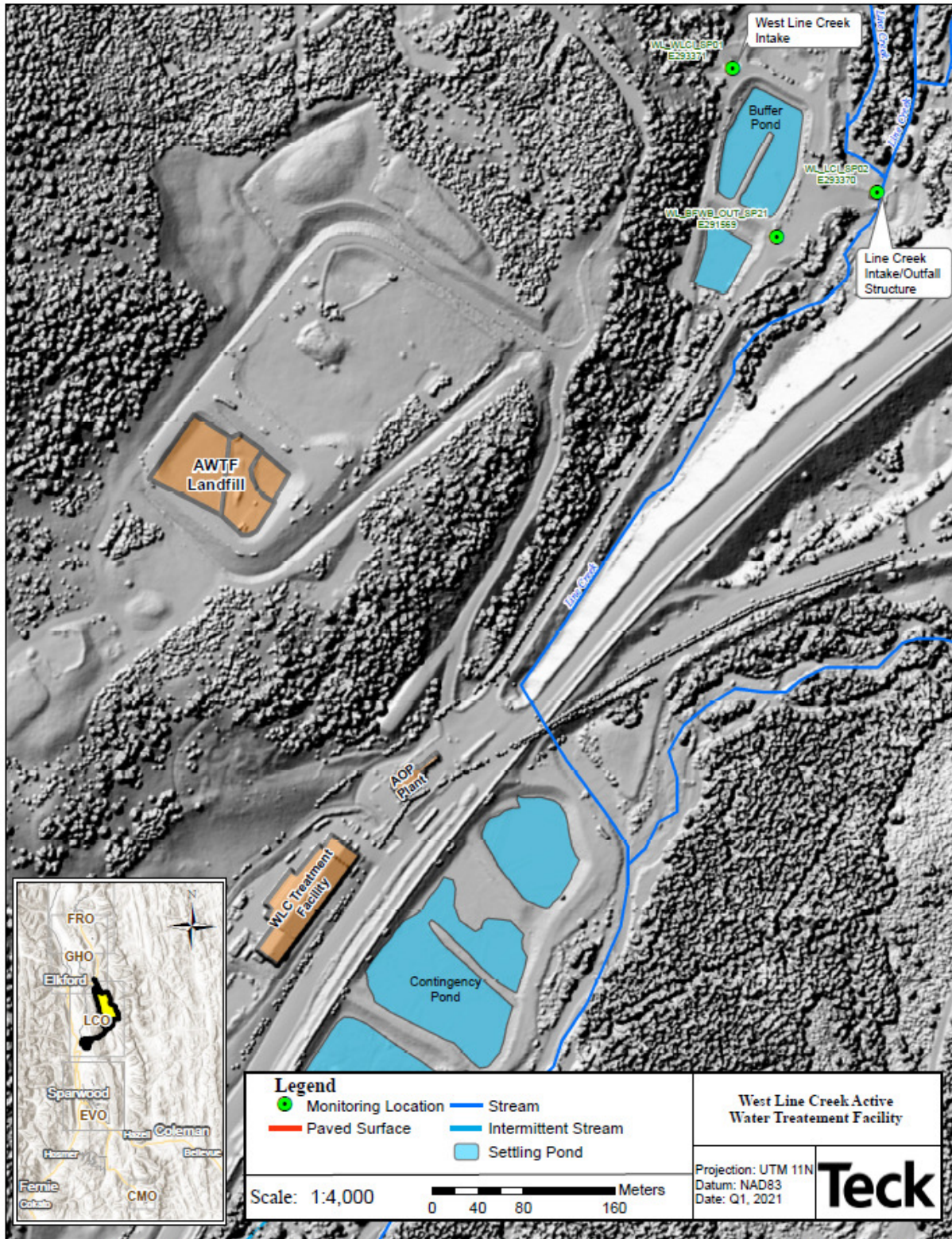


Figure 8. Map of the WLC AWTF and Associated Influent, Effluent and Receiving Environment Locations

Operational and Receiving Environment Monitoring Data

This section provides a summary and evaluation of key operational and receiving environment monitoring data associated with the WLC AWTF. Data related to the WLC AWTF effluent (E291569) permit limits and selenium and nitrate data for the downstream compliance point LC_LCDSSLCC (E297110) are included below.

Operational Data

Appendix 4, Section 4B1.2 of Permit 107517 requires the WLC AWTF effluent (E291569) to meet the following discharge limits:

Table 7. WLC AWTF Effluent (E291569) 107517 Permit Limits

Parameter	Units	Criteria	Limit
Ammonia	mg/L	Maximum	1.0
Biological Oxygen Demand	mg/L	Maximum	25
pH Range	-	Maximum	6.5 - 8.5
Nitrate	mg/L	Maximum	3.0
T - Phosphorus	mg/L	Maximum	0.3
T - Selenium	µg/L	Monthly Average	20
Total Suspended Solids	mg/L	Maximum	10.0
Antiscalant ¹	mg/L	2 minute weighted	5

1. The 2 minute weighted average limit for antiscalant was adjusted to 10 mg/L in the March 11, 2021 amendment to Permit 107517.

There were no Permit Limit exceedances in 2020. The following graphs display the WLC AWTF effluent (E291569) compared to the limits in Appendix 4, Section 4B1.2 of Permit 107517 for 2020. Monthly averages are calculated by averaging daily averages. All monitoring data required in Table 4B3 of Permit 107517 for 2020 can be found in Appendix B.

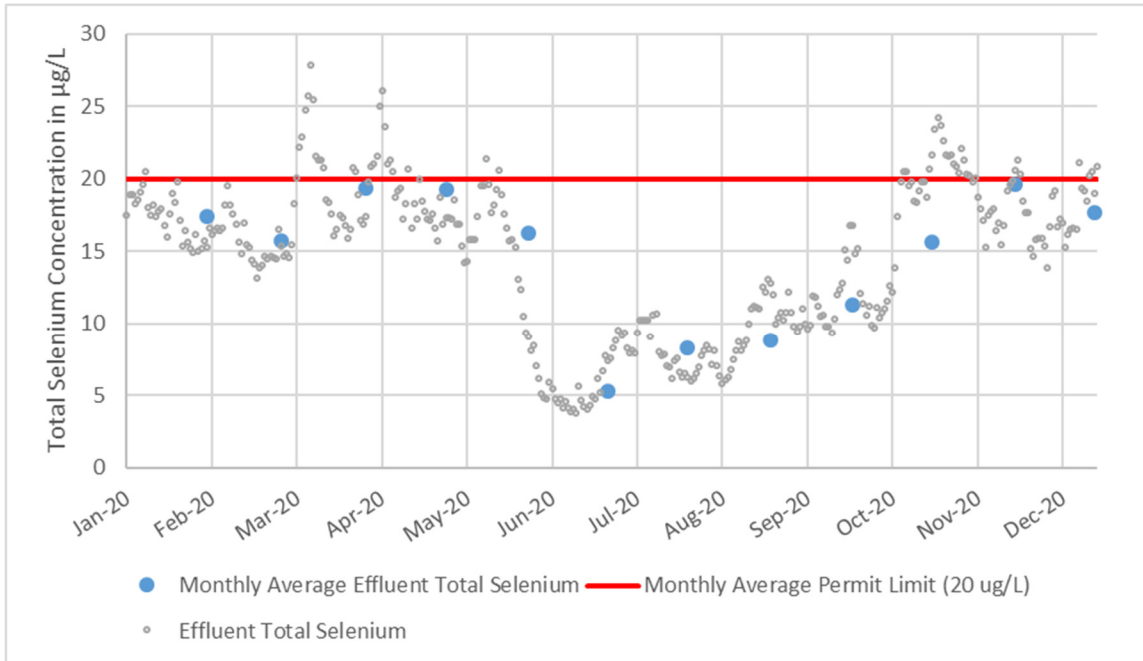


Figure 9. WLC AWTF Effluent (E291569) Total Selenium Compared to the 107517 Monthly Average Permit Limit

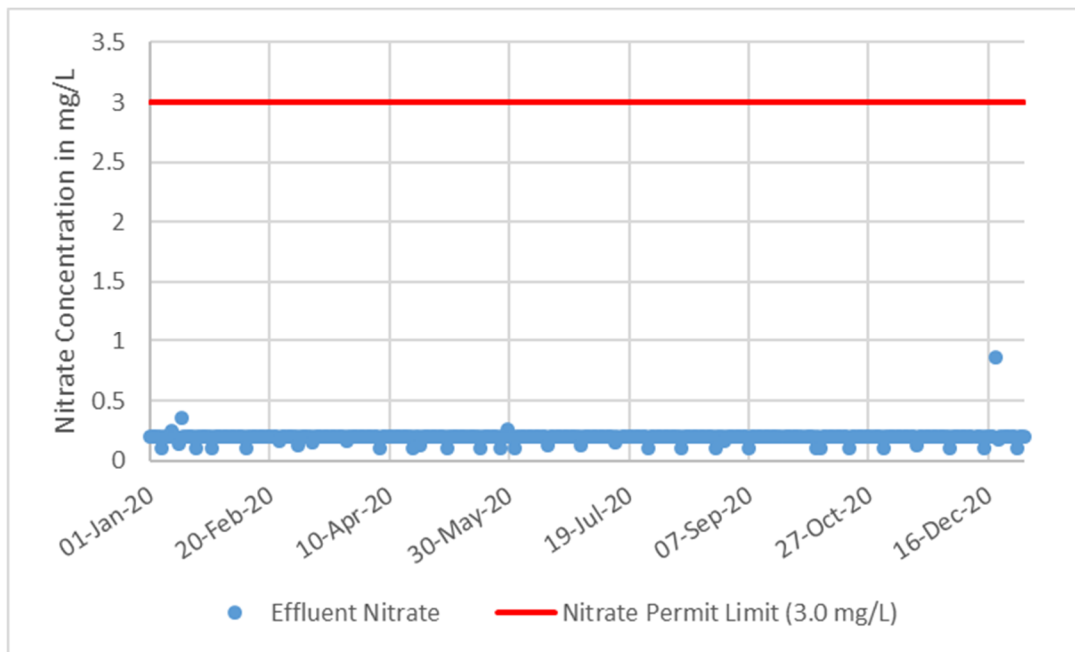


Figure 10. WLC AWTF Effluent Total (E291569) Nitrate Compared to the 107517 Permit Limit

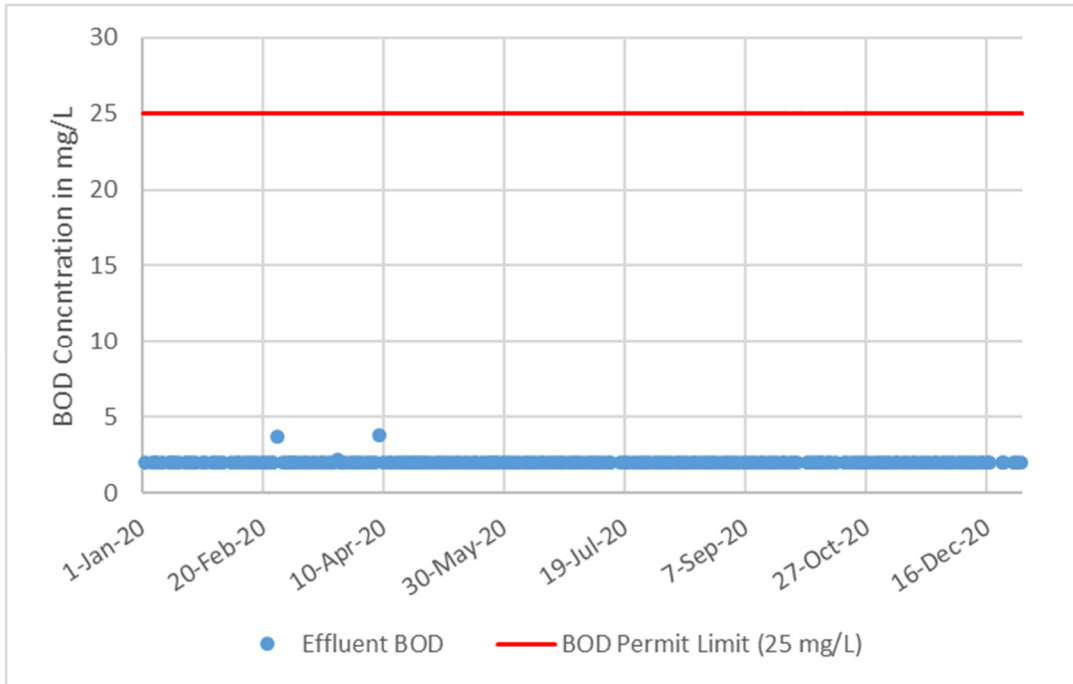


Figure 11. WLC AWTF Effluent (E291569) BOD Compared to the 107517 Permit Limit

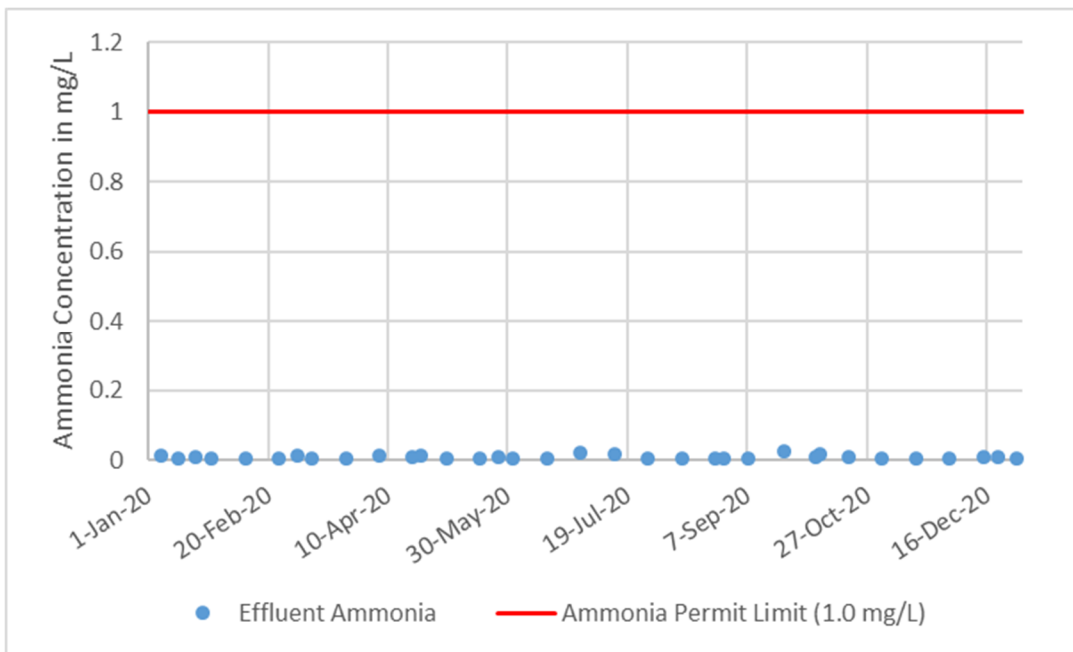


Figure 12. WLC AWTF Effluent (E291569) Ammonia Compared to the 107517 Permit Limit

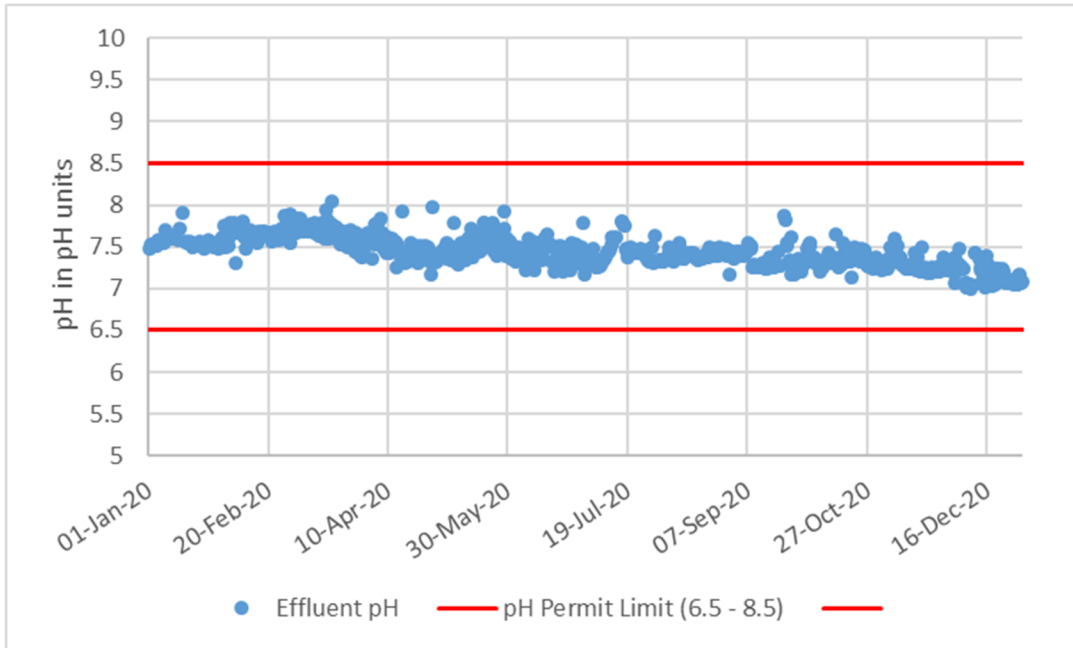


Figure 13. WLC AWTF Effluent (E291569) pH Compared to the 107517 Permit Limit

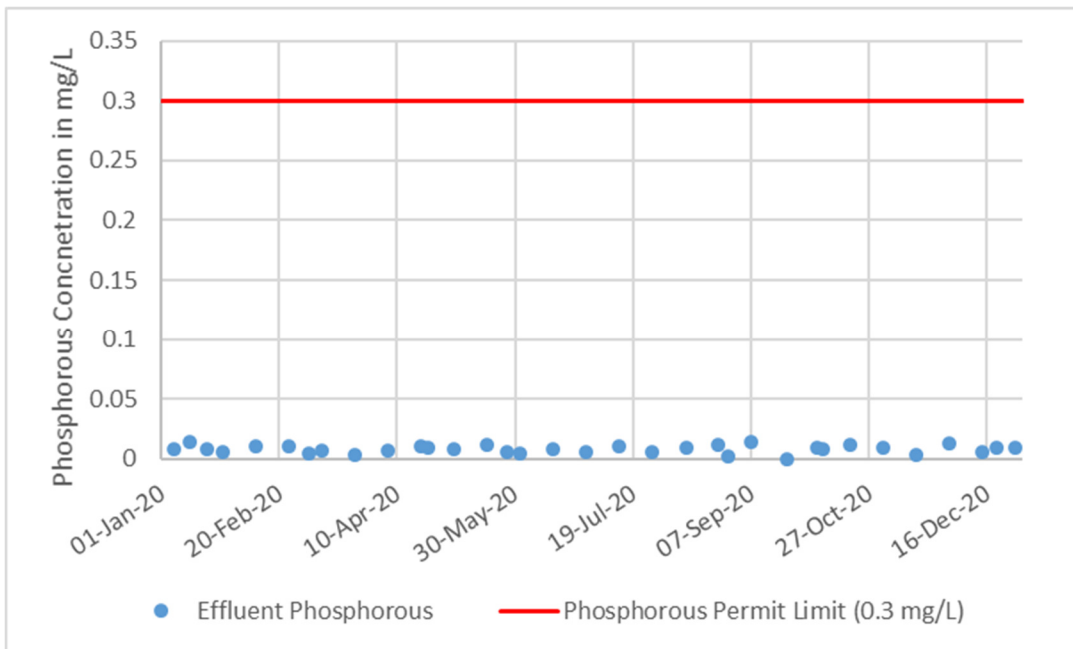


Figure 14. WLC AWTF Effluent (E291569) Phosphorous Compared to the 107517 Permit Limit

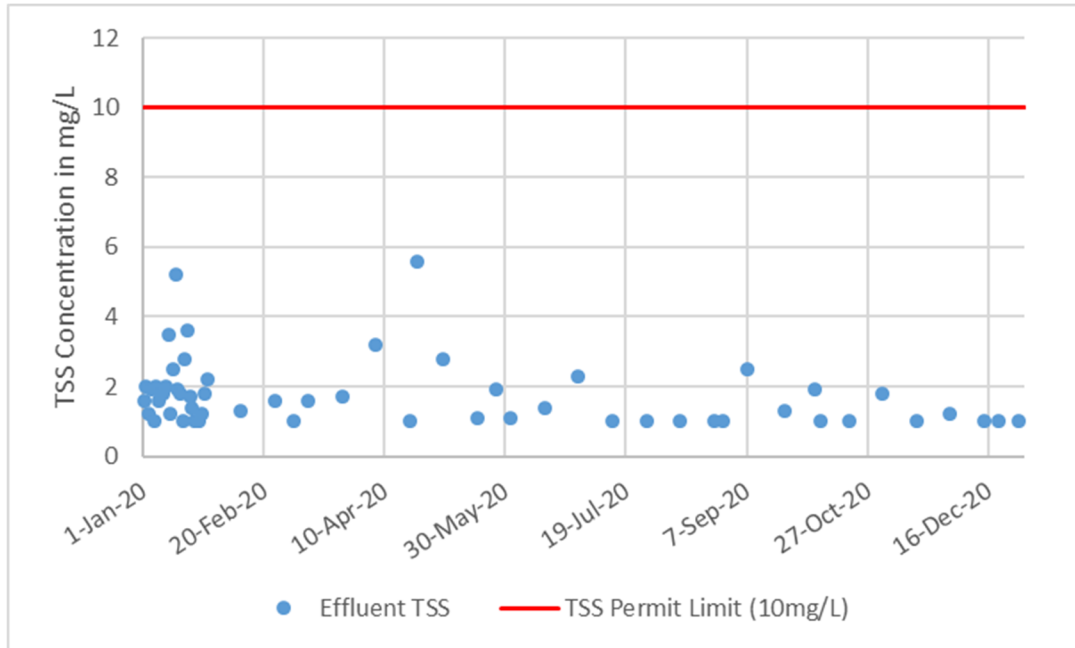


Figure 15. WLC AWTF Effluent (E291569) TSS Compared to the 107517 Permit Limit

The AOP continued to effectively oxidize the more bioavailable selenium species to selenate. The average concentration of non-selenate in the WLC AWTF effluent (E291569) was 1.2 ug/L in 2020. An evaluation of the concentrations of selenium in the aquatic biota (periphyton, invertebrates, and fish) downstream of the treatment facility can be found in the 2020 LCO LAEMP Report.

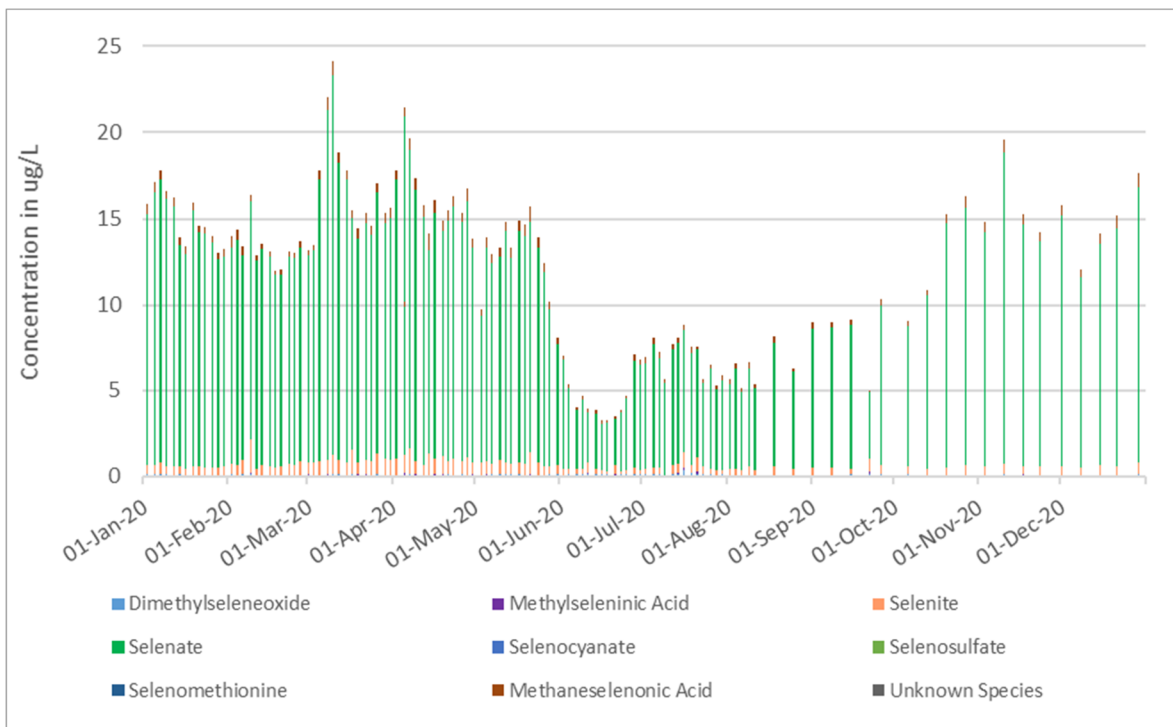


Figure 16. WLC AWTF Effluent (E291569) Selenium Speciation

Receiving Environment Data

The Line Creek compliance point (LC_LCDSSLCC; E297110), downstream of the treatment facility, is required to meet the monthly average and daily maximum limits for nitrate and selenium.

Table 8. Line Creek Compliance Point LCDSSLCC (E297110) 107517 Nitrate and Selenium Permit Limits

Parameter	Units	Criteria	Limit
Total Selenium	µg/L	Daily Maximum	58
Total Selenium	µg/L	Monthly Average	50
Nitrate	mg/L	Daily Maximum	9
Nitrate	mg/L	Monthly Average	7

There were several noncompliances at LCDSSLCC in 2020 for nitrate and there was one daily maximum selenium noncompliance. The WLC AWTF (with the advanced oxidation process) has been operating since the end of 2018, and while the facility is successful in removing nitrate, the influent nitrate concentrations are not high enough for the facility to remove enough nitrate load to maintain compliance with the nitrate compliance limit at LC_LCDSSLCC during all periods of the year.

The single daily maximum selenium exceedance at LC_LCDSSLCC occurred on September 21 during an unscheduled shutdown of the WLC AWTF. At the time, Teck experienced a “brown” power outage in which the backup generators did not come online because the outage did not cause a complete loss of power. Consequently, the WLC AWTF was not operating from 7:00 AM on September 20 to 10:30 AM on September 22. Water quality results at LC_LCDSSLCC leading up to this period (three samples collected between September 1 and 15) were below the daily maximum nitrate and selenium compliance limits. Once the WLC AWTF was restarted, selenium and nitrate results returned to levels below the daily maximum compliance limits.

The following graphs display LCDSSLCC (E297110) compared to the nitrate and selenium limits for 2020.

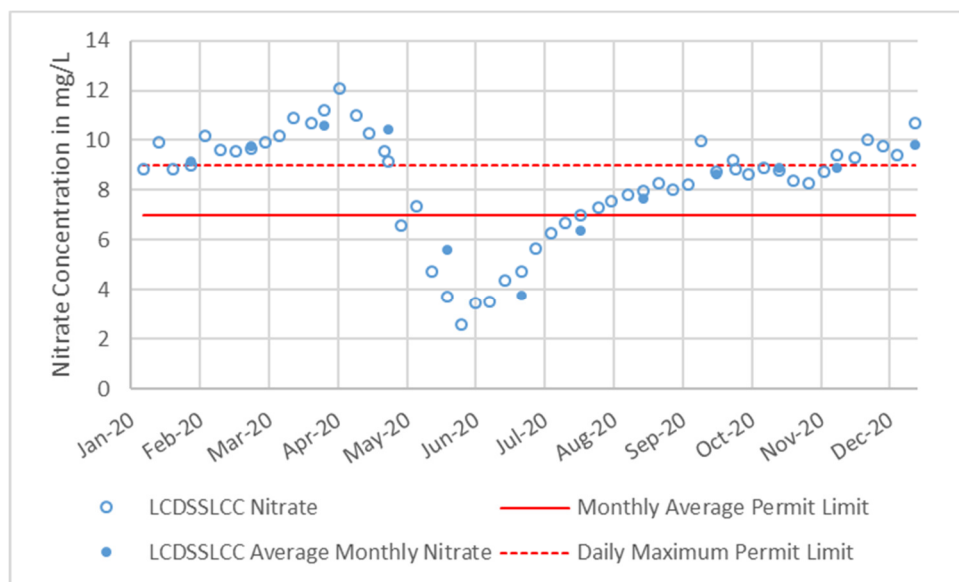


Figure 17. LCDSSLCC (E297110) Nitrate Compared to 107517 Permit Limits

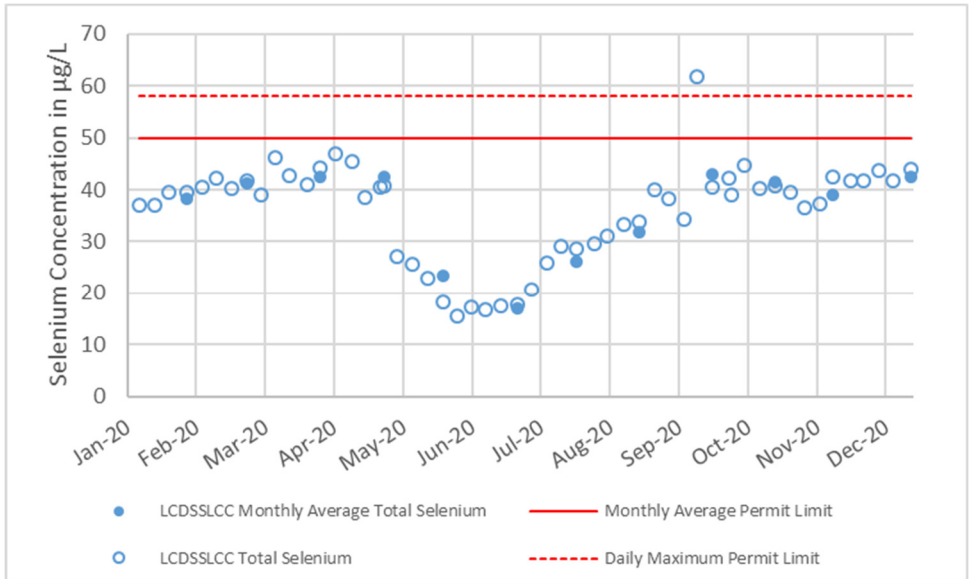


Figure 18. LCDSSLCC (E297110) Total Selenium Compared to 107517 Permit Limits

As part of the nitrate and selenium treatment, the WLC AWTF adds ferric chloride to the process. The ferric chloride acts as a coagulant in the solid liquid separation phase of the treatment. Ferric chloride addition increases chloride concentrations downstream of the facility. The graph below shows the chloride concentrations at LCDSSLCC compared to the BCWQG Approved Maximum (600 mg/L) and the BCWQG Approved Average (150 mg/L). As shown below, the chloride concentrations remain below the Approved Maximum and Average BCWQG.

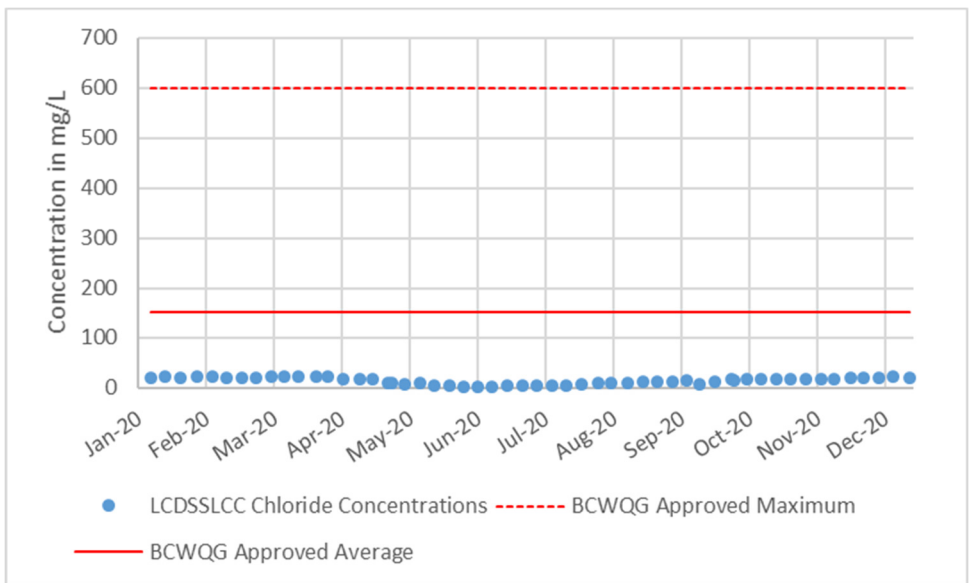


Figure 19. LCDSSLCC (E297110) Chloride Compared to Approved Maximum and Average BCWQG

Site Performance Objectives

The Total Phosphorous Site Performance Objective for the WLC AWTF was not exceeded in 2020.

Acute Toxicity

All acute toxicity test results conducted in 2020 on Rainbow Trout (*Oncorhynchus mykiss*) and water flea (*Daphnia magna*) are provided in Appendix C. Acute toxicity tests were conducted as required by Section 8.1 of Permit 107517. The acute toxicity tests conducted on the WLC AWTF effluent (E291569) in 2020 were:

- 29 96-hour Rainbow Trout 100% (single concentration) acute lethality toxicity tests.
- 29 48-hour *Daphnia magna* 100% (single concentration) acute lethality toxicity tests.

There were no acute toxicity failures on the WLC AWTF effluent (E291569) in 2020.

QA/QC Summary

Teck has established a quality assurance/quality control (QA/QC) program to promote the collection of high quality environmental data. Teck has developed protocols and procedures to collect representative samples and to minimize the potential for deterioration and contamination of samples before laboratory analysis.

Representativeness is the degree to which the data represent a characteristic of an environmental condition. In the field, representativeness is achieved by collecting samples at the permitted water sampling sites and adhering to sample collection procedures. In the laboratory, representativeness is achieved by the proper handling and storage of samples, the use of standard performance-based methods, and the initiation of analyses within hold times.

Comparability is the qualitative similarity of one dataset to another (i.e., the extent to which different data sets can be combined for use). Comparability is achieved by consistently using standardized field and laboratory methods and procedures.

Despite the considerable level of effort and management system tools employed to achieve high-quality data, there were instances in 2020 where data quality issues occurred.

Teck's Data Quality Objective

Teck conducts and manages a wide range of environmental monitoring programs. Teck depends on the data generated by these programs to inform management decisions and actions. Data can be categorized as either:

Category 1 – Data of Known Quality

Data is of known quality and are considered acceptable for use in decision-making. There is sufficient information on the dataset to be confident that the data, along with associated qualifiers, accurately represents the chemical concentrations present at the location at the time of sampling.

Category 2 – Data of Partially Known Quality

Data has a limited body of supporting QA/QC information. Although not sufficient to be considered Category 1, the data is considered suitable for qualitative use. These datasets may be considered for further evaluation based on project-specific Data Quality Objectives and intended end uses.

Category 3 – Data of Unknown Quality

Data includes sample concentration information, but lacks an adequate level of supporting QA/QC information. These datasets are not considered suitable for detailed project uses. However, considering the reputability of the source, these datasets may be used on a limited or provisional basis for qualitative comparisons with Category 1 and Category 2 datasets.

Teck's data quality objective is to produce Category 1 and 2 data at all times. To meet this objective, Teck has developed and implemented sampling and data management procedures that align with provincial standards. Teck applies these standards when samples are collected and analyzed, and when data is managed and stored.

Quantifying Data Quality

To determine the quality or category of each data point, Teck collects duplicate samples in the field and calculates relative percent difference (RPD). RPD is the arithmetic difference between two samples divided by the mean of those samples, then multiplied by one hundred to express the result as a percentage:

$$\text{RPD} = (\text{difference}/\text{mean}) \times 100\%$$

or

$$\text{RPD} = \left(\frac{(a - b)}{(a + b) / 2} \right) \times 100\%$$

Teck's environmental database, EQUIS, is configured to run RPD reports on demand. RPD results are assigned a pass/fail grade that correlates to the data quality categories described above. Teck uses the same RPD criteria outlined in the British Columbia Field Sampling Manual (2013):

- An RPD of <20% = Pass, Category 1
 - No action required; data point is considered validated.

- An RPD of >20%, with results < 5 times the detection limit = Pass, Category 1
 - No action required; result is not considered quantitatively meaningful.

- An RPD of >20% and <50%, with results >5 times the detection limit = Pass, Category 2
 - Data point is validated, but does have reasonable variance.
 - This analyte is monitored in future RPD evaluations to determine if the variance is a trend.
 - If a variance of 20% to 50% persists, the lab is notified and requested to investigate.

- An RPD of >50%, with results >5 times the detection limit = Fail, Category 3
 - Data point is not validated and is not suitable for quantitative use.
 - If a variance >50% persists, the lab is notified and requested to investigate.
 - Lab can be requested to re-analyze the sample.

To determine if contamination has occurred during bottle storage, sample collection, sample handling, or sample analysis, Teck collects blank samples. Teck collects a set of trip blanks and field blanks with each sample event. Blank sample results are reviewed and if a measurable level of an analyte is detected, the blank sample is re-analyzed to confirm. Detectable results are investigated to determine the source of the contamination.

Laboratory QA/QC

Teck's water samples are analyzed by ALS Laboratory Group, Nautilus Environmental Company, and Brooks Applied Labs. Quality control samples and procedures (as specified in analytical method protocols) are completed by the laboratory and include:

- initial calibration
- initial calibration verification
- continuing calibration
- calibration or instrument blanks
- method blanks
- laboratory control samples
- internal standards (including certified reference material)
- serial dilutions
- matrix spikes
- laboratory duplicates

The laboratory determines a method detection limit (MDL) for each analyte. MDLs are statistically derived. They reflect the concentration at which an analyte can be detected in a clean matrix with 99% confidence that a false positive result has not been reported. The laboratory establishes method reporting limits (MRLs) at levels above the MDLs for each parameter. These values are based on the laboratory's experience analyzing environmental samples and reflect the typical sensitivity obtained by the analytical system; they represent the level of analyte above which concentrations are accurately quantified.

The laboratory quantifies parameters at concentrations above the MRL. Parameters detected at concentrations between the MDL and MRL are flagged with a "J" qualifier to indicate that the value is an estimate (i.e., the analyte concentration is greater than or equal to the MDL and less than the MRL). Parameters that are not detected are reported as the MDL and are flagged with a "U" qualifier. MDLs can be adjusted by the laboratory to reflect sample dilution and/or matrix interference.

QA/QC Results

Data quality issues encountered in 2020 were related to RPD failures, blank detect results, and hold-time exceedances. Teck continues to monitor QA/QC results to identify any potential issues with laboratory precision or sample contamination. Due to the relative infrequency of blank sample detections and RPD failures, Teck's dataset is considered to be of high quality and meets the intent of the monitoring program.

RPD Results

The precision of laboratory results was evaluated using field duplicate samples. RPD calculations as described above were performed on the 114 field duplicate samples collected in 2020. Of the 1,183 parameters evaluated for RPD, 1 (0.08%) failed the RPD criteria. A summary of the 2020 RPD results is provided below.

Table 9. WLC AWTF RPD Failures

Date	EMS ID	Location Code	Parameters	Reason
2/10/2020	E291569	WL_BFWB_OUT_SP21	Nitrate Nitrogen (NO3), As N	RPD

Blank Detect Results

In 2020, 81 blank samples were collected to determine if contamination was occurring during bottle storage, sample collection, sample handling, and sample analysis. Of the 1,203 parameters analyzed in these samples, 10 had results above detection limits (0.8%). [Table 10](#) summarizes blank detect results in 2020.

Table 10. WLC AWT 2020 Blank Detects

Date	EMS ID	Location Code	Parameters	Reason
1/6/2020	E291569	WL_BFWB_OUT_SP21	Nitrate Nitrogen (NO3), As N	Blank Detect
1/6/2020	E291569	WL_BFWB_OUT_SP21	Nitrogen, Ammonia (As N)	Blank Detect
1/13/2020	E291569	WL_BFWB_OUT_SP21	Total Dissolved Solids (Residue, Filterable)	Blank Detect
1/13/2020	E291569	WL_BFWB_OUT_SP21	Total Suspended Solids, Lab	Blank Detect
11/2/2020	E291569	WL_BFWB_OUT_SP21	Zinc - Total	Blank Detect
11/2/2020	E291569	WL_BFWB_OUT_SP21	Zinc - Dissolved	Blank Detect
11/10/2020	E291569	WL_BFWB_OUT_SP21	Selenite - Dissolved	Blank Detect
12/8/2020	E291569	WL_BFWB_OUT_SP21	Selenite - Dissolved	Blank Detect
12/20/2020	E291569	WL_BFWB_OUT_SP21	Selenium - Dissolved	Blank Detect
12/28/2020	E291569	WL_BFWB_OUT_SP21	Selenium - Dissolved	Blank Detect

Several of the parameters detected in blank samples occurred at all five Teck operations in the Elk Valley. These included barium, ammonia, and zinc. Because these occurred across the valley, it is likely there are potential contamination sources common to each site, specific to the mining industry, or related to the laboratory analysis. ALS Laboratories has indicated that analytical variability can affect the results of blank samples with very low detection limits; even the slightest variability (to 1/100th of a decimal place) can result in false detection.

Higher than expected field blank results at the regional sampling locations (2.4%) were due to dissolved metals contamination from field filtration equipment. Upon discovery, use of the equipment was discontinued. Contamination levels were low and did not have an effect on routine sample results.

Teck continues to evaluate blank detect results by location and by parameter to determine if detections are consistent across all five operations or specific to an area that might point to a deviation from standard procedures.

Equipment Calibration

Equipment calibrations for the WLC AWTF are summarized in Table 11.

Table 11. WLC AWTF Equipment Calibration

Equipment	Model	Calibration Frequency	Last Calibrated
Field Meter #1	YSI Handheld Multiparameter Instrument #1 (Pro Plus) (Temperature, pH, DO, Spec Cond., ORP)	Monthly calibration, daily verification	12/6/2020
Field Meter #2	YSI Handheld Multiparameter Instrument (Spare) (Pro Plus) (Temperature, pH, DO, Spec Cond., ORP)	Monthly calibration, daily verification. Only used if Field Meter #1 is out of service	12/6/2020
Field Meter #3	Hach TU5200 (Turbidity)	Annual calibration by manufacturer	10/6/2020

Hold Time Exceedances

Parameter hold-times were exceeded on 8 of 17,910 analyses completed in 2020 (0.04%).

The hold-time exceedances in 2020 were for time-sensitive water quality parameters, specifically sulphide, which exceeded hold time on 6 of 8 data points affected (75%). Through discussions with the external laboratories, the largest contributing cause to the sulphide exceedances was lab capacities issues resulting from equipment downtime for the sulphide analyzing equipment.

Teck continues to address the causes of hold-time exceedances by working with the laboratories to improve the timely reporting of issues such as equipment malfunctions, sample volumes, shipping delays, and laboratory resources. Timely reporting of these issues to Teck often provides field samplers enough time to resample to meet permit requirements.

Table 12. WLC AWTF 2020 Hold Time Exceedances

Date	EMS ID	Location Code	Parameters	Reason
4/23/2020	E291569	WL_BFWB_OUT_SP21	Sulphide (as S)	EHT
4/23/2020	E293370	WL_LCI_SP02	Sulphide (as S)	EHT
4/23/2020	E293371	WL_WLCI_SP01	Sulphide (as S)	EHT
5/4/2020	E291569	WL_BFWB_OUT_SP21	Sulphide (as S)	EHT
7/13/2020	E293370	WL_LCI_SP02	Ortho-phosphate (as P)	HTA - EHT

Date	EMS ID	Location Code	Parameters	Reason
7/13/2020	E293371	WL_WLCI_SP01	Ortho-phosphate (as P)	HTA - EHT
8/24/2020	E291569	WL_BFWB_OUT_SP21	Sulphide (as S)	EHT
12/28/2020	E291569	WL_BFWB_OUT_SP21	Sulphide (as S)	EHT

Elkview Operations Saturated Rockfill Phase 2

Executive Summary

Teck received authorization for operating the Elkview Operations Saturated Rockfill Phase 2 (EVO SRF P2) on October 22, 2020. Teck commenced commissioning of the EVO SRF P2 on December 10, 2020 with the wet-testing of the Erickson Creek intake/outfall structure. During the wet testing there was intermittent influent flow from Erickson and intermittent effluent flow to Erickson. Wet testing activities were completed on December 19, 2020 and the system remained in recirculation as the facility continued the biomass growth stage in advance of moving into forward flow. This report includes activities associated with 2020 commissioning activities. Additional reporting required in the 107517 EVO SRF Full Scale Trial Authorization (September 7, 2018) can be found in the 2020 EVO SRF Annual Performance Report.

Facility Performance

This section summarizes the facility performance in 2020 and provides a comparison to the key performance metrics for selenium and nitrate treatment facilities.

Selenium and Nitrate Load Removal

This section provides a summary of the EVO SRF P2 selenium and nitrate load removal in 2020. Due to the long retention time of the SRF system, the Erickson influent has not yet reached the extraction wells so this data is representative of EVO SRF Phase 1 effluent. The load removal displayed is not representative of EVO SRF P2 performance.

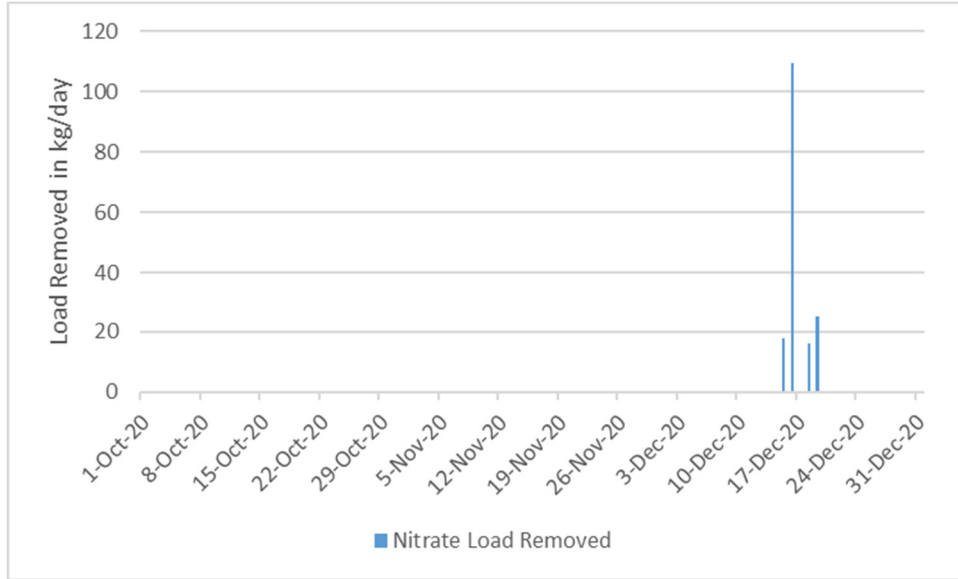


Figure 20. EVO SRF P2 2020 Nitrate Load Removal

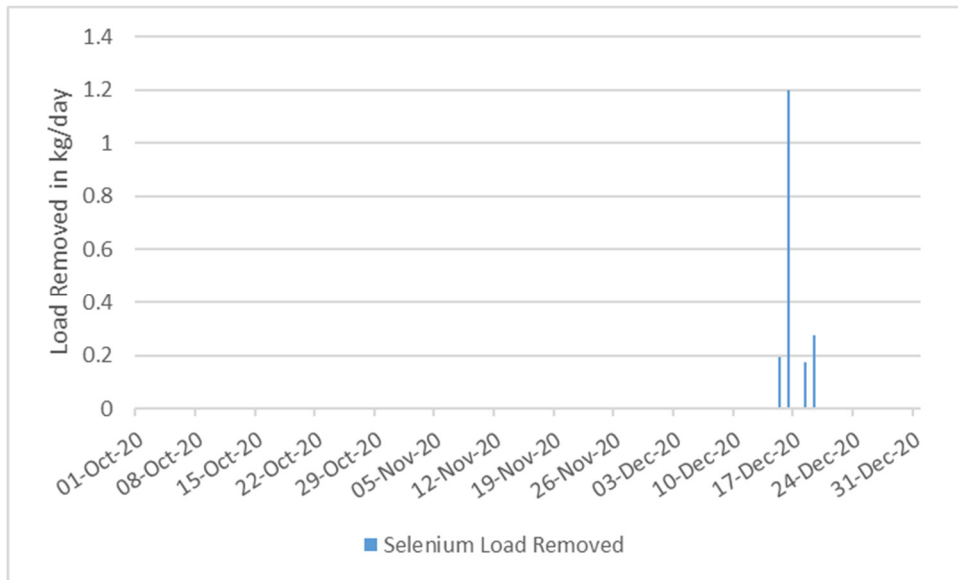


Figure 21. EVO SRF P2 2020 Selenium Load Removal

Influent Sources and Flow Rates

This section provides a summary of the EVO SRF P2 influent sources and flow rates. The EVO SRF transitioned to P2 in Q4 of 2020. The SRF remained in full recirculation during the fourth quarter except for short periods of wet testing the Erickson Creek intake/outfall.

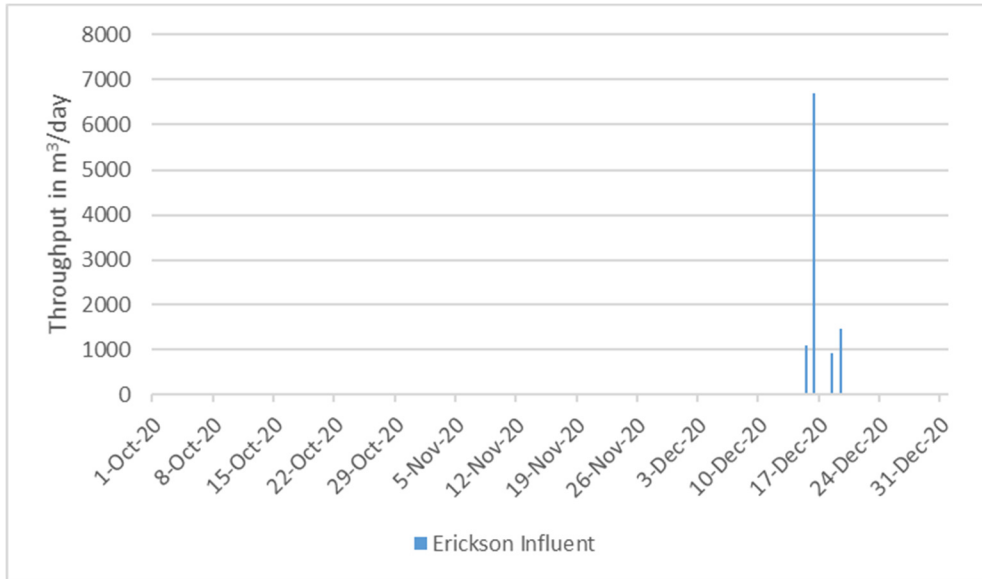


Figure 22. EVO SRF P2 2020 Throughput

During the wet testing water was taken into the SRF from Erickson Creek and effluent was returned to Erickson Creek. The graph below displays the influent and effluent flows during the wet testing activities. The EVO SRF P2 is designed to match influent and effluent flow rates. Wet testing of the intake/outfall with flow matching began December 15th, as shown in the graph below.

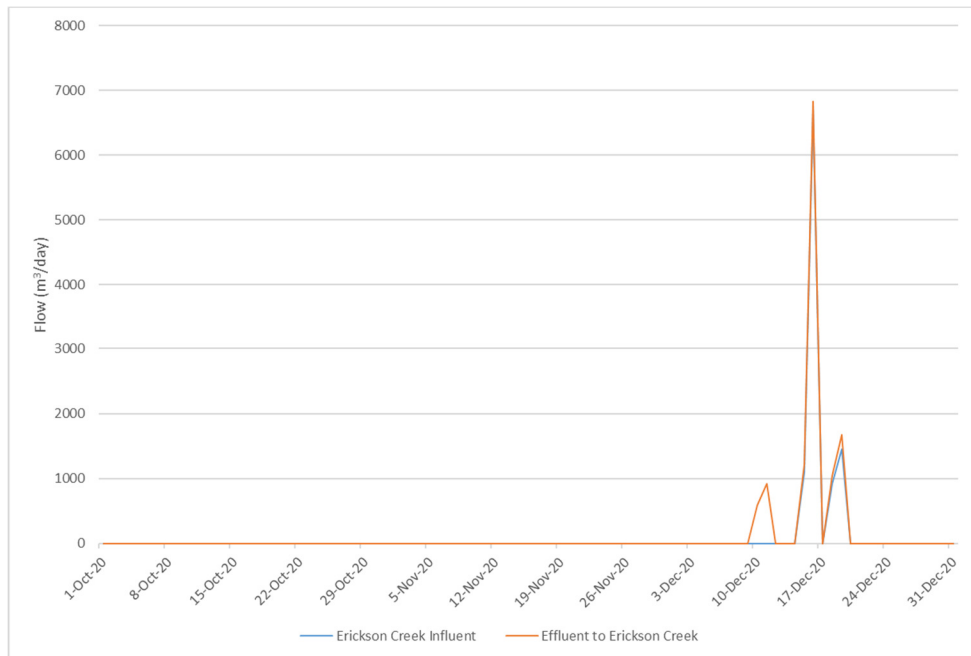


Figure 23. EVO SRF P2 2020 Influent and Effluent Flows

Quantities of Reagents Used and Residuals Generated

The EVO SRF does not produce residuals that require disposal.

The table below summarizes the quantity of reagents used in 2020 for the EVO SRF P2.

Table 13. EVO SRF P2 2020 Reagent Quantities

Reagent	Total Volume or Mass
Methanol	19,259 L
Phosphoric Acid	79 L
Sodium Nitrate	4,426 kg
Sodium Chloride	0 kg
Antiscalant	57 L

Continuous Improvement Initiatives

Teck commenced commissioning of the EVO SRF P2 on December 10, 2020 with the wet-testing of the Erickson Creek intake/outfall structure. Commissioning efforts for the remainder of 2020 were focused on wet testing.

Reportable Spills and Incidents

This sections summarizes process upsets, spills, issues with and bypasses of the Authorized Works, including recirculation events. Recirculation and downtime events included are greater than 24 hours in duration, consistent with the Draft Bypass Clauses 4C3.5 and 4D3.3 for the EVO SRF and FRO AWTF-S respectively in the December 2, 2020 draft Permit 107517 authorization.

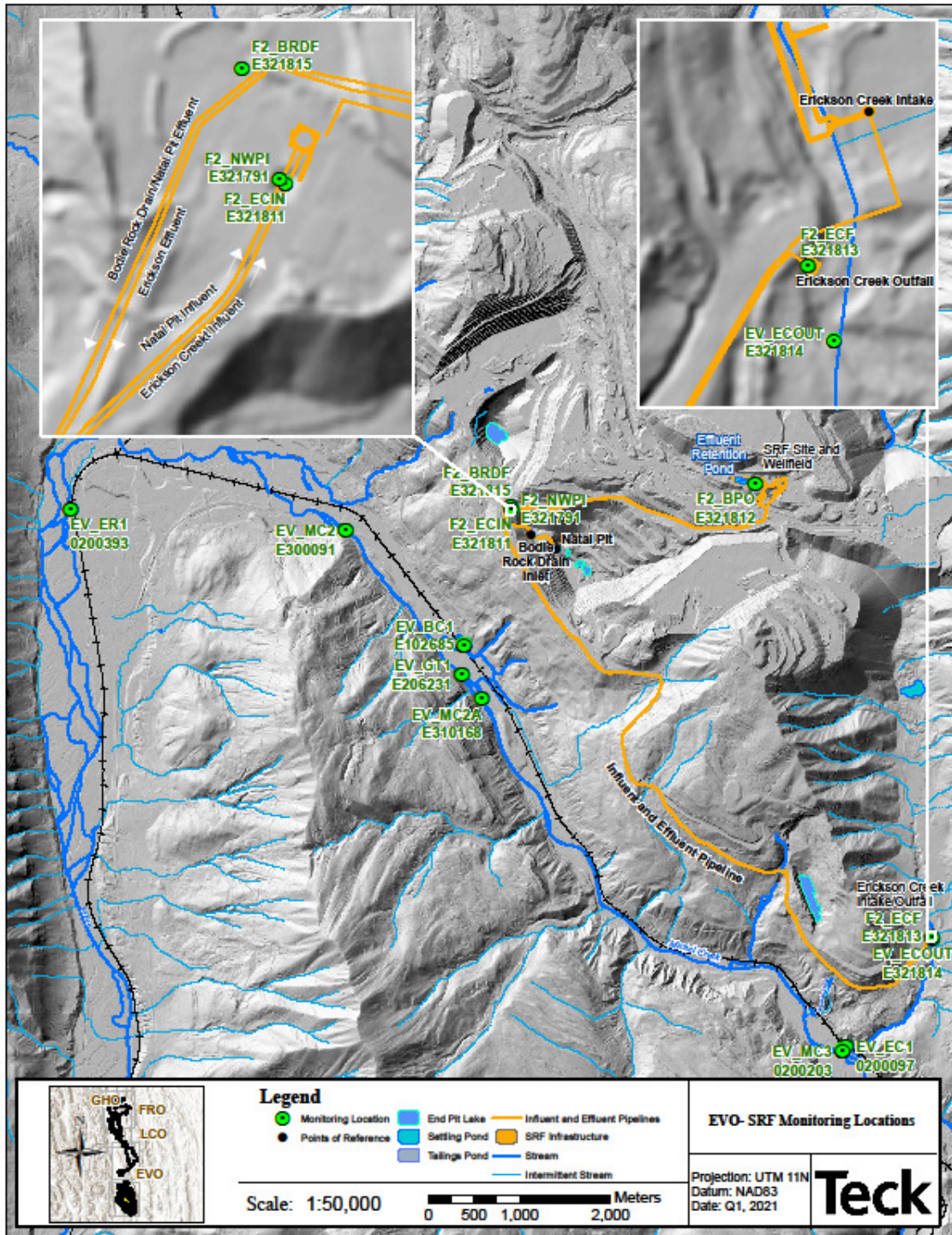
Noncompliances

December 2020 – Missed Samples

On January 6, 2021, during a review of December 2020 sample data, Teck noted that analysis of certain parameters was missed for E321811 (F2_ECIN) and E321812 (F2_BPO) due to operator error. As per Table 4C4 of Appendix 4 of Permit 107517 (October 22, 2020), total metals samples are required to be collected monthly at E321811 and E321812, and selenium speciation samples are required to be collected weekly at E321811 and E321812 when influent and effluent water is available. For location E321811, Total Metals and Selenium Speciation analysis was missed. For location E321812, Total Metals analysis was missed. The non-compliance was confirmed in January 2021 and due to this timing, additional samples could not be taken to meet the sampling requirements.

An initial investigation indicated that the operators were following a sample schedule that had sampling for total metals and selenium speciation scheduled at a different time than the sampling for other parameters. The missed samples occurred during pre-commissioning wet testing of the P2 Erickson intake/outfall structure at the EVO SRF. During this time, the influent and effluent were available intermittently, resulting in a small window (less than one week) for the sampling events to take place during the month. Teck has incorporated additional flexibility into the sampling schedule and has reinforced the sampling requirements with the operating team at the EVO SRF in response to this event.

Map



Document Path: \\teck\com\in\cgs\Groups\TCGIS\Data\Projects\Annual\WaterReporting\AnnualReporting2021\SurfaceWaterAnnual_Rpt\Regional\MXD\RG_Map10_EVO-SRF_F2.mxd
Figure 24. EVO SRF P2 Map and Associated Influent, Effluent and Receiving Environment Locations

Receiving Environment Monitoring Data

The EVO SRF P2 commissioning period began on December 10th, 2020 and ends 180 days after the beginning of Stage 3 of commissioning (moving into forward flow treating Erickson Creek) during which time the effluent is required to be non-acutely toxic. As per Appendix 4, Section 4A1 of Permit 107517, the limits listed in the table below are not in affect during this time.

Appendix 4, Section 4C1.2 of Permit 107517 requires the EVO SRF effluent (E321812) to meet the following discharge limits. These discharge limits will apply to the EVO SRF effluent after the commissioning phase ends.

Table 14. EVO SRF P2 Effluent (E321812) 107517 Permit Limits

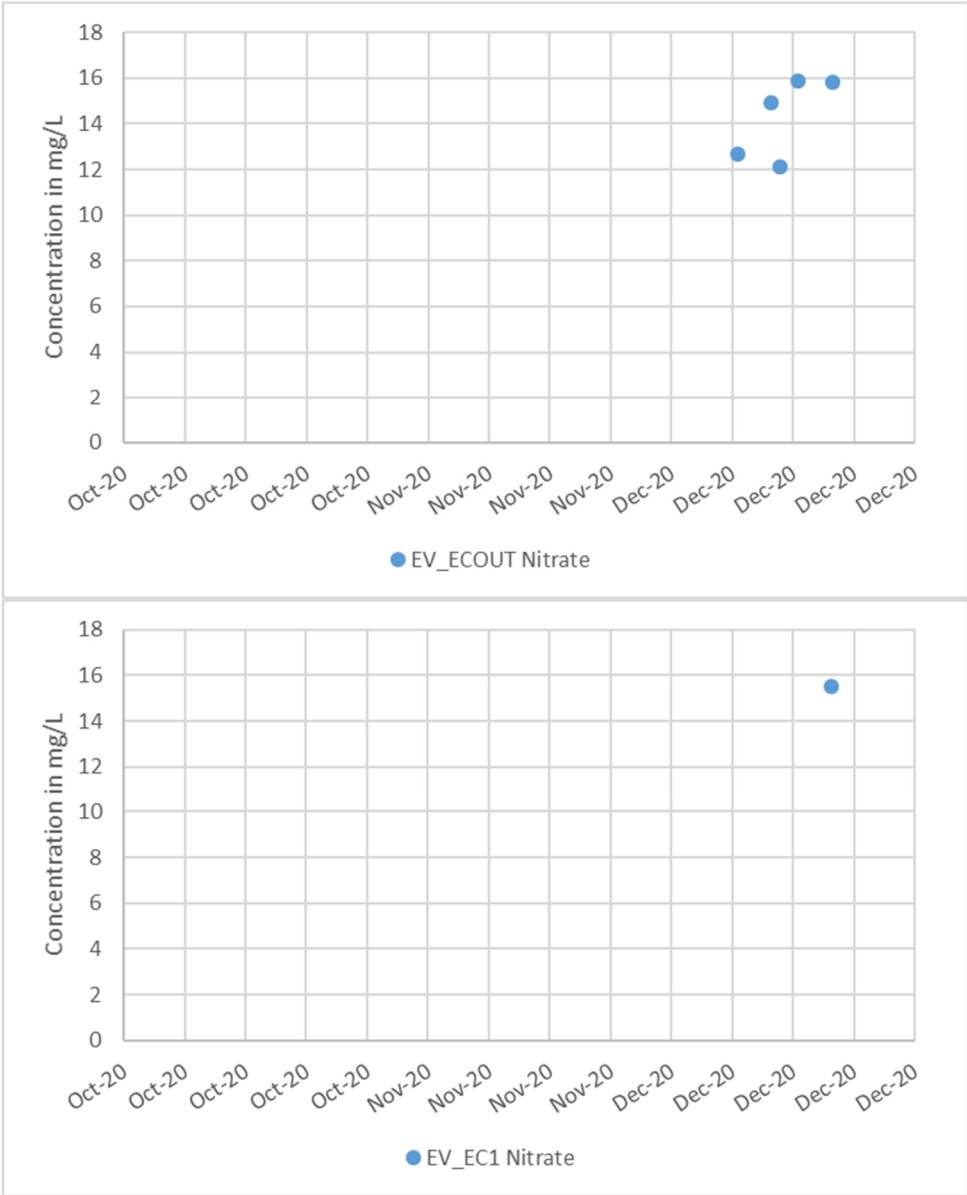
Parameter	Units	Criteria	Limit
Ammonia	mg/L	Maximum	1.2
Biological Oxygen Demand	mg/L	Maximum	25
pH Range	-	Maximum	6.5 – 9.0
Nitrite	mg/L	Maximum	0.4
T - Phosphorus	mg/L	Monthly Average	0.10
Sulphide	mg/L	Monthly Average	0.01
Dissolved Oxygen	mg/L	Minimum	5.0
Antiscalant	mg/L	2 minute weighted	10

Water quality is monitored downstream of the EVO SRF P2 at multiple locations including EV_ECOUT (E321814), EV_EC1 (0200097) and EV_MC2 (E321814). The Elkview Compliance point EV_MC2 is required to meet the following limits for nitrate and selenium. EV_MC2 remained below the Permit Limits during the wet testing phase of the EVO SRF.

Table 15. Elkview Compliance Point EV_MC2 (E321814) 107517 Permit Limits

Parameter	Units	Criteria	Limit
Total Selenium	µg/L	Monthly Average	28
Nitrate	mg/L	Monthly Average	6

Limited data was collected in 2020 during or after the wet testing phase of the EVO SRF. The graphs below show the nitrate and selenium concentrations collected during or after wet testing. This data is not representative of EVO SRF P2 performance. All monitoring data required in Table 4C4 of Permit 107517 for 2020 can be found in Appendix B.



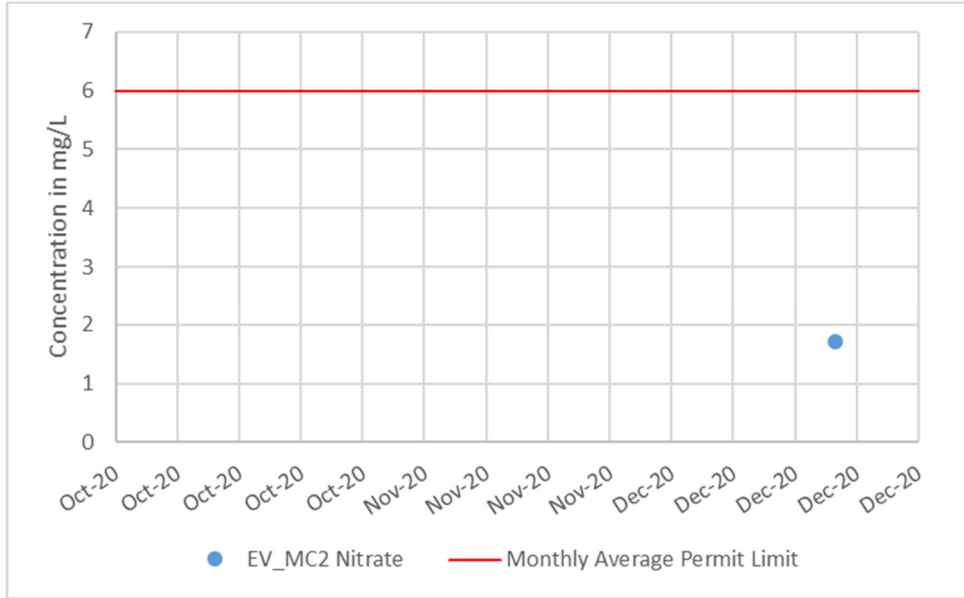
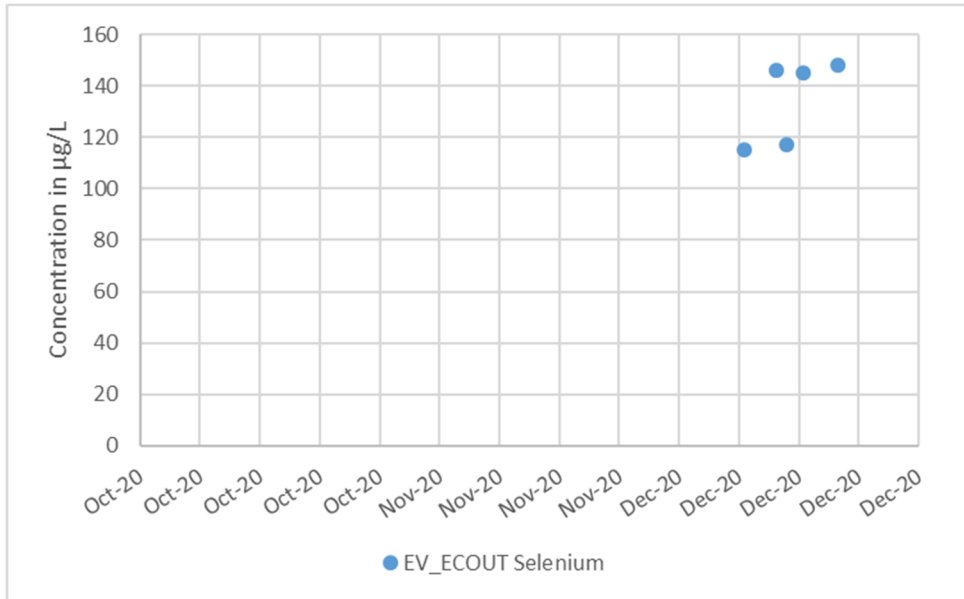


Figure 25. Nitrate Concentrations Downstream of the EVO SRF P2 During 2020 Wet Testing



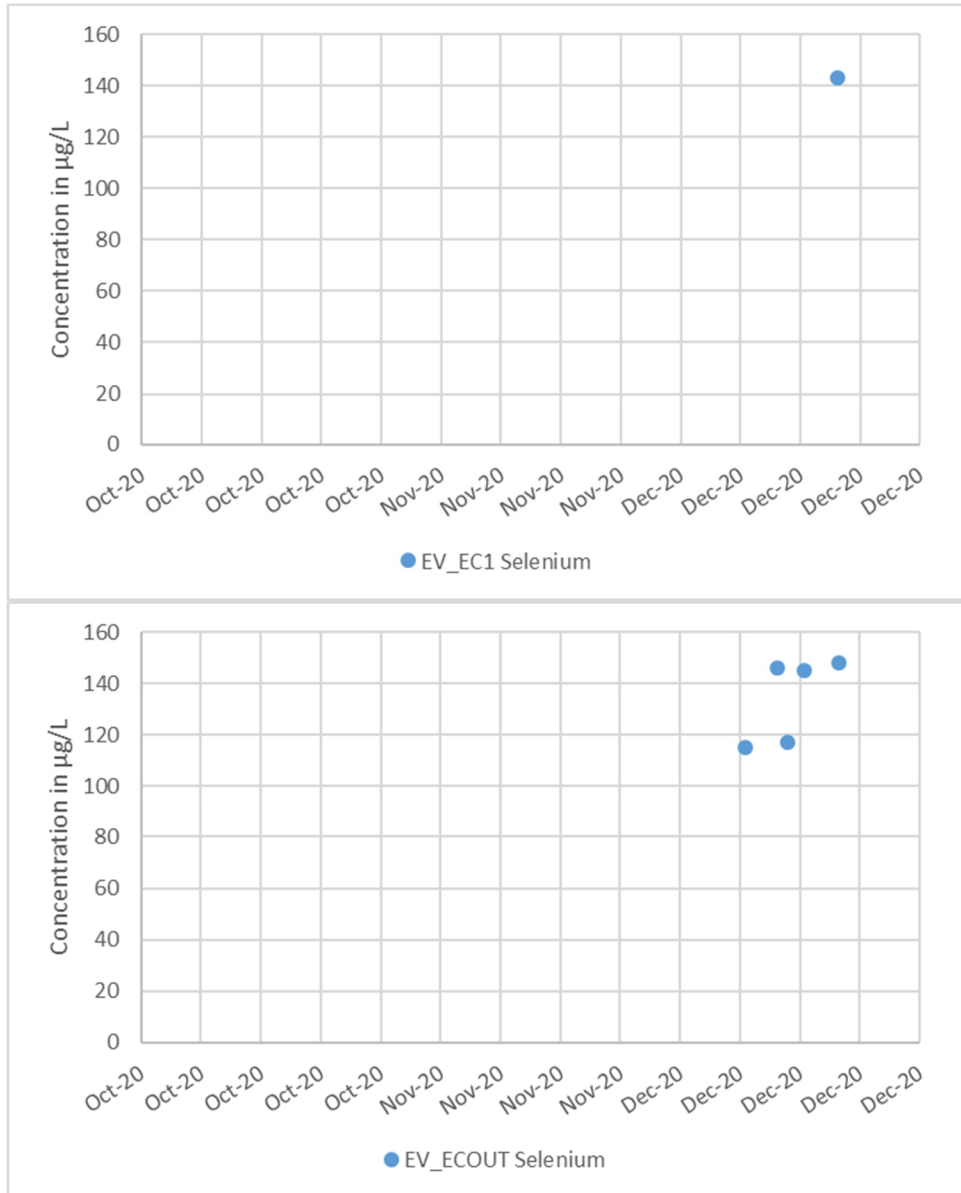


Figure 26. Total Selenium Concentrations Downstream of the EVO SRF P2 During 2020 Wet Testing

Site Performance Objectives

The EVO SRF Water Temperature Site Performance Objectives do not come into effect until the 180 day commissioning period is complete on August 13, 2021 (as per Appendix 4, Section 4A1 of Permit 107517).

Acute Toxicity

All acute toxicity test results conducted for EVO SRF P2 in 2020 on Rainbow Trout (*Oncorhynchus mykiss*) and water flea (*Daphnia magna*) are provided in Appendix C. Acute toxicity tests were conducted as required by Section 8.1 of Permit 107517. The acute toxicity tests conducted on the EVO SRF effluent (E321812) during P2 in 2020 were:

- 2 96-hour Rainbow Trout 100% (single concentration) acute lethality toxicity tests.

- 2 48-hour *Daphnia magna* 100% (single concentration) acute lethality toxicity tests.

There were no acute toxicity test failures on the EVO SRF effluent (E321812) during P2 in 2020.

Due to the long retention time of the SRF system the Erickson influent has not yet reached the extraction wells and this data is representative of EVO SRF Phase 1 effluent.

QA/QC Summary

Teck has established a quality assurance/quality control (QA/QC) program to promote the collection of high quality environmental data. Teck has developed protocols and procedures to collect representative samples and to minimize the potential for deterioration and contamination of samples before laboratory analysis.

Representativeness is the degree to which the data represent a characteristic of an environmental condition. In the field, representativeness is achieved by collecting samples at the permitted water sampling sites and adhering to sample collection procedures. In the laboratory, representativeness is achieved by the proper handling and storage of samples, the use of standard performance-based methods, and the initiation of analyses within hold times.

Comparability is the qualitative similarity of one dataset to another (i.e., the extent to which different data sets can be combined for use). Comparability is achieved by consistently using standardized field and laboratory methods and procedures.

Despite the considerable level of effort and management system tools employed to achieve high-quality data, there were instances in 2020 where data quality issues occurred.

Teck's Data Quality Objective

Teck conducts and manages a wide range of environmental monitoring programs. Teck depends on the data generated by these programs to inform management decisions and actions. Data can be categorized as either:

Category 1 – Data of Known Quality

Data is of known quality and are considered acceptable for use in decision-making. There is sufficient information on the dataset to be confident that the data, along with associated qualifiers, accurately represents the chemical concentrations present at the location at the time of sampling.

Category 2 – Data of Partially Known Quality

Data has a limited body of supporting QA/QC information. Although not sufficient to be considered Category 1, the data is considered suitable for qualitative use. These datasets may be considered for further evaluation based on project-specific Data Quality Objectives and intended end uses.

Category 3 – Data of Unknown Quality

Data includes sample concentration information, but lacks an adequate level of supporting QA/QC information. These datasets are not considered suitable for detailed project uses. However, considering the reputability of the source, these datasets may be used on a limited or provisional basis for qualitative comparisons with Category 1 and Category 2 datasets.

Teck's data quality objective is to produce Category 1 and 2 data at all times. To meet this objective, Teck has developed and implemented sampling and data management procedures that align with provincial standards. Teck applies these standards when samples are collected and analyzed, and when data is managed and stored.

Quantifying Data Quality

To determine the quality or category of each data point, Teck collects duplicate samples in the field and calculates relative percent difference (RPD). RPD is the arithmetic difference between two samples divided by the mean of those samples, then multiplied by one hundred to express the result as a percentage:

$$\text{RPD} = (\text{difference}/\text{mean}) \times 100\%$$

or

$$\text{RPD} = \left(\frac{(a - b)}{(a + b) / 2} \right) \times 100\%$$

Teck's environmental database, EQUiS, is configured to run RPD reports on demand. RPD results are assigned a pass/fail grade that correlates to the data quality categories described above. Teck uses the same RPD criteria outlined in the British Columbia Field Sampling Manual (2013):

- An RPD of <20% = Pass, Category 1
 - No action required; data point is considered validated.
- An RPD of >20%, with results < 5 times the detection limit = Pass, Category 1
 - No action required; result is not considered quantitatively meaningful.
- An RPD of >20% and <50%, with results >5 times the detection limit = Pass, Category 2
 - Data point is validated, but does have reasonable variance.
 - This analyte is monitored in future RPD evaluations to determine if the variance is a trend.
 - If a variance of 20% to 50% persists, the lab is notified and requested to investigate.
- An RPD of >50%, with results >5 times the detection limit = Fail, Category 3
 - Data point is not validated and is not suitable for quantitative use.
 - If a variance >50% persists, the lab is notified and requested to investigate.
 - Lab can be requested to re-analyze the sample.

To determine if contamination has occurred during bottle storage, sample collection, sample handling, or sample analysis, Teck collects blank samples. Teck collects a set of trip blanks and field blanks with each sample event. Blank sample results are reviewed and if a measurable level of an analyte is detected, the blank sample is re-analyzed to confirm. Detectable results are investigated to determine the source of the contamination.

Laboratory QA/QC

Teck's water samples are analyzed by ALS Laboratory Group, Nautilus Environmental Company, and Brooks Applied Labs. Quality control samples and procedures (as specified in analytical method protocols) are completed by the laboratory and include:

- initial calibration
- initial calibration verification
- continuing calibration
- calibration or instrument blanks
- method blanks
- laboratory control samples
- internal standards (including certified reference material)
- serial dilutions
- matrix spikes
- laboratory duplicates

The laboratory determines a method detection limit (MDL) for each analyte. MDLs are statistically derived. They reflect the concentration at which an analyte can be detected in a clean matrix with 99% confidence that a false positive result has not been reported. The laboratory establishes method reporting limits (MRLs) at levels above the MDLs for each parameter. These values are based on the laboratory's experience analyzing

environmental samples and reflect the typical sensitivity obtained by the analytical system; they represent the level of analyte above which concentrations are accurately quantified.

The laboratory quantifies parameters at concentrations above the MRL. Parameters detected at concentrations between the MDL and MRL are flagged with a “J” qualifier to indicate that the value is an estimate (i.e., the analyte concentration is greater than or equal to the MDL and less than the MRL). Parameters that are not detected are reported as the MDL and are flagged with a “U” qualifier. MDLs can be adjusted by the laboratory to reflect sample dilution and/or matrix interference.

QA/QC Results

Data quality issues encountered in 2020 were related to RPD failures, blank detect results, and hold-time exceedances. Teck continues to monitor QA/QC results to identify any potential issues with laboratory precision or sample contamination. Due to the relative infrequency of blank sample detections and RPD failures, Teck’s dataset is considered to be of high quality and meets the intent of the monitoring program.

For the QA/QC issues related to RPD failures and blank detects of the EVO SRF P2 monitoring program are captured in the Elk Valley Regional Water Quality Report under Elkview Operations – Permit 425 and 107517 QA/QC issues. This is due to the sampling program for the EVO SRF P2 locations being completed in conjunction with the sampling at the EVO specific monitoring locations. For further details on this evaluation refer to the Elk Valley Regional Water Quality Report.

For the QA/QC issues related to the EVO SRF P2 exclusive monitoring, for parameters only outlined in Appendix 4C4, Table 1, the following sections outline these RPD failures, blank detect results, and hold-time exceedances.

RPD Results

The precision of laboratory results was evaluated using field duplicate samples. RPD calculations as described above were performed on the 3 field duplicate samples collected during commissioning in 2020. Of the 86 parameters evaluated for RPD, 1 (1.16%) failed the RPD criteria, 5 (5.81%) received Pass -1, and 3 (3.49%) were Pass-2. Table 16 summarizes the 2020 RPD results.

Table 16. EVO SRF P2 RPD Results

Date	EMS ID	Location Code	Parameters	Reason
12/10/2020	E321814	EV_ECOUT	Total Suspended Solids, Lab	Pass-2
12/10/2020	E321814	EV_ECOUT	Turbidity, Lab	Pass-2
12/10/2020	E321814	EV_ECOUT	Aluminum, T	Pass-2
12/10/2020	E321814	EV_ECOUT	Copper, T	Pass-1
12/10/2020	E321814	EV_ECOUT	Lead, T	Pass-1
12/10/2020	E321814	EV_ECOUT	Carbon, Total Organic, T	Pass-1
12/10/2020	E321814	EV_ECOUT	Copper, D	Pass-1
12/10/2020	E321814	EV_ECOUT	Mercury, T	Pass-1
12/10/2020	E321814	EV_ECOUT	Zinc, D	Fail

Blank Detect Results

In 2020, 3 blank samples were collected to determine if contamination was occurring during bottle storage, sample collection, sample handling, and sample analysis. Of the 96 parameters analyzed in these samples, 4 had results above detection limits (4.17%). Table 17 summarizes blank detect results in 2020.

Table 17. EVO SRF P2 Blank Detects

Date	EMS ID	Location Code	Parameters	Reason
12/10/2020	E321814	EV_ECOUT	Copper -D	Blank Detect
12/10/2020	E321814	EV_ECOUT	Copper - T	Blank Detect
12/10/2020	E321814	EV_ECOUT	Tin - T	Blank Detect
12/10/2020	E321814	EV_ECOUT	Zinc - D	Blank Detect

Several of the parameters detected in blank samples occurred at all five Teck operations in the Elk Valley. These included barium, ammonia, and zinc. Because these occurred across the valley, it is likely there are potential contamination sources common to each site, specific to the mining industry, or related to the laboratory analysis. ALS Laboratories has indicated that analytical variability can affect the results of blank samples with very low detection limits; even the slightest variability (to 1/100th of a decimal place) can result in false detection.

Teck continues to evaluate blank detect results by location and by parameter to determine if detections are consistent across all five operations or specific to an area that might point to a deviation from standard procedures.

Equipment Calibration

Equipment calibrations are summarized in Table 18.

Table 18. EVO SRF P2 Equipment Calibration

Equipment	Model	Calibration Frequency	Last Calibrated
Field Meter #1	YSI Handheld Multiparameter Instrument #1 (EXO 1) (Temperature, pH, DO, EC, ORP, Turbidity)	Weekly calibration, daily verification	12/21/2020
Field Meter #2	YSI Handheld Multiparameter Instrument #2 (EXO 1) (Temperature, pH, DO, EC, ORP, Turbidity)	Weekly calibration, daily verification	12/21/2020
Field Meter #3	YSI Handheld Multiparameter Instrument #3 (EXO 1) (Temperature, pH, DO, EC, ORP, Turbidity)	Weekly calibration, daily verification	12/21/2020

Appendix A

This appendix contains the Annual Status Form for Appendix 4 of Permit 107517.



Annual Status Form

AUTHORIZATION NUMBER: 107517

AUTHORIZATION TYPE: Effluent, Permit

LEGAL AUTHORIZATION HOLDER NAME: Teck Coal Limited

AUTHORIZED PERSON NAME: Marty Hafke

AUTHORIZED PERSON SIGNATURE: _____

SIGNATURE DATE: March 31, 2021

I understand that it is an offense to mislead a government official, and I declare that all of the information presented is accurate and true. I have been given the authority by the authorization holder to sign this form.

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 9.1	The permittee must submit the results of the discharge and receiving environment water sampling program directly into the EMS database using the appropriate EMS site identification numbers within 30 days of the end of the quarter in which the samples were collected. Flow data is to be submitted annually.	No	More detail is reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Non-compliances
Section 4A1	The commissioning phase includes reasonable time for undertaking operational refinement or adjustment of works to optimize efficiency and/or effluent quality. In this regard, a maximum of 120 days is considered a reasonable time to commission the facility. The permittee must stipulate the start date of the commissioning period in the Commissioning Plan as per Section 4A2.	Yes	N/A
Section 4A1	During commissioning of a treatment facility, the authorized discharge limits for each specific facility included in the subsequent sections do not apply, but the discharge is required to be non-acutely toxic as per Section 6.2.	Yes	N/A
Section 4A2	A Commissioning Plan for each selenium and nitrate treatment facility must be prepared by a Qualified Professional, submitted to the director and implemented prior to commencement of the discharge from the treatment facility.	Yes	N/A
Section 4A2	The Commissioning Plan must include but is not necessarily limited to operational procedures required to commission and to start-up following a shut-down of the water treatment facility, including any additional monitoring and reporting required to demonstrate that no adverse environmental impacts result from commissioning.	Yes	N/A
Section 4A3	An Operations Plan for each selenium and nitrate treatment facility and the associated authorized works in Appendix 4 must be prepared by a Qualified Professional, submitted to the director and implemented prior to commencement of the discharge from the treatment facility.	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: The facility operator's manual, with provision for its continual improvement;	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: An overview of the planned maintenance program which includes an inventory of facility components and authorized replacement parts, and a detailed description of inspection, repair and replacement frequency for facility components;	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: Documentation to verify that the facility is operated at all times within specifications and in a manner to ensure compliance with this authorization and other applicable legislation;	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: Procedures for safely shutting down the treatment facility; and	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: Actions to be taken if effluent quality fails to meet the requirements of this permit;	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: Contingency planning which describes built-in redundancy of the facility and outlines measures to prevent emergency conditions from occurring; and	Yes	N/A
Section 4A3	Operations Plan must include but is not necessarily limited to: Key metrics to be used to demonstrate the performance of the treatment facility relative to the intended performance.	Yes	N/A
Section 4A3	The Operations Plan must be reviewed and updated following the first year of facility operations and as needed thereafter to assess its appropriateness for the authorized works, discharges and conditions.	Yes	N/A
Section 4A3	Results of the initial review must be provided to the director in the commissioning report prepared under Section 4A6 of this permit.	Yes	N/A
Section 4A3	Any significant update to the plan must be submitted to the director within 30 days of adoption.	Yes	N/A
Section 4A3	Minor updates must be summarized in the quarterly report for the time period when the minor update was made.	Yes	N/A

Authorized Person Initial: _____

Date: March 31, 2021

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 4A4	A Site-Specific Environmental Emergency Response Plan must be prepared for all selenium and nitrate treatment facilities	Yes	N/A
Section 4A4	The plan must be submitted to the director prior to commencement of the discharge from the selenium and nitrate treatment facilities	Yes	N/A
Section 4A4	The site specific Environmental Emergency Response Plan must include, but is not limited to:	Yes	N/A
Section 4A4	The site specific Environmental Emergency Response Plan must include, but is not limited to:	Yes	N/A
Section 4A4	The site specific Environmental Emergency Response Plan must include, but is not limited to:	Yes	N/A
Section 4A4	Any significant update to the Site Specific Environmental Emergency Response Plan must be submitted to the director within 30 days of adoption.	Yes	N/A
Section 4A4	Minor updates to the Site Specific Environmental Emergency Response Plan must be summarized in the quarterly report for the time period when the minor update was made.	Yes	N/A
Section 4A5	The permittee must sample the parameters at the sampling sites at the specific frequencies as defined in subsequent sections in Appendix 4.	No	More detail is reported in the Annual Water Treatment Report for 2020 under the Elkview Operations Saturated Rock Fill Phase 2, Section: Non-compliances
Section 4A6	Within 12 months of finalizing the commissioning phase of the selenium and nitrate treatment facility, the permittee must submit a commissioning report, prepared by a Qualified Professional to the director.	Yes	N/A
Section 4A7	The permittee must submit a quarterly treatment performance report to the director within 30 days of the end of the quarter in which the samples were collected.	Yes	N/A
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A7	The quarterly treatment performance report must include the following for each water treatment facility:	Yes	N/A - Reported in Quarterly Water Treatment Report for Q4 2020, and in the Quarterly Elk Valley Water Quality Reports prior to that.
Section 4A8	The permittee must submit an annual treatment performance report to the director by March 31 of each year following the data collection calendar year. The report may include all facilities, though discussion for each facility must be distinct. Alternatively, the permittee may submit a series of reports. Each deliverable should not exceed manageable file sizes.	Yes	N/A - Submitted in accompanying Annual Water Treatment Report for 2020

Authorized Person Initial: MSH

Date: March 31, 2021

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Facility Performance; and Elkview Operations Saturated Rockfill Phase 2, Section: Facility Performance
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Influent Sources and Flow Rates; and Elkview Operations Saturated Rockfill Phase 2, Section: Influent Sources and Flow Rates
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Selenium and Nitrate Load Removal; and Elkview Operations Saturated Rockfill Phase 2, Section: Selenium and Nitrate Load Removal
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Quantities of Reagents used and Residuals Generated; and Elkview Operations Saturated Rockfill Phase 2, Section: Quantities of Reagents used and Residuals Generated
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Continuous Improvement Initiatives; and Elkview Operations Saturated Rockfill Phase 2, Section: Continuous Improvement Initiatives
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Reportable Spills and Incidents; and Elkview Operations Saturated Rockfill Phase 2, Section: Non-compliance Reportable Spills and Incidents
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - This Annual Status Form. More detail is also reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Non-compliance and Elkview Operations Saturated Rockfill Phase 2, Section: Non-compliance
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - This Annual Status Form. More detail is also reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Map; and Elkview Operations Saturated Rockfill Phase 2, Section: Map
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; and Elkview Operations Saturated Rockfill Phase 2, Section: Operational and Receiving Environment Monitoring Data
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Site Performance Objectives; and Elkview Operations Saturated Rockfill Phase 2, Section: Site Performance Objectives
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Acute Toxicity; and Elkview Operations Saturated Rockfill Phase 2, Section: Acute Toxicity
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Acute Toxicity; and Elkview Operations Saturated Rockfill Phase 2, Section: Acute Toxicity. These lab reports are also included as an Appendix to the Annual Water Treatment Report for 2020
Section 4A8	The report must include the following for each water treatment facility:	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: QA/QC Summary; and Elkview Operations Saturated Rockfill Phase 2, Section: QA/QC Summary
Section 4B1	The WLC AWTF influent is comprised of contact water from waste rock pile and non-hazardous leachate from the WLC AWTF residual waste landfill	No	More detail is reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Non-compliance
Section 4B1.1	The maximum authorized rate of discharge of effluent at the West Line Creek Active Water Treatment Facility (WLC AWTF) is 8,300 cubic meters per day.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Influent Sources and Flow Rates
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data

Authorized Person Initial: WLF

Date: March 31, 2021

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4B1.2	The characteristics of the discharge at the treated effluent outlet of the WLC AWTF must not exceed the limits specified.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the West Line Creek Active Water Treatment Facility, Section: Operational and Receiving Environment Monitoring Data; Operational Data
Section 4C1.2	The treated effluent discharged to Erickson Creek must not be acutely toxic as per Section 6.2.	Yes	N/A - Reported in the Annual Water Treatment Report for 2020 under the Elkview Operations Saturated Rockfill Phase 2, Section: Acute Toxicity
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C1.2	The characteristics of the discharge at the Effluent Retention Pond Outlet (F2_BPO, E321812) must be equivalent to or better than:	Yes	N/A - Not required at this time due to commissioning period.
Section 4C3.1	The permittee must develop and implement an operational contingency plan (alarm strategy) to manage the parameters listed in Section 4C1.2 related to operation of the EVO SRF that pose a risk of impacts to receptors in the receiving environment.	Yes	N/A
Section 4C3.1	The permittee must develop and implement an operational contingency plan (alarm strategy) to manage the parameters listed in Section 4C1.2 related to operation of the EVO SRF that pose a risk of impacts to receptors in the receiving environment.	Yes	N/A
Section 4C3.1	The permittee must develop and implement an operational contingency plan (alarm strategy) to manage the parameters listed in Section 4C1.2 related to operation of the EVO SRF that pose a risk of impacts to receptors in the receiving environment.	Yes	N/A
Section 4C3.2	The permittee must develop and track key metrics demonstrating the performance of the EVO SRF, including but not limited to removal of nitrate and selenium load.	Yes	N/A
Section 4C3.3	The performance metrics to be tracked must be submitted to the director 30 days prior to the end of the commissioning period for the EVO SRF, and the permittee must notify the director at least 15 days prior to implementing any proposed changes to the metrics.	Yes	N/A
Section 4C3.3	The performance metrics must align with the EVWQP goals and environmental management objectives.	Yes	N/A
Section 4C3.3	The permittee must present the performance metrics results at routine regulator updates and in routine reports per Section 4A of Appendix 4.	Yes	N/A - Reported in Triweekly, Quarterly, and Annual Performance updates and reports
Section 4C3.3	The permittee must develop and implement a discharge management plan to manage discharge from the EVO SRF to Erickson Creek.	Yes	N/A

Authorized Person Initial: MAH

Date: March 31, 2021

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN	
Section 4C3.3	The plan must be submitted to the director 30 days prior to the end of the commissioning period for the EVO SRF, and the permittee must notify the director at least 15 days prior to implementing any proposed changes to the plan.	Yes	N/A	
Section 4C3.3	The plan must describe the actions and monitoring Teck will implement to minimize change in streamflow between upstream and downstream of the Erickson Creek intake/outfall structure and follow the Federal Department of Fisheries and Oceans Canada (DFO) guidance on allowable rates of change in streamflow to avoid adverse effects to fish habitat.	Yes	N/A	
Section 4C3.3	The permittee must report the monitoring results from the plan in the routine reports per Section 4A of Appendix 4.	Yes	N/A - Reported in Triweekly, Quarterly, and Annual Performance updates and reports	
Section 4C3.4	The permittee must develop and implement the following studies under the Adaptive Management Plan (AMP) to resolve uncertainties regarding the water balance in Erickson Creek and potential unidentified mine contact water discharge pathways.	Uncertainty: Erickson Creek water balance study. The study must resolve uncertainty related to the magnitude of total precipitation, evapotranspiration, surface flow and groundwater flow in the watershed. In completing the study, the permittee must demonstrate closure of the Erickson Creek water balance to the satisfaction of the director.	Yes	N/A
Section 4C3.4	The permittee must develop and implement the following studies under the Adaptive Management Plan (AMP) to resolve uncertainties regarding the water balance in Erickson Creek and potential unidentified mine contact water discharge pathways.	Uncertainty: Michel Creek contaminant load balance study. The study must resolve uncertainty related to the potential existence of an unaccounted mine contact water discharge pathway from EVO to Michel Creek. The study must utilize measured water quality data from mine contact surface water and groundwater sources. If the mass balance for contaminant loadings cannot be adequately closed to the satisfaction of the director, then Teck must develop and implement an additional study to locate and characterize the missing contaminant load pathway(s).	Yes	N/A
Section 4C3.4 107517	The study designs must incorporate feedback from the Elk Valley Groundwater Working Group and be submitted to the director for approval by March 31, 2021.	Yes	N/A	
Approval Letter 2018-09-07 A.4	The EVO SRF buffer pond must maintain a minimum of 0.5 metre freeboard while in use for the Project	Yes		
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Commissioning Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Operations Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Alarm Strategy Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Sample and Monitoring Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Effluent Quality Monitoring Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Maintenance Management Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Communication and Reporting Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.2	The Project Operational Documents listed below must be prepared by a qualified professional, submitted to the director and to the Ktunaxa Nation Council (KNC), and implemented prior to commencement of the Project	The EVO SRF Emergency Response Plan	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.3	The Permittee must implement the Water Management Plan as described in Section 6.1 of the Project application "Elkview Operations Saturated Rock Full Scale Trial Project (March 30, 2017)".	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517	

Authorized Person Initial: MSH

Date: March 31, 2021

CONDITION NUMBER	CONDITION DESCRIPTION	COMPLIANT? (Yes/No/ND)	ACTION TAKEN
107517 Approval Letter 2018-09-07 B.4 107517	Only reagents used as tracers and carbon sources as described in the application "Elkview Operations Saturated Rock Full Scale Trial Project (March 30, 2017)" may be added to the SRF. Notification must be provided to the director if there is any deviation from the If nutrient addition is required to improve system performance, notification, including an assessment of upper bound concentrations, associated risk, and proposed monitoring must be provided to the director at least 15 days prior to implementation	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 B.4 107517	Monitoring is to be conducted in accordance with the monitoring plan in Appendix A. Any deviation which results in reduced number of samples or parameters must be approved by the director prior to implementation.	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 C.1	Data collected to evaluate the performance of the Project must be provided to the director upon request. Collected data must include field parameters, conventional parameters, major ions, nutrients, dissolved metals, total metals, low level mercury, selenium and selenium speciation, on at least a monthly frequency at the break tank and the buffer pond outlet	Yes	N/A - Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 C.2	For the purposes of evaluating the Project, Teck must undertake toxicity monitoring at the buffer pond outlet at a minimum quarterly	Yes	N/A - toxicity monitoring at the buffer pond outlet at a minimum quarterly and results were submitted as per the EVO SRF Quarterly reports. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 C.3	Teck must develop and implement a Calcite Surveillance Monitoring Program specific to the Project before discharge commences. The Calcite Surveillance Monitoring Program must include a schedule for visual monitoring of calcite for representative components of the project. All observations must be recorded	Yes	N/A
107517 Approval Letter 2018-09-07 D.1a	A Quarterly Summary report must be submitted electronically to the director and the Ktunaxa Nation Council within 30 days after the end of the quarterly period in which samples were collected, that includes the following:	Yes	N/A - Flow rates for influent and effluent at the EVO SRF were submitted as per the EVO SRF Quarterly Reports. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.1b	A Quarterly Summary Report must be submitted electronically to the director and the Ktunaxa Nation Council within 30 days after the end of the quarterly period in which samples were collected, that includes the following:	Yes	N/A - Comparison between influent and effluent concentrations for: Total selenium and Selenium species; Nitrate and nitrite, Dissolved oxygen, DOC and COD, Bromide and Chloride (tracers), and aluminum, ammonia, antimony, arsenic, beryllium, cadmium, chromium, cobalt, molybdenum, nickel, sulphate, sulphide, total dissolved solids, uranium and zinc were submitted as per the EVO SRF Quarterly Reports. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.1	A Quarterly Summary Report must be submitted electronically to the director and the Ktunaxa Nation Council within 30 days after the end of the quarterly period in which samples were collected, that includes the following:	Yes	N/A - Summary of operational and/or performance highlights and trends were submitted as per the EVO SRF Quarterly Reports. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.1	A Quarterly Summary report must be submitted electronically to the director and the Ktunaxa Nation Council within 30 days after the end of the quarterly period in which samples were collected, that includes the following:	Yes	N/A - Toxicity monitoring results were submitted as per the EVO SRF Quarterly Reports. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.1 107517	Results from samples collected in the last month of the quarter that are not available of the quarterly report must be included in the following quarterly report.	Yes	N/A - Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.1	Any deviation from the information listed in this section must be communicated in the quarterly report and include rationale for the changes	Yes	N/A - No Deviation. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517
107517 Approval Letter 2018-09-07 D.2	A final report evaluating the performance of the field study must be submitted to the director and the Ktunaxa Nation Council within six (6) months of completing the Project. The report must include:	Yes	N/A - Condition met with submission of the 2019 EVO SRF Fst Performance Report. Authorization is now superceded with the March 11, 2021 amendment to 107517

Authorized Person Initial:

MAY

Date: March 31, 2021

Appendix B

This appendix contains the monitoring data for the WLC AWTF monitoring data required in Table 4B3 of Permit 107517 and the EVO SRF P2 monitoring data required in Table 4C4 of Permit 107517 for 2020.

Appendix C

This appendix contains acute toxicity test results conducted for the WLC AWTF and EVO SRF P2 in 2020 on Rainbow Trout (*Oncorhynchus mykiss*) and water flea (*Daphnia magna*).



Acute Toxicity Test Results

Sample collected January 6, 2020

Final Report

January 23, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
WL_BFWB_OUT_SP21_2020-01-06_N / 1920-0715	6-Jan-2020 at 0900h	7-Jan-2020 at 1030h	8-Jan-2020 at 1505h	7-Jan-2020 at 1420h	7-Jan-2020 at 1410h	7-Jan-2020 at 1435h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-01-06_N	2.3°C	841	189

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 2 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-06_N	100	100	97	100

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-06_N	0	7	3

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-01-06_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.1 (2.8-3.5) g/L KCl ¹	6.4 (6.2-6.6) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.7 (2.8-4.9) g/L KCl	6.0 (5.1-7.1) g/L NaCl
Reference toxicant CV	9.5%	5.6%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, December 29, 2019; ² Test Date January 6, 2020
 LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 2 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0715 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/01/08	1505 * AW		1	SK
1	2020/01/09	0800	KK	-	JM
2	2020/01/10	0830	SC	-	JM
3	2020/01/11	0815	ST	-	HE
4	2020/01/12	0805 MFAW	I		KL

Sample Information

Initial pH:	<u>7.4</u>
Initial EC (µS/cm):	<u>1630</u>
Initial DO (mg/L):	<u>11.3</u>
Initial Temp (°C):	<u>13</u>
Salinity (ppt):	<u>2</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>10.1</u>	<u>9.6</u>	<u>8.9</u>	

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.6</u>	<u>7.3</u>					
Day 4	<u>8.1</u>	<u>8.2</u>					

EC (uS/cm)

Day 0	<u>479</u>	<u>1581</u>					
Day 4	<u>476</u>	<u>1507</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.9</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20191114TR-A
1	<u>3.3</u>	<u>0.4</u>	Loading Density (g/L):	<u>0.2</u>
2	<u>3.0</u>	<u>0.3</u>	(must be ≤0.5 g/L)	
3	<u>3.3</u>	<u>0.4</u>	Mean Length (cm):	<u>3.2</u>
4	<u>3.3</u>	<u>0.4</u>	Length Range (cm):	<u>3.0 - 3.9</u>
5	<u>3.1</u>	<u>0.3</u>	Mean Weight (g):	<u>0.4</u>
6	<u>3.0</u>	<u>0.3</u>	(Must be ≥0.3g)	
7	<u>3.2</u>	<u>0.4</u>	Weight Range (g):	<u>0.3 - 0.5</u>
8	<u>3.0</u>	<u>0.3</u>		
9	<u>3.1</u>	<u>0.3</u>		
10	<u>3.1</u>	<u>0.3</u>		
			Source	Troutlodge
			Tank #	<u>8</u>
			Days Held at 15± 2°C	<u>26</u>
			(must be ≥14 days)	
			Percent stock mortality	<u>0.3</u>
			(7 days prior to test, must be ≤2%)	
			Test Volume (L)	<u>18</u>

Comments : 0 hr: No ppt
9hr: no ppt

Reviewed By: 10

Date Reviewed: 1/20/2013

Method DAS Client TEC164 Reference 1920-0715

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/07	1410	SC/ST	3	MF	Initial pH: <u>7.4</u>
1	2020/01/08	1040	AW	-	TM	Initial EC (µS/cm): <u>1632</u>
2	2020/01/09	1055	MW	3	AW	Initial DO (mg/L): <u>11.3</u>
						Initial Temp (°C): <u>13</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>
2	<u>8.3</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>457</u>	<u>459</u>	<u>460</u>	<u>1611</u>	<u>1620</u>	<u>1628</u>
2	<u>462</u>	<u>470</u>	<u>466</u>	<u>1580</u>	<u>1616</u>	<u>1610</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.8</u>	<u>7.8</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>9</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar C1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 8
 Average number of young produced (≥15 young) 24
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
 DO % of sample prior to aeration: 125% Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20 min Filtered with 110µm screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 841 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -

Dilution Water
 Pail label / preparation date 1:12/31
 Hardness of dilution water (mg/L) 203

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Comments/Observations:
0 nr: no ppt
48 hr: No ppt

Reviewed By: WJ Date Reviewed: 2020/01/13

Method DAS 10

Client TEC164

Reference 1920-0715

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/07	1420	SC/ST	3	ME	Initial pH: <u>7.4</u>
1	2020/01/08	1530	AW	-	ME	Initial EC (µS/cm): <u>1632</u>
2	2020/01/09	1115	MW	3	AW	Initial DO (mg/L): <u>11.3</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>7.6</u>	<u>7.7</u>	<u>7.7</u>
2	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>455</u>	<u>457</u>	<u>458</u>	<u>1592</u>	<u>1625</u>	<u>1638</u>
2	<u>470</u>	<u>473</u>	<u>470</u>	<u>1635</u>	<u>1645</u>	<u>1640</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>
2	<u>9.4</u>	<u>9.3</u>	<u>9.2</u>	<u>9.3</u>	<u>9.4</u>	<u>9.4</u>

	Temperature (°C) (range: 8-12 °C)					
0	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>
2	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>CH</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Average number of young produced (≥15 young) <u>24</u>	
Were test treatments randomized on test tray? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample	
DO % of sample prior to aeration: <u>124%</u>	Is aeration required (<40% or >100%)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>841</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>1:12/31</u>	DO Levels (40-100% saturation) - corrected for altitude - 4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C 4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C 3.9 to 9.8 mg/L at 10°C
Hardness of dilution water (mg/L) <u>203</u>	
Comments/Observations: <u>0 hrs. no ppt 4 hrs. no ppt</u>	

Reviewed By: W

Date Reviewed: 1820/01/13

Daphnia Antiscalant Bench Sheet

Method DAS AS Client TEC164 Reference 1920-0715

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/07	1435	STSC	3	MF	Initial pH: <u>7.4</u>
1	2020/01/08	1040	AW	-	MF	Initial EC (µS/cm): <u>1632</u>
2	2020/01/09	1100	MW	3	AW	Initial DO (mg/L): <u>11.3</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>
2	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>460</u>	<u>460</u>	<u>461</u>	<u>1607</u>	<u>1610</u>	<u>1620</u>
2	<u>458</u>	<u>464</u>	<u>466</u>	<u>1600</u>	<u>1604</u>	<u>1587</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>7.9</u>	<u>8.0</u>	<u>8.0</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.9</u>	<u>7.8</u>	<u>7.8</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>

	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture Young jar <u>C1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month) Days to first brood (≤12 days) <u>8</u> Average number of young produced (≥15 young) <u>24</u> Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	Control Validity Criteria Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Sample DO % of sample prior to aeration: <u>125%</u> Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u> Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No Hardness (mg CaCO ₃ /L) of 100%: <u>841</u> Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water Pail label / preparation date <u>1:12/3</u> Hardness of dilution water (mg/L) <u>203</u>	Antiscalant Final Concentration in Sample: <u>2mg/L</u> Volume of sample: <u>500mL</u> Volume of antiscalant: <u>15.8µL</u>
Comments/Observations: <u>ch: No ppt</u> <u>48hrs No ppt</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C

Reviewed By: 10 Date Reviewed: 2020/01/13

APPENDIX C – Chain-of-custody form

Teck

PROJECT/CLIENT INFO			TURNAROUND TIME: REGULAR		RUSH: OTHER INFO		
COC ID: 2020-01-06 Toxicity SP21	LABORATORY	Report Format / Distribution	Excel	PDF	EDD		
Facility Name WLC AWTF	Lab Name Nautilus Environmental	Email 1: DL-WLC-Lab@teck.com					
Project Manager Thomas Davidson	Lab Contact Jacklyn Pool	Email 2: Thomas.Davidson@teck.com					
Email thomas.davidson@teck.com		Email 3: TeckCoul@equionline.com					
Address 15 Km North HWY 43		Email 4: Tricia.Hill@teck.com					
City Sparwood	Province BC	Email 5: Stukone.Yin@teck.com					
Postal Code V0B 2G0	Country Canada	Email 6: Marty.HaRke@teck.com					
		Email 7:					
		Email 8:					
Phone Number (250) 603 - 9417	Phone Number +1.403.253.7121	PO number VPO00676571					
SAMPLE DETAILS							
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G-Grab C=Comp	# Of Cont.
WL_BFWB_OUT_SP21_2020-01-06_N	WL_BFWB_OUT_SP21	WS		1/6/2020	0900	G	8
201 1920-0715							
2020 701103							
10:30							
Magnitrolin							
5x 20L carboys, 5x 1L bottles							
Nos/Nos							
Good condition							
2.8°C							
ANALYSIS							
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS							
RELINQUISHED BY/AFFILIATION Date Time Accepted By/Affiliation Date Time							
Study from Rudy Brown							
SERVICE REQUEST (rush - subject to availability)							
Regular (default) X							
Priority (2-3 business days) - 50% surcharge							
Emergency (1 Business Day) - 100% surcharge							
For Emergency <1 Day, ASAP or Weekend - Contact A.L.S							
Sampler's Name Rudy Brown				Mobile #		Date/Time 6-Jan-20	
Sampler's Signature							

END OF REPORT



Acute Toxicity Test Results

Sample collected January 13, 2019

Final Report

January 28, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
WL_BFWB_OUT_SP21_2020-01-13_N / 1920-0750	13-Jan-20 at 0900h	14-Jan-20 at 0940h	14-Jan-20 at 1530h	14-Jan-20 at 1435h	14-Jan-20 at 1400h	14-Jan-20 at 1450h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-01-13_N	0.5°C	902	229

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 2 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-13_N	100	100	100	100

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-13_N	0	0	0

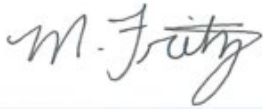
Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-01-13_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.0 (2.7-3.4) g/L KCl ¹	6.4 (6.2-6.6) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.6-5.0) g/L KCl	6.0 (5.1-7.1) g/L NaCl
Reference toxicant CV	10.8%	5.6%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, January 16, 2020; ² Test Date January 6, 2020
 LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 2 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0750 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/01/14	1530 *	SCIAW	1	MF
1	2020/01/15	0810	ST	-	TM
2	2020/01/16	0810	AW	-	TM
3	2020/01/17	0845	LC	-	TM
4	2020/01/18	0910	MW/AW	1	-

Sample Information

Initial pH: 7.5
Initial EC (µS/cm): 1644
Initial DO (mg/L): 11.7
Initial Temp (°C): 13
Salinity (ppt): 2

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>10.1</u>	<u>9.4</u>	<u>8.9</u>	

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.7</u>	<u>7.6</u>					
Day 4	<u>7.9</u>	<u>8.1</u>					

EC (uS/cm)

Day 0	<u>457</u>	<u>1603</u>					
Day 4	<u>462</u>	<u>1596</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.9</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day	10	10					
Day 0							
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.4</u>	<u>0.5</u>	<u>20191114TR-B</u>	
2	<u>3.3</u>	<u>0.4</u>	Source	<u>Troutlodge</u>
3	<u>3.3</u>	<u>0.4</u>	Tank #	<u>2</u>
4	<u>3.7</u>	<u>0.6</u>	Days Held at 15± 2°C	<u>26</u>
5	<u>3.4</u>	<u>0.4</u>	(must be ≥14 days)	
6	<u>3.0</u>	<u>0.3</u>	Percent stock mortality	<u>1.07</u>
7	<u>3.4</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.4</u>	<u>0.5</u>	Test Volume (L)	<u>18L</u>
9	<u>3.5</u>	<u>0.5</u>		
10	<u>3.0</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.3</u>				
Length Range (cm): <u>3.0-3.7</u>				
Mean Weight (g): <u>0.5</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.6</u>				
Comments: <u>0 nr: no ppt</u> <u>96hrs% No ppt</u>				

Reviewed By: W

Date Reviewed: 2020/01/21

Method DAS

Client TEC164

Reference 1920-0750

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/14	1400	FW/MF	3	SC	Initial pH: <u>7.5</u>
1	2020/01/15	0830	MF	-	TM	Initial EC (µS/cm): <u>1044</u>
2	2020/01/16	1120	MF/SC	3	KL	Initial DO (mg/L): <u>11.7</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>
2	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>458</u>	<u>459</u>	<u>468</u>	<u>1615</u>	<u>1637</u>	<u>1645</u>
2	<u>469</u>	<u>470</u>	<u>471</u>	<u>1608</u>	<u>1629</u>	<u>1626</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.7</u>	<u>8.7</u>	<u>8.7</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Average number of young produced (≥15 young) <u>25</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / No	Control Validity Criteria
		Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Sample	DO % of sample prior to aeration: <u>115%</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>902</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) _____	
Dilution Water	Pail label / preparation date <u>2:01/08</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>252</u>	
Comments/Observations:		
<u>0 hr: No ppt</u> <u>48 hr: no ppt</u>		

Reviewed By: lo

Date Reviewed: 2020/01/21

Method DAS 10

Client TEC164

Reference 1920-0750

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/14	1435	MF/AW	3	SC	Initial pH: <u>7.5</u>
1	2020/01/15	0330	MF	-	TM	Initial EC (µS/cm): <u>1644</u>
2	2020/01/16	1300	CB	2	-	Initial DO (mg/L): <u>11.7</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day pH (units) (range: 6.0-8.5)

0	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (µS/cm)

0	<u>404</u>	<u>408</u>	<u>470</u>	<u>1643</u>	<u>1660</u>	<u>1657</u>
2	<u>468</u>	<u>472</u>	<u>418</u>	<u>1589</u>	<u>1633</u>	<u>1638</u>

DO (mg/L) (40-100% saturation at test temp.)

0	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>
2	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>

Temperature (°C) (range: 8-12 °C)

0	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>
2	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>

Number Alive
(I, immobile)

0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	
Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>25</u>	Mean % mortality at 48 hours - <u>0%</u>
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	(must be ≤10%)
Sample	
DO % of sample prior to aeration: <u>100</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>-</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>902</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>2:01/08</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>232 MF</u> <u>252</u>	
Comments/Observations: <u>0hr: no ppt</u> <u>48h: no ppt</u>	

Reviewed By: W

Date Reviewed: 2020/01/21

Daphnia Antiscalant Bench Sheet

Method DAS AS

Client TEC164

Reference 1920-0750

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/14	1450	MF/PW	3	SC	Initial pH: <u>7.5</u>
1	2020/01/15	0830	MF	-	TM	Initial EC (µS/cm): <u>11044</u>
2	2020/01/16	1050	MF	3	YK	Initial DO (mg/L): <u>11.7</u>
						Initial Temp (°C): <u>13</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>4605</u>	<u>8.4</u>	<u>4608</u>	<u>16005</u>	<u>16030</u>	<u>16033</u>
2	<u>467</u>	<u>470</u>	<u>473</u>	<u>16009</u>	<u>16016</u>	<u>16017</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	
Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>25</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>115</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>902</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>2:01/08</u>	Antiscalant
Hardness of dilution water (mg/L) <u>252 MF</u>	Final Concentration in Sample: <u>2 mg/L</u>
<u>252</u>	Volume of sample: <u>500ml</u> Volume of antiscalant: <u>15.8µl</u>
Comments/Observations: <u>0hr: no ppt</u>	
<u>48hr: no ppt</u>	
DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C	

Reviewed By: W

Date Reviewed: 2020/01/21

APPENDIX C – Chain-of-custody form

COC ID: 2020-01-13 Toxicity_SP21

TURNAROUND TIME: REGULAR

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution				
Project Manager	Thomas Davidson			Lab Contact	Jacklyn Pool			Email 1:	DL-WLC-Lab@teck.com	Excel	PDF	EDD
Email	thomas.davidson@teck.com			Email	Jacklyn@NautilusEnvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Sudong_Yin@teck.com	X	X	X
								Email 6:	Marty.Hafke@teck.com	X	X	X
								Email 7:				
								Email 8:				
Phone Number	(250) 603 - 9417			Phone Number	+1.403.253.7121			PO number	VPO00676571			

SAMPLE DETAILS								ANALYSIS REQUESTED													
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont	Please indicate below Filtered, Preserved or both (F, P, F/P)													
								NAUT_96hr_RT_Single_Concentration_Toxicity Test	NAUT_48hr_DM_Single_Concentration_Toxicity Test @ 10C	NAUT_48hr_DM_Single_Concentration_Toxicity Test @ 20C	NAUT_48hr_DM_Single_Concentration_Toxicity Test @ 20C + Antiscalant	EXTRA									
WL_BFWB_OUT_SP21_2020-01-13_N	WL_BFWB_OUT_SP21	WS		1/13/2020	0900	G	8	X	X	X	X	X									
<p>1920-0750 2020/01/14 09:40 Manitowlin 3c 3x 20L carboys, 5x 1L bottles NoS/NoZ Good condition 0.5°C</p>																					

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
	Julia Johnson	13 Jan				

SERVICE REQUEST (rush - subject to availability)			
Regular (default)	X	Sampler's Name	Mark Gaizauskas
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	
Emergency (1 Business Day) - 100% surcharge		Mobile #	
For Emergency <1 Day, ASAP or Weekend - Contact ALS		Date/Time	13-Jan-20

END OF REPORT



Acute Toxicity Test Results

Sample collected January 20, 2020

Final Report

February 7, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
WL_BFWB_OUT_SP21_2020-01-20_N / 1920-0772	20-Jan-20 at 0900h	21-Jan-20 at 1000h	21-Jan-20 at 1530h	21-Jan-20 at 1425h	21-Jan-20 at 1405h	21-Jan-20 at 1425h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-01-20_N	6.7°C	910	212

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 2 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-20_N	100	100	100	100

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-20_N	0	0	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-01-20_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.0 (2.7-3.4) g/L KCl ¹	6.3 (5.8-6.7) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.6-5.0) g/L KCl	6.1 (5.1-7.1) g/L NaCl
Reference toxicant CV	10.8%	5.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, January 16, 2020; ² Test Date January 20, 2020
 LC = Lethal Concentration; CL = Confidence Limit

Michael Wrubleski

Report By:
Michael Wrubleski, BSc
Biologist

Tamara McClure

Reviewed By:
Tamara McClure, BSc
Quality Assurance Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 2 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0772 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/01/21	15:30	* AW MW	1	ME
1	2020/01/22	08:40	ST	-	TM
2	2020/01/23	08:00	ST	-	TM
3	2020/01/24	08:40	MW	-	ST
4	2020/01/25	09:15	MW	1	ST

Sample Information

Initial pH:	7.0
Initial EC (µS/cm):	1610
Initial DO (mg/L):	10.8
Initial Temp (°C):	13
Salinity (ppt):	2

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 10.4 10.0 9.5 8.9

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
-------	-----	-----	--	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	7.9	7.6				
Day 4	8.0	8.1				

EC (uS/cm)

Day 0	468	1545				
Day 4	474	1547				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.9	8.9				
Day 4	8.8	8.8				

Temperature (°C) (range: 14-16°C)

Day 0	14	14				
Day 4	14	14				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	10	10				
Day 2	10	10				
Day 3	10	10				
Day 4	10	10				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	3.6	0.6	20191114TR-B	
2	3.7	0.6	Source	Troutlodge
3	3.6	0.7	Tank #	6
4	3.7	0.7	Mean Length (cm):	3.7
5	3.8	0.8	Length Range (cm):	3.6-3.9
6	3.6	0.6	Mean Weight (g):	0.7
7	3.8	0.7	Weight Range (g):	0.6-0.8
8	3.7	0.7	Days Held at 15± 2°C	36
9	3.9	0.8	(must be ≥14 days)	
10	3.7	0.7	Percent stock mortality	1.57
			(7 days prior to test, must be ≤2%)	
			Test Volume (L)	18

Comments :

0 hrs No PPT
 96 hrs No PPT

Reviewed By: LD

Date Reviewed: 2020/01/29

Method DAS20

Client TEC164

Reference 1920-0772

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/01/21	1405	MF/KK	3	MW
1	2020/01/22	0920	KK	-	TM
2	2020/01/23	1030	MW	3	KK

Sample Information

Initial pH:	7.2
Initial EC (µS/cm):	1510
Initial DO (mg/L):	10.8
Initial Temp (°C):	13
Salinity (ppt):	2

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C
----------	-------	-------	-------	-------	-------	-------

pH (units) (range: 6.0-8.5)

day						
0	8.0	8.0	8.0	7.7	7.8	7.8
2	8.2	8.2	8.2	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (uS/cm)

0	430	443	441	1586	1580	1586
2	441	445	444	1571	1584	1590

DO (mg/L) (40-100% saturation at test temp.)

0	8.1	8.1	8.1	8.2	8.2	8.2
2	8.0	8.0	8.0	8.0	8.0	8.0

Temperature (°C) (range: 18-22 °C)

0	19	19	19	18	18	18
2	18	18	18	18	18	18

Number Alive (I, immobile)

0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar C1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 9
 Average number of young produced (≥15 young) 25
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - 0%
 (must be ≤10%)

Sample
 DO % of sample prior to aeration: 110 Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 910 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -

Dilution Water
 Pail label / preparation date 1-01/14
 Hardness of dilution water (mg/L) 208

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Comments/Observations: 0hr: no ppt
48hrs: No ppt

Reviewed By: W

Date Reviewed: 2020/01/23

Method DAS 10

Client TEC164

Reference 1920-0772

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information	
0	2020/01/21	1425	MF/KK	3	MW	Initial pH:	7.2
1	2020/01/22	0940	KK	-	TM	Initial EC (µS/cm):	1610
2	2020/01/23	1046	MW	3	KL	Initial DO (mg/L):	10.8
						Initial Temp (°C):	13
						Salinity (ppt):	2

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	8.1	8.1	8.1	7.8	7.7	7.7
2	8.1	8.1	8.1	8.1	8.1	8.2

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	430	443	442	1611	1610	1602
2	449	450	450	1596	1619	1605

	DO (mg/L) (40-100% saturation at test temp.)					
0	9.4	9.4	9.4	9.6	9.6	9.6
2	9.2	9.4	9.4	9.5	9.6	9.6

	Temperature (°C) (range: 8-12 °C)					
0	12	12	12	11	11	11
2	10	10	10	10	10	10

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>71.</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Average number of young produced (≥15 young) <u>35</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	Control Validity Criteria Mean % mortality at 48 hours - (must be ≤10%) <u>0.1</u>
Sample	DO % of sample prior to aeration: <u>113</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>910</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	Pail label / preparation date <u>1/01/14</u>	DO Levels (40-100% saturation) - corrected for altitude - 4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C 4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C 3.9 to 9.8 mg/L at 10°C
	Hardness of dilution water (mg/L) <u>208</u>	
Comments/Observations:	<u>0hr: no ppt</u> <u>48hrs: No ppt</u>	

Reviewed By: W

Date Reviewed: 2020/01/24

Daphnia Antiscalant Bench Sheet

Method DAS AS

Client TEC164

Reference 1920-0772

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/01/21	1425	ME/KK	3	MM	Initial pH: <u>7.2</u>
1	2020/01/22	0915	KL	-	TK	Initial EC (µS/cm): <u>1600</u>
2	2020/01/23	1015	MM	3	KL	Initial DO (mg/L): <u>10.8</u>
						Initial Temp (°C): <u>13</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>
2	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>431</u>	<u>440</u>	<u>441</u>	<u>1588</u>	<u>1584</u>	<u>1593</u>
2	<u>446</u>	<u>446</u>	<u>448</u>	<u>1576</u>	<u>1589</u>	<u>1575</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.9</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.1</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>122</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>71.</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>01.</u>
Average number of young produced (≥15 young) <u>35</u>	
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>110</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>910</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	Antiscalant
Pail label / preparation date <u>1.01/14</u>	Final Concentration in Sample: <u>2 mg/L</u>
Hardness of dilution water (mg/L) <u>208</u>	Volume of sample: <u>500mL</u> Volume of antiscalant: <u>15.8µL</u>
Comments/Observations: <u>chr: no ppt</u> <u>48hrs & no ppt</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C

Reviewed By: W

Date Reviewed: 7/20/2020

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-01-20_Toxicity_SP21

TURNAROUND TIME: REGULAR

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO																	
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD														
Project Manager	Thomas Davidson			Lab Contact	Jacklyn Pool			Email 1:	DL-WLC-Lab@teck.com	X	X	X													
Email	thomas.davidson@teck.com			Email	Jacklyn@NautilusEnvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X													
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X													
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X													
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Sudong_Yin@teck.com	X	X	X													
								Email 6:	Marty.Hafke@teck.com	X	X	X													
								Email 7:																	
								Email 8:																	
Phone Number	(250) 603 - 9417			Phone Number	+1.403.253.7121			PO number	VPO00676571																
SAMPLE DETAILS								ANALYSIS REQUESTED																	
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)																	
WL_BFWB_OUT_SP21_2020-01-20_N	WL_BFWB_OUT_SP21	WS		1/20/2020	0900	G	8	NAUT_96Hr_RT_Single_Concentrati on_Toxicity Test	NAUT_48Hr_DM_Single_Concentrati on_Toxicity Test @ 10C	NAUT_48Hr_DM_Single_Concentrati on_Toxicity Test @ 20C	NAUT_48Hr_DM_Single_Concentrati on_Toxicity Test @ 20C + Antiscalant	EXTRA													
<p><i>1920-0272</i> <i>2020/01/21</i> <i>202 10:00</i> <i>Manitowlin</i> <i>SC</i> <i>3x20L carboys, 5x1L bottles</i> <i>No's/No's</i> <i>Good condition</i> <i>6.2°C</i></p>								X	X	X	X	X													
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS				RELINQUISHED BY/AFFILIATION				Date	Time	Accepted By/Affiliation	Date	Time													
				<i>BETH MASON</i>				<i>1/20/20</i>																	
SERVICE REQUEST (rush - subject to availability)																									
Regular (default) X				Sampler's Name	Les Tipton				Mobile #																
Priority (2-3 business days) - 50% surcharge				Sampler's Signature					Date/Time	20-Jan-20															
Emergency (1 Business Day) - 100% surcharge																									
For Emergency <1 Day, ASAP or Weekend - Contact ALS																									

END OF REPORT



Acute Toxicity Test Results

Sample collected January 27, 2020

Final Report

February 14, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
WL_BFWB_OUT_SP21_2020-01-27_N / 1920-0809	27-Jan-20 at 0900h	28-Jan-20 at 1000h	29-Jan-20 at 1445h	28-Jan-20 at 1405h	28-Jan-20 at 1355h	28-Jan-20 at 1400h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-01-27_N	8.3°C	860	213

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 2 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-27_N	100	100	100	100

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_BFWB_OUT_SP21_2020-01-27_N	0	0	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-01-27_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.0 (3.5-4.4) g/L KCl ¹	6.3 (5.8-6.7) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.5-4.9) g/L KCl	6.1 (5.1-7.1) g/L NaCl
Reference toxicant CV	11.0%	5.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, January 28, 2020; ² Test Date January 20, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 2 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0809 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/01/29	1445 *	MF	1	ST
1	2020/01/30	0900	SC	-	TM
2	2020/01/31	0750	SC	-	TM
3	2020/02/01	0845	MW	-	LF
4	2020/02/02	0905	LF	1	CB

Sample Information

Initial pH: 7.3
Initial EC (µS/cm): 1570
Initial DO (mg/L): 12.1
Initial Temp (°C): 14
Salinity (ppt): 3

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes

Preaeration time

DO(mg/L) of 100%

0.5 hours 9.8 1 hour 8.9 1.5 hours 2 hours

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc. CTL 100

pH (units) (range: 5.5-8.5)

Day 0 7.8 7.9
Day 4 8.2 8.4

EC (uS/cm)

Day 0 472 1558
Day 4 483 1583

DO (mg/L) (70-100% saturation at test temp.)

Day 0 8.9 8.9
Day 4 8.6 8.8

Temperature (°C) (range: 14-16°C)

Day 0 14 14
Day 4 15 15

Number Alive (In brackets number stressed)

Day 0 10 10
Day 1 10 10
Day 2 10 10
Day 3 10 10
Day 4 10 10

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)		
1	<u>3.7</u>	<u>0.6</u>	Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L) Mean Length (cm): <u>3.6</u> Length Range (cm): <u>3.2-3.7</u> Mean Weight (g): <u>0.5</u> (Must be ≥0.3g) Weight Range (g): <u>0.4-0.6</u>	Batch: <u>20200114TR</u>
2	<u>3.7</u>	<u>0.5</u>		Source: <u>Smoky Trout Farms</u>
3	<u>3.6</u>	<u>0.5</u>		Tank #: <u>3</u>
4	<u>3.7</u>	<u>0.4</u>		Days Held at 15± 2°C: <u>15</u> (must be ≥14 days)
5	<u>3.5</u>	<u>0.5</u>		Percent stock mortality: <u>0.25</u> (7 days prior to test, must be ≤2%)
6	<u>3.3</u>	<u>0.5</u>		Test Volume (L): <u>18</u>
7	<u>3.5</u>	<u>0.6</u>		
8	<u>3.7</u>	<u>0.6</u>		
9	<u>3.7</u>	<u>0.6</u>		
10	<u>3.6</u>	<u>0.5</u>		

Comments: 0 hr: no ppt
16h: no ppt

Reviewed By: TM

Date Reviewed: 2020/02/03

Method DAS

Client TEC164

Reference 1920-0809

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/01/28	1355	ST/MF	3	KL	7.3	1576	12.1	14	
1	2020/01/29	0945	SC	-	TM					
2	2020/01/30	1000	AW	2	MF					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	8.1	8.1	8.2
2	8.2	8.2	8.1	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	421	413	411	1595	1603	1605
2	409	407	403	1546	1567	1599

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.2	8.2	8.2	8.2	8.2	8.2
2	8.1	8.1	8.1	8.1	8.1	8.1

	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	18	18	18
2	19	19	19	19	19	19

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture		
Young jar <u>C1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>	
QA (previous month)		
Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria	
Average number of young produced (≥15 young) <u>38</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>	
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No		
Sample		
DO % of sample prior to aeration: <u>145</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No	
Hardness (mg CaCO ₃ /L) of 100%: <u>860</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) _____		
Dilution Water		
Pail label / preparation date <u>1.01/18</u>	DO Levels (40-100% saturation) - corrected for altitude -	
Hardness of dilution water (mg/L) <u>208</u>		
		3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C	
Comments/Observations:		
<u>0hr: no ppt</u>		
<u>14hr: No ppt</u>		

Reviewed By: TM

Date Reviewed: 2020/02/03

Method DAS 10

Client TEC164

Reference 1920-0809

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/01/28	1405	ST/MF	3	JK	7.3	1576	12.1	14	
1	2020/01/29	0945	SC	-	JM					
2	2020/01/30	1030	AW	2	MF					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.1	8.2	8.2	7.8	7.8	7.8
2	8.1	8.1	8.1	8.3	8.3	8.2

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	400	410	410	1601	1619	1617
2	396	400	402	1560	1589	1594

	DO (mg/L) (40-100% saturation at test temp.)					
0	9.4	9.4	9.4	9.4	9.4	9.4
2	9.4	9.4	9.4	9.4	9.4	9.4

	Temperature (°C) (range: 8-12 °C)					
0	12 MF	12 MF	12 MF	12	12	12
2	12	12	12	12	12	12

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar D1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 9
 Average number of young produced (≥15 young) 36
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - 0%
 (must be ≤10%)

Sample
 DO % of sample prior to aeration: 125 Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110um screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 860 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -

Dilution Water
 Pail label / preparation date 1-01/14
 Hardness of dilution water (mg/L) 208

DO Levels (40-100% saturation) - corrected for altitude -
 4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C
 4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C
 3.9 to 9.8 mg/L at 10°C

Comments/Observations:
0hr: no ppt
40hr: No ppt

Reviewed By: JM

Date Reviewed: 2020/02/03

Daphnia Antiscalant Bench Sheet

Method DAS

Client TEC164

Reference 1920-0809

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/01/28	1400	ST/MF	3	PK	7.3	1576	12.1	14	3
1	2020/01/29	0945	SC	-	TM					
2	2020/01/30	1000	AW	2	MF					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.1	8.1	8.1	8.2	8.2	8.2
2	8.0	8.1	8.1	8.3	8.3	8.2

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	400	409	410	1580	1516	1600
2	397	399	399	1567	1584	1591

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.2	8.2	8.2	8.2	8.2	8.2
2	8.1	8.1	8.1	8.1	8.1	8.1

	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	18	18	18
2	19	19	19	19	19	19

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar C1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 8
 Average number of young produced (≥15 young) 38
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
 DO % of sample prior to aeration: 145 Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 860 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -

Dilution Water
 Pail label / preparation date 1.01/14
 Hardness of dilution water (mg/L) 208

Antiscalant
 Final Concentration in Sample: 2mg/L
 Volume of sample: 500mL Volume of antiscalant: 15.8µL

Comments/Observations: 0hr: no ppt
48hr: no ppt

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Reviewed By: TM

Date Reviewed: 2020/02/10/3

APPENDIX C – Chain-of-custody form



COC ID: 2020-01-27 Toxicity SP21 TURNAROUND TIME: Regular (default) RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD	
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571			

SAMPLE DETAILS							ANALYSIS REQUESTED							
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)						
								NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C					
WL_BFWB_OUT_SP21_2020-01-27_N AE	WL_BFWB_OUT_SP21	WS		1/27/2020	9:00	G	6	X	X					
<p>1920-0813 10:00 0809 Jazoo AE 3x 20L carboys 5x 1L bottles good cond. 8.3°C no s/nol 2020101128</p>														

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
	Julia Johnson	1/27/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Julia Johnson		Mobile #	Date/Time
Priority (2-3 business days) - 50% surcharge						
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus		Sampler's Signature				27-Jan-20

END OF REPORT



Acute Toxicity Test Results

Sample collected February 10, 2020

Final Report

March 2, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP 21_2020-02-10_N / 1920-0853	10-Feb-20 at 0900h	11-Feb-20 at 1000h	11-Feb-20 at 1540h	11-Feb-20 at 1420h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020- 02-10_N	4.6°C	915	239

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-02-10_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-02-10_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-02-10_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.0 (3.5-4.4) g/L KCl ¹	6.3 (6.0-6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.5-4.9) g/L KCl	6.1 (5.2-7.1) g/L NaCl
Reference toxicant CV	11.0%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, January 28, 2020; ² Test Date February 17, 2020
 LC = Lethal Concentration; CL = Confidence Limit

Shae Cole

Report By:
Shae Cole, BSc
Biologist

Jacklyn Poole

Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0853 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/02/11	1540	* AW / SC	1	NAF	Initial pH: <u>7.6</u>
1	2020/02/12	0900	SC	-	NAF	Initial EC (µS/cm): <u>1712</u>
2	2020/02/13	0900	SC	-	NAF	Initial DO (mg/L): <u>10.6</u>
3	2020/02/14	0815	AW	-	ST	Initial Temp (°C): <u>15</u>
4	2020/02/15	0900	NAF	1	TM KIL	Salinity (ppt): <u>4</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 10.6 10.2 9.5 8.9

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>8.0</u>	<u>7.8</u>				
Day 4	<u>8.3</u>	<u>8.4</u>				

EC (µS/cm)

Day 0	<u>448</u>	<u>1655</u>				
Day 4	<u>478</u>	<u>1679</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>8.9</u>				
Day 4	<u>8.8</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	<u>10</u>	<u>10</u>				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.9</u>	<u>0.8</u>	<u>20200114TR</u>	
2	<u>3.5</u>	<u>0.5</u>	Source	<u>Smoky Trout Farm</u>
3	<u>3.8</u>	<u>0.7</u>	Tank #	<u>3</u>
4	<u>3.8</u>	<u>0.7</u>	Days Held at 15± 2°C	<u>28</u>
5	<u>3.7</u>	<u>0.6</u>	(must be ≥14 days)	
6	<u>3.7</u>	<u>0.6</u>	Percent stock mortality	<u>1.7</u>
7	<u>3.9</u>	<u>0.7</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.9</u>	<u>0.7</u>	Test Volume (L)	<u>18</u>
9	<u>3.3</u>	<u>0.4</u>		
10	<u>3.6</u>	<u>0.5</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.7</u>				
Length Range (cm): <u>3.3-3.9</u>				
Mean Weight (g): <u>0.6</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.5-0.8</u>				
Comments: <u>0 hr: NO ppt</u> <u>96 hr: NO ppt</u>				

Reviewed By: MLG

Date Reviewed: 2020/02/18

Method DAS 20

Client TEC 164

Reference 1920-0853

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/02/11	1420	CO/KK	3	SC	Initial pH: <u>7.6</u>
1	2020/02/12	1115	SF	-	MF	Initial EC (µS/cm): <u>1712</u>
2	2020/02/13	1030	MF	3	KL	Initial DO (mg/L): <u>10.6</u>
						Initial Temp (°C): <u>16.18 16</u>
						Salinity (ppt): <u>4</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>
2	<u>8.3</u>	<u>8.2</u>	<u>8.2</u>	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>393</u>	<u>394</u>	<u>390</u>	<u>1658</u>	<u>1752</u>	<u>1690</u>
2	<u>397</u>	<u>403</u>	<u>401</u>	<u>1690</u>	<u>1786</u>	<u>1762</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10(1I)</u>	<u>10(1I)</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - <u>0%</u>
Average number of young produced (≥15 young) <u>27</u>	(must be ≤10%)
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>122</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20mins</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>915</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>Drum 1: 01129</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>126</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations:	
0 hr: <u>NO ppt.</u>	
48 hr: <u>NO ppt.</u>	

Reviewed By: MB

Date Reviewed: 2020/02/18

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-02-10 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	Teck.Coal@equisonline.com			X
								Email 4:	Tricia.Hill@teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Marty.Hafke@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 6:				
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571			

SAMPLE DETAILS								ANALYSIS REQUESTED															
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)															
								ANALYSIS	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C													
2020/02/11 10:00 Monitoculin JC 3x 20L carboys, 5x 1L bottles N6S/N6B Good condition 4.6°C																							
WL_BFWB_OUT_SP21_2020-02-10_N	WL_BFWB_OUT_SP21	WS		2/10/2020	9:00	G	6		X	X													
1920-0855																							

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Vanessa Turner	2/10/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Mark Gaizauskas	Mobile #		
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	10-Feb-20	
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Sample collected February 24, 2020

Final Report

March 5, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-02-24_N / 1920-0900	24-Feb-20 at 0900h	25-Feb-20 at 1100h	25-Feb-20 at 1550h	25-Feb-20 at 1435h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-02-24_N	4.6°C	818	208

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-02-24_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-02-24_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-02-24_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.2 (3.8-4.7) g/L KCl ¹	6.3 (6.0-6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.5-5.1) g/L KCl	6.1 (5.2-7.1) g/L NaCl
Reference toxicant CV	11.5%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, February 19, 2020; ² Test Date February 17, 2020
 LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Tamara Pomeroy, BSc
Quality Assurance Manager

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TBS Client TEC104 Reference 1920-0900 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/02/25	1550 *	VK/CP	1	MW	Initial pH: <u>7.5</u>
1	2020/02/26	0800	SC	-	TP	Initial EC (µS/cm): <u>1821</u>
2	2020/02/27	0830	AW	-	TP	Initial DO (mg/L): <u>10.3</u>
3	2020/02/28	0830	AW	-	TP	Initial Temp (°C): <u>14</u>
4	2020/02/29	0845	AW/MF	1	KL	Salinity (ppt): <u>3</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L. yes no
 Preaeration time _____
 DO(mg/L) of 100% _____

0.5 hours	1 hour	1.5 hours	2 hours
<u>11.2</u>	<u>10.6</u>	<u>10.3</u>	<u>10.1</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	<u>100</u>				
-------	-----	------------	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>7.7</u>	<u>7.4</u>				
Day 4	<u>8.1</u>	<u>8.2</u>				

EC (µS/cm)

Day 0	<u>491</u>	<u>1674</u>				
Day 4	<u>474</u>	<u>1630</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>10.1</u>				
Day 4	<u>8.8</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	<u>10</u>	<u>10</u>				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)		
1	<u>3.4</u>	<u>0.4</u>	Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L) Mean Length (cm): <u>3.3</u> Length Range (cm): <u>2.9-3.5</u> Mean Weight (g): <u>0.4</u> (Must be ≥0.3g) Weight Range: (g): <u>0.3-0.5</u>	Batch: <u>20200205102</u>
2	<u>3.2</u>	<u>0.4</u>		Source: <u>Lynden</u>
3	<u>3.2</u>	<u>0.4</u>		Tank #: <u>4</u>
4	<u>3.0</u>	<u>0.3</u>		Days Held at 15± 2°C: <u>20</u> (must be ≥14 days)
5	<u>3.4</u>	<u>0.5</u>		Percent stock mortality: <u>1.14</u> (7 days prior to test, must be ≤2%)
6	<u>3.3</u>	<u>0.4</u>		Test Volume (L): <u>18L</u>
7	<u>3.2</u>	<u>0.3</u>		
8	<u>3.4</u>	<u>0.3</u>		
9	<u>3.5</u>	<u>0.5</u>		
10	<u>3.5</u>	<u>0.5</u>		
Comments: <u>96 hr No ppt</u>				

Reviewed By: TP

Date Reviewed: 2020/03/02

Method DAS-20

Client TEC 164

Reference 1920-0900

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:
0	2020/02/25	1435	AW/MF	3	MW	7.5
1	2020/02/26	1000	AW	-	TP	Initial EC (µS/cm): 1821
2	2020/02/27	1040	MFB	3	MW	Initial DO (mg/L): 10.3
						Initial Temp (°C): 15.3
						Salinity (ppt): 3

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	8.3	8.2	8.2	8.0	8.0	8.0
2	8.3	8.3	8.3	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	383	337	401	1608	1691	1711
2	406	408	408	1656	1670	1686

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.2	8.2	8.2	8.2	8.2	8.2
2	7.9	7.9	7.9	7.8	7.8	7.8

	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	18	18	18
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>36</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>124</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>218</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	Pail label / preparation date <u>2:02/17</u>	DO Levels (40-100% saturation) - corrected for altitude -
	Hardness of dilution water (mg/L) <u>243</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	0Hrs: <u>no ppt</u> 48Hrs: <u>no ppt</u>	

Reviewed By: JP

Date Reviewed: 2020/03/02

APPENDIX C – Chain-of-custody form

COC ID: 2020-02-24 Toxicity SP21


TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution				
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	Excel	PDF	EDD
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571			

SAMPLE DETAILS								ANALYSIS REQUESTED									
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C	Please indicate below Filtered, Preserved or both (F, P, F/P)							
2020/02/25 WLC Monitoolin 3c 20L carboys 3att bottles, 5all bottles NoS/NoB Good condition																	
WL_BFWB_OUT_SP21_2020-02-24_N	WL_BFWB_OUT_SP21	WS		2/24/2020	9:00	G	6	X	X	4.6°C							

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Julia Johnson	2/26/2020				

SERVICE REQUEST (rush - subject to availability)			
Regular (default)	X	Sampler's Name	Nicholas Lagarde
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	
Emergency (1 Business Day) - 100% surcharge		Date/Time	24-Feb-20
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus		Mobile #	

END OF REPORT



Acute Toxicity Test Results

Sample collected March 3, 2020

Final Report

March 19, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020- 03-03_N_1140 / 1920-0940	3-Mar-20 at 1140h	4-Mar-20 at 1100h	5-Mar-20 at 1510h	4-Mar-20 at 1645h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020- 03-03_N_1140	4.4°C	969	215

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 03-03_N_1140	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 03-03_N_1140	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-03-03_N_1140	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.7 (2.2-3.2) g/L KCl ¹	6.1 (5.8-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.1 (5.3-7.1) g/L NaCl
Reference toxicant CV	12.0%	5.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, March 9, 2020; ² Test Date March 2, 2020
 LC = Lethal Concentration; CL = Confidence Limit

Shae Cole

Report By:
Shae Cole, BSc
Biologist

Sara Thiessen

Reviewed By:
Sara Thiessen, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-0940 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/03/05	10:15:10 *	ST/MW	1	AW
1	2020/03/06	11:45	MF/MM	-	SC
2	2020/03/07	11:00	SC	-	LF
3	2020/03/08	08:25	MW	-	WF
4	2020/03/09	11:15	AW/MM/MW	1	WF

Sample Information

Initial pH: 7.4
 Initial EC (µS/cm): 1792
 Initial DO (mg/L): 10.5
 Initial Temp (°C): 13
 Salinity (ppt): 3

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.7</u>	<u>8.9</u>		

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					

pH (units) (range: 5.5-8.5)

Day 0	<u>7.3</u>	<u>7.4</u>					
Day 4	<u>8.1</u>	<u>8.3</u>					

EC (µS/cm)

Day 0	<u>1129</u>	<u>1625</u>					
Day 4	<u>399</u>	<u>1576</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.9</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>15</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	10	10					
Day 2	10	10					
Day 3	10	10					
Day 4	10	10					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data				Test Organism Information			
Control Fish	Length (cm)	Weight (g)		Batch	<u>2020D117JR</u>		
1	<u>3.1</u>	<u>0.3</u>	Loading Density (g/L): (must be ≤0.5 g/L)	Source	<u>Trout Lodge</u>		
2	<u>3.2</u>	<u>0.3</u>		Tank #	<u>4</u>		
3	<u>3.2</u>	<u>0.4</u>	Mean Length (cm):	Days Held at 15± 2°C (must be ≥14 days)	<u>16</u>		
4	<u>2.9</u>	<u>0.3</u>		Percent stock mortality (7 days prior to test, must be ≤2%)	<u>0.38</u>		
5	<u>3.0</u>	<u>0.3</u>	Length Range (cm):	Test Volume (L)	<u>18</u>		
6	<u>3.3</u>	<u>0.4</u>		Mean Weight (g): (Must be ≥0.3g)	<u>0.3</u>		
7	<u>3.0</u>	<u>0.3</u>	Weight Range (g):				
8	<u>2.7</u>	<u>0.2</u>					
9	<u>2.5</u>	<u>0.2</u>					
10	<u>3.3</u>	<u>0.4</u>					

Comments: Ohc: no ppt
96 hrs no ppt

Reviewed By: W

Date Reviewed: 2020/03/10

Method DAS Client TEC164 Reference 1920-0940

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/03/04	18:05	JK	3	SC	Initial pH: <u>7.4</u>
1	2020/03/05	09:00	SF	-	ME	Initial EC (µS/cm): <u>1792</u>
2	2020/03/06	11:30	LF	3	SC	Initial DO (mg/L): <u>10.3</u>
						Initial Temp (°C): <u>13</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>7.0</u>	<u>7.0</u>	<u>7.0</u>	<u>7.7</u>	<u>7.8</u>	<u>7.0</u>
2	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.4</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	<u>409</u>	<u>406</u>	<u>420</u>	<u>1723</u>	<u>1720</u>	<u>1753</u>
2	<u>448</u>	<u>442</u>	<u>441</u>	<u>1737</u>	<u>1783</u>	<u>1746</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>
2	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C2123</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/</u>
QA (previous month)	Days to first brood (≤12 days) <u>0</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>35</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0/</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>130+</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>969</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	Pail label / preparation date <u>1:02/26</u>	DO Levels (40-100% saturation) - corrected for altitude -
	Hardness of dilution water (mg/L) <u>212</u>	
Comments/Observations:	0 Hr: <u>no ppt</u> 48 Hr: <u>no ppt</u>	

Reviewed By: W

Date Reviewed: 2020/03/10

APPENDIX C – Chain-of-custody form

COC ID: 2020-03-03 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO													
Facility Name	WLC AWH			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD										
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X									
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X									
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X									
								Email 4:	Tricia.Hill@teck.com	X	X	X									
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Marty.Hafke@teck.com	X	X	X									
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 6:													
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571												
SAMPLE DETAILS								ANALYSIS REQUESTED													
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)													
WL_BFWB_OUT_SP21_2020-03-03_N_1140	WL_BFWB_OUT_SP21	W3		3/3/2020	11:40	G	4	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	X	X											
<p><i>1920-0940</i> <i>2020/03/04</i> <i>11:00</i> <i>Manitowlin</i> <i>3c</i> <i>2x 20L carboys, 2x 1L bottles</i> <i>No S/Ns</i> <i>Good Condition</i> <i>4.4°C</i></p>																					
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS				RELINQUISHED BY/AFFILIATION		Date	Time	Accepted By/Affiliation		Date	Time										
Shipment includes 1 extra 20 L bladder and 1 extra 1 L plastic bottle.				Vanessa Turner		3/3/2020															
SERVICE REQUEST (rush - subject to availability)																					
Regular (default)				X		Sampler's Name		Jocelyn Traverse/Bryan Ogden		Mobile #											
Priority (2-3 business days) - 50% surcharge						Sampler's Signature				Date/Time											
Emergency (1 Business Day) - 100% surcharge										3-Mar-20											
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus																					

END OF REPORT



Acute Toxicity Test Results

Sample collected March 9, 2020

Final Report

March 24, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, AB

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_SP21_20 20-03-09_N / 1920-0962	9-Mar-20 at 0900h	10-Mar-20 at 1120h	11-Mar-20 at 1530h	10-Mar-20 at 1430h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_SP21_2020- 03-09_N	6.4°C	1002	234

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_SP21_2020- 03-09_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_SP21_2020- 03-09_N	0

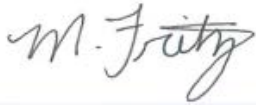
Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_SP21_2020-03-09_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.7 (2.2-3.2) g/L KCl ¹	6.1 (5.8-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.1 (5.3-7.1) g/L NaCl
Reference toxicant CV	12.0%	5.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, March 9, 2020; ² Test Date March 2, 2020
 LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC164 Reference 1920-0962 Chamber 9

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/03/11	1530 *	MM/MF/ AW	1	SG
1	2020/03/12	0830	AW	-	JP
2	2020/03/13	0900	AW	-	JP
3	2020/03/14	0730	SC	-	CB
4	2020/03/15	0900	MW/LF	1	ST

Sample Information

Initial pH: 7.4
Initial EC (µS/cm): 1469
Initial DO (mg/L): 11.0
Initial Temp (°C): 10
Salinity (ppt): 1

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L. yes
Preaeration time 0.5 hours, 1 hour, 1.5 hours, 2 hours
DO(mg/L) of 100% 10.9 9.6 8.9

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C
**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
-------	-----	-----	--	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>8.1</u>	<u>7.7</u>					
Day 4	<u>8.2</u>	<u>8.3</u>					

EC (µS/cm)

Day 0	<u>403</u>	<u>1550</u>					
Day 4	<u>459</u>	<u>1524</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>8.9</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>14</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200117TR
1	<u>3.2</u>	<u>0.3</u>	Source	<u>Troutlodge</u>
2	<u>3.1</u>	<u>0.3</u>	Tank #	<u>3</u>
3	<u>3.6</u>	<u>0.5</u>	Days Held at 15± 2°C	<u>22</u>
4	<u>3.6</u>	<u>0.5</u>	(must be ≥14 days)	
5	<u>3.4</u>	<u>0.4</u>	Percent stock mortality	<u>0</u>
6	<u>3.4</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.3</u>	<u>0.4</u>	Test Volume (L)	<u>16</u>
8	<u>3.1</u>	<u>0.3</u>		
9	<u>3.5</u>	<u>0.5</u>		
10	<u>3.0</u>	<u>0.3</u>		

Loading Density (g/L): 0.3
 (must be ≤0.5 g/L)
 Mean Length (cm): 3.3
 Length Range (cm): 3.0-3.6
 Mean Weight (g): 0.4
 (Must be ≥0.3g)
 Weight Range (g): 0.3-0.5

Comments: 0hr: no ppt
9hr: No ppt
MF

Reviewed By: JP

Date Reviewed: 2020/03/14

Method DAS 20

Client TEC164

Reference 1920-0962

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information		
0	2020/03/10	1430	LF/KK	3		Initial pH:		<u>7.4</u>
1	2020/03/11	0850	MW	-	JP AW	Initial EC (µS/cm):		<u>11669</u>
2	2020/03/12	1100	KK	3	SC	Initial DO (mg/L):		<u>11.0</u>
						Initial Temp (°C):		<u>10</u>
						Salinity (ppt):		<u>1</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C			

day

	pH (units) (range: 6.0-8.5)								
0	<u>8.1</u>	<u>8.2</u>	<u>8.1</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>			
2	<u>8.0</u>	<u>8.0</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)								
0	<u>412</u>	<u>415</u>	<u>415</u>	<u>1065</u>	<u>1074</u>	<u>1068</u>			
2	<u>410</u>	<u>420</u>	<u>410</u>	<u>1050</u>	<u>1054</u>	<u>1043</u>			

	DO (mg/L) (40-100% saturation at test temp.)								
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>			
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>			

	Temperature (°C) (range: 18-22 °C)								
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>			
2	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>	<u>19</u>			

	Number Alive (l, immobile)								
0	10	10	10	10	10	10			
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/1</u>
QA (previous month)	
Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>30</u>	Mean % mortality at 48 hours - <u>0%</u>
Were test treatments randomized on test tray? <u>Yes</u> / No	(must be ≤10%)
Sample	
DO % of sample prior to aeration: <u>118%</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>1002</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>2:13104</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>226</u>	
Comments/Observatio	
0h: <u>ncppt</u>	3.3 to 8.2 mg/L at 18°C
48h: <u>nc ppt</u>	3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C
	3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C

Reviewed By: JP

Date Reviewed: 2020/03/16

APPENDIX C – Chain-of-custody form

COC ID: 2020-03-09 Toxicity SP21

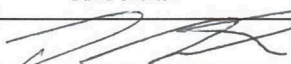
TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD	
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571			

SAMPLE DETAILS								ANALYSIS REQUESTED										
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C	Please indicate below Filtered, Preserved or both (F, P, F/P)								
2020/03/10 11:20 Manitowlin JC 3x20L carboys, 3x1L bottles NoS/NoB Good Condition																		
WL_BFWB_OUT_SP21_2020-03-09_N	WL_BFWB_OUT_SP21	W5		3/9/2020	9:00	G	6	X	X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Julia Johnson	3/9/2020				

SERVICE REQUEST (rush - subject to availability)			
Regular (default)	X	Sampler's Name	David Crichton
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	
Emergency (1 Business Day) - 100% surcharge		Date/Time	9-Mar-20
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus			

END OF REPORT



Acute Toxicity Test Results

Sample collected March 23, 2020

Final Report

April 6, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP 21_2020-03-23_N / 1920-1007	23-Mar-20 at 0900h	24-Mar-20 at 1145h	25-Mar-20 at 1500h	24-Mar-20 at 1700h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-03-23_N	6.1	933	196

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-03-23_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-03-23_N	0

Precipitate observations

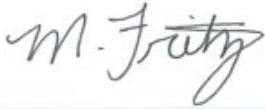
Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-03-23_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.7 (2.2-3.2) g/L KCl ¹	6.2 (5.6-6.9) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.1 (5.3-7.1) g/L NaCl
Reference toxicant CV	12.0%	4.9%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, March 9, 2020; ² Test Date March 16, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC164 Reference 1920-1007 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020-03-25	1500 *	MF / KL	1	AW
1	2020/03/26	0835	MM	-	AW
2	2020/03/27	0845	MM	-	JP
3	2020/03/28	0900	SC	-	CB
4	2020/03/29	0845	AW/KK	1	JP

Sample Information

Initial pH: 7.3
 Initial EC (µS/cm): 1634
 Initial DO (mg/L): 12.4
 Initial Temp (°C): 10
 Salinity (ppt): 2

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 8.8

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
-------	-----	-----	--	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>8.1</u>	<u>7.7</u>					
Day 4	<u>8.7</u>	<u>8.3</u>					

EC (µS/cm)

Day 0	<u>446</u>	<u>1518</u>					
Day 4	<u>447</u>	<u>1522</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.8</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>15</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10 (1)</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	<u>20200117TR</u>
1	<u>3.1</u>	<u>0.4</u>	Source	<u>Troutlodge</u>
2	<u>3.4</u>	<u>0.4</u>	Tank #	<u>3</u>
3	<u>3.6</u>	<u>0.5</u>	Days Held at 15± 2°C	<u>36</u>
4	<u>3.1</u>	<u>0.3</u>	(must be ≥14 days)	
5	<u>3.0</u>	<u>0.2</u>	Percent stock mortality	<u>0.36</u>
6	<u>3.9</u>	<u>0.4</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.5</u>	<u>0.4</u>	Test Volume (L)	<u>16</u>
8	<u>3.5</u>	<u>0.3</u>		
9	<u>3.3</u>	<u>0.4</u>		
10	<u>3.4</u>	<u>0.5</u>		
Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.4</u>				
Length Range (cm): <u>3.0-3.6</u>				
Mean Weight (g): <u>0.4</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.2-0.5</u>				
Comments : 0 Hr: <u>no ppt</u> 96 Hr: <u>no ppt</u>				

Reviewed By: JP

Date Reviewed: 2020/03/30

Method DAS 20 Client TEC 164 Reference 1920-1007

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/03/24	1700	KK	3	AW	Initial pH: <u>7.3</u>
1	2020/03/25	1210	MF	-	ST	Initial EC (µS/cm): <u>11034</u>
2	2020/03/26	1050	MW	3	ST	Initial DO (mg/L): <u>12.4</u>
						Initial Temp (°C): <u>10</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	7.9	7.9	7.9	7.9	7.8	7.9
2	8.2	8.2	8.2	8.2	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	450	449	451	11000	1015	11017
2	486	474	470	1549	1570	1588

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.1	8.1	8.1	8.1	8.1	8.1
2	7.7	7.7	7.7	7.6	7.7	7.8

	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	19	19	19
2	19	19	19	19	19	19

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>01.</u>
QA (previous month)	
Days to first brood (≤12 days) <u>0</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>30</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>01.</u>
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>1201.</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>933</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Dilution Water	
Pail label / preparation date <u>2:03113</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>241</u>	
Comments/Observations:	
0 hr: <u>no ppt</u>	
48 hr: <u>NO ppt</u>	

Reviewed By: JP

Date Reviewed: 2020/03/30

APPENDIX C – Chain-of-custody form

COC ID: 2020-03-23 Toxicity SP21 TURNAROUND TIME: Regular (default) RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution				
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	Excel	PDF	EDD
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00676571			

SAMPLE DETAILS								ANALYSIS REQUESTED														
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)														
								NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C													
2020/03/24 11:45 Monitoring SE 3x 20L carboys to 5x 1L bottles NoS/NoZ Good Condition																						
WL_BFWB_OUT_SP21_2020-03-23_N	WL_BFWB_OUT_SP21	WS		3/23/2020	9:00	G	6	X	X	6100												

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Julia Johnson	3/23/2020				

SERVICE REQUEST (rush - subject to availability)		Sampler's Name	Mobile #
Regular (default)	X	Julia Johnson	
Priority (2-3 business days) - 50% surcharge			
Emergency (1 Business Day) - 100% surcharge			
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus		Sampler's Signature	Date/Time
			23-Mar-20

END OF REPORT



Acute Toxicity Test Results

Sample collected April 6, 2020

Final Report

April 21, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP 21_2020-04-06_N / 1920-1055	6-Apr-20 at 0900h	7-Apr-20 at 1140h	8-Apr-20 at 1550h	7-Apr-20 at 1455h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020- 04-06_N	6.1°C	1015	220

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020- 04-06_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020- 04-06_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-04-06_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.0 (3.5-4.4) g/L KCl ¹	5.3 (5.0-5.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.0 (5.0-7.2) g/L NaCl
Reference toxicant CV	11.9%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, March 18, 2020; ² Test Date April 2, 2020

LC = Lethal Concentration; CL = Confidence Limit

Michael Wrubleski

Report By:
Michael Wrubleski, BSc
Biologist

Jacklyn Poole

Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC164 Reference 1920-1055 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020-04-08	1550 *	MF/MW	1/2	CS	Initial pH: 7.6
1	2020/04/09	0805	MF	-	JP	Initial EC (µS/cm): 2010
2	2020/04/10	0840	MW	-	JS	Initial DO (mg/L): 10.7
3	2020/04/11	0900	SC	-	MF	Initial Temp (°C): 16
4	2020/04/12	1040	K/ST	1	AW	Salinity (ppt): 4

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes / no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 10.9 10.8 9.9 9.5

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C
 **corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	8.0	7.8					
Day 4	8.0	8.2					

EC (uS/cm)

Day 0	506	1871					
Day 4	513	1800					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.9	9.5					
Day 4	8.7	9.7					

Temperature (°C) (range: 14-16°C)

Day 0	14	14					
Day 4	14	15					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	10	10					
Day 2	10	10					
Day 3	10	10					
Day 4	10	10					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	3.4	0.5	20200303TR	
2	3.5	0.5	Source	Sam Livingston
3	3.7	0.4	Tank #	6
4	3.6	0.6	Days Held at 15 ± 2°C	36
5	3.6	0.5	(must be ≥14 days)	
6	3.1	0.4	Percent stock mortality	0.06
7	3.3	0.4	(7 days prior to test, must be ≤2%)	
8	3.8	0.7	Test Volume (L)	16
9	3.0	0.3		
10	3.7	0.6		
Loading Density (g/L): (must be ≤0.5 g/L)			0.3	
Mean Length (cm):			3.4	
Length Range (cm):			3.0-3.8	
Mean Weight (g): (Must be ≥0.3g)			0.5	
Weight Range (g):			0.3-0.7	

Comments: 0hr: no ppt
 9hr: no ppt

Reviewed By: TA

Date Reviewed: 2020/04/13

Method DAS

Client TEC164

Reference 1920-1055

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/04/07	1455	AW	3	SS
1	2020/04/08	0930	SC	-	JP
2	2020/04/09	0800	SC	3	CB

Sample Information

Initial pH:	<u>7.6</u>
Initial EC (µS/cm):	<u>2010</u>
Initial DO (mg/L):	<u>10.7</u>
Initial Temp (°C):	<u>16</u>
Salinity (ppt):	<u>4</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	<u>424</u>	<u>427</u>	<u>431</u>	<u>1893</u>	<u>1921</u>	<u>1940</u>
2	<u>428</u>	<u>435</u>	<u>438</u>	<u>1885</u>	<u>1890</u>	<u>1908</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>27</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>109.1</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>1015</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>220</u>	
Dilution Water	Pail label / preparation date <u>2:03/27</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>201</u>	
Comments/Observations:	<u>0 hr: No ppt</u> <u>48 hr: no ppt</u>	

Reviewed By: TA

Date Reviewed: 2020/04/13

APPENDIX C – Chain-of-custody form

COC ID: 2020-04-06 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO					
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD	
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X	
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X	
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X	
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X	
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X	
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115				
SAMPLE DETAILS								ANALYSIS REQUESTED					
2020/04/07 11:40 Manitoulin SE 3x 20L carboys, 5x 1L bottles NOS/NoI Good Condition 6.1°C								Please indicate below Filtered, Preserved or both (F, P, F/P)					
								ANALYSIS	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C			
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C				
WL_BFWB_OUT_SP21_2020-04-06_N <i>1920-1055</i>	WL_BFWB_OUT_SP21	WS		4/6/2020	9:00	G	6	X	X				
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS				RELINQUISHED BY/AFFILIATION				Date	Time	Accepted By/Affiliation	Date	Time	
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.				Julia Johnson				4/6/2020					
SERVICE REQUEST (rush - subject to availability)													
Regular (default)								X		Sampler's Name		Bella Chen	Mobile #
Priority (2-3 business days) - 50% surcharge										Sampler's Signature			Date/Time
Emergency (1 Business Day) - 100% surcharge													6-Apr-20
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus													

END OF REPORT



Acute Toxicity Test Results

Sample collected April 20, 2020

Final Report

May 5, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP 21_2020-04-20_N / 1920-1114	20-Apr-20 at 0900h	21-Apr-20 at 1000h	22-Apr-20 at 1550h	21-Apr-20 at 1435h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_202 0-04-20_N	7.9°C	1320	192

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-04-20_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-04-20_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-04-20_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.4 (2.9-3.9) g/L KCl ¹	5.9 (5.6-6.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.0 (5.0-7.2) g/L NaCl
Reference toxicant CV	11.8%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, April 17, 2020; ² Test Date April 13, 2020;

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Biologist



Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1114 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020-04-22	15:50 *	SC/MW	1	CB	Initial pH: <u>7.3</u>
1	2020-04-23	00:45	MF	-	OP	Initial EC (µS/cm): <u>1642</u>
2	2020-04-24	08:15	SC	-	JP	Initial DO (mg/L): <u>12.1</u>
3	2020-04-25	08:50	MF	-	SC	Initial Temp (°C): <u>16</u>
4	2020-04-26	09:35	AV/LF	1	LF	Salinity (ppt): <u>2</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.6</u>	<u>9.3</u>	<u>8.9</u>	

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				

pH (units) (range: 5.5-8.5)

Day 0	<u>7.8</u>	<u>7.6</u>				
Day 4	<u>8.0</u>	<u>8.1</u>				

EC (µS/cm)

Day 0	<u>578</u>	<u>1653</u>				
Day 4	<u>549</u>	<u>1627</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.9</u>				
Day 4	<u>8.8</u>	<u>8.9</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>14</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>4.0</u>	<u>0.8</u>	<u>20200303TR</u>	
2	<u>3.9</u>	<u>0.8</u>	Source	<u>Sam Livingston</u>
3	<u>4.1</u>	<u>0.9</u>	Tank #	<u>5</u>
4	<u>3.5</u>	<u>0.4</u>	Days Held at 15± 2°C	<u>50</u>
5	<u>4.1</u>	<u>1.0</u>	(must be ≥14 days)	
6	<u>3.7</u>	<u>0.6</u>	Percent stock mortality	<u>0</u>
7	<u>3.9</u>	<u>0.8</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.8</u>	<u>0.7</u>	Test Volume (L)	<u>16L</u>
9	<u>3.6</u>	<u>0.7</u>		
10	<u>4.0</u>	<u>0.8</u>		
Loading Density (g/L): <u>0.4</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.9</u>				
Length Range (cm): <u>3.5-4.1</u>				
Mean Weight (g): <u>0.8</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.4-1.0</u>				
Comments : 0 hr: <u>NO PPT</u> 96 hr: <u>NO PPT</u>				

Reviewed By: TJA

Date Reviewed: 2020/04/30

Method DAS20

Client TEC164

Reference 1920-1114

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:
0	2020/04/21	1435	LF	3		7.3
1	2020/04/22	0955	MF	-		Initial EC (µS/cm): 1692
2	2020/04/23	0830	SC	3		Initial DO (mg/L): 7.1
						Initial Temp (°C): 16
						Salinity (ppt): 2

Lab Code	CTL A	CTL B	CTL C	100A	100B	100C
	6 th	12 th	25 th	50 th	100 th	7 th

day	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	7.6	7.6	7.6
2	8.0	8.0	8.0	8.2	8.2	8.2

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	416	411	415	1691	1700	1696
2	424	423	423	1693	1684	1677

day	DO (mg/L) (40-100% saturation at test temp.)					
0	8.1	8.1	8.1	8.1	8.1	8.1
2	7.9	7.9	7.9	7.9	7.9	7.9

day	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	19	19	19
2	20	20	20	20	20	20

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>7</u>	Mean % mortality at 48 hours - <u>0</u>
Average number of young produced (≥15 young) <u>27</u>	(must be ≤10%)
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>115%</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>1320</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>192</u>	
Dilution Water	
Pail label / preparation date <u>2:04/08</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
Hardness of dilution water (mg/L) <u>211</u>	
Comments/Observations:	
0h: <u>no ppt</u>	
48h: <u>no ppt</u>	

Reviewed By: JA

Date Reviewed: 2020/04/30

APPENDIX C – Chain-of-custody form

COC ID: 2020-04-20 Toxicity SP21


TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD	
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	Teck.Coal@equisonline.com			X
								Email 4:	Tricia.Hill@teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Marty.Hafke@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 6:				
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115			

SAMPLE DETAILS								ANALYSIS REQUESTED									
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Conc entration_Toxicity Test	NAUT_48Hr_DM_Single_Con centration_Toxicity Test @ 20C								
2020/04/21 10:00 Moniteau lin JC 3x 20L carboys, 3x 1L bottles NaOH/NaI Good Condition																	
1920-1114	WL_BFWB_OUT_SP21	WS		4/20/2020	9:00	G	6	X	X	7.9°C							

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	4/20/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Nicholas Lagarde	Mobile #		
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time	20-Apr-20	
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Samples collected April 23, 2020

Final Report

May 8, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
WL_WLC1_SP01_20 20-04-23_N_1100 / 1920-1132-01	23-Apr-20 at 1100h	24-Apr-20 at 1020h	25-Apr-20 at 1300h	24-Apr-20 at 1350h	24-Apr-20 at 1400h	24-Apr-20 at 1615h
WL_LC1_SP02_2020 -04-23_N_1100 / 1920-1132-02	23-Apr-20 at 1100h	24-Apr-20 at 1020h	25-Apr-20 at 1300h	24-Apr-20 at 1350h	24-Apr-20 at 1400h	24-Apr-20 at 1615h
WL_BFWB_OUT_SP 21_2020-04- 23_N_1100 / 1920-1132-03	23-Apr-20 at 1100h	24-Apr-20 at 1020h	25-Apr-20 at 1300h	24-Apr-20 at 1530h	24-Apr-20 at 1515h	24-Apr-20 at 1550h
LC_LC3_2020-04- 23_N_1100 / 1920-1132-04	23-Apr-20 at 1100h	24-Apr-20 at 1020h	25-Apr-20 at 1300h	24-Apr-20 at 1525h	24-Apr-20 at 1510h	24-Apr-20 at 1545h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_WLC1_SP01_2020-04- 23_N_1100	3.8°C	1610	288
WL_LC1_SP02_2020-04- 23_N_1100	4.7°C	540	189
WL_BFWB_OUT_SP21_2020- 04-23_N_1100	3.6°C	924	189
LC_LC3_2020-04- 23_N_1100	4.6°C	610	194

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 2 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_WLC1_SP01_2020-04-23_N_1100	100	100	57	100
WL_LC1_SP02_2020-04-23_N_1100	100	100	100	100
WL_BFWB_OUT_SP21_2020-04-23_N_1100	100	100	100	100
LC_LC3_2020-04-23_N_1100	100	100	100	100

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
WL_WLC1_SP01_2020-04-23_N_1100	0	100	0
WL_LC1_SP02_2020-04-23_N_1100	0	0	0
WL_BFWB_OUT_SP21_2020-04-23_N_1100	0	0	0
LC_LC3_2020-04-23_N_1100	0	0	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_WLC1_SP01_2020-04-23_N_1100	Rainbow trout	Precipitate observed on the test vessel	None
	<i>Daphnia magna</i>	Precipitate observed on the of test vessel and sample surface of the 20-degree test	Precipitate observed on carapace in the 20-degree test
WL_LC1_SP02_2020-04-23_N_1100	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None
WL_BFWB_OUT_SP21_2020-04-23_N_1100	Rainbow trout	Precipitate observed on the test vessel	None
	<i>Daphnia magna</i>	None	None
LC_LC3_2020-04-23_N_1100	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.5 (3.0-3.8) g/L KCl ¹	6.2 (5.9-6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.1 (5.1-7.3) g/L NaCl
Reference toxicant CV	11.9%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, April 7, 2020; ² Test Date April 27, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 2 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1132-01 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/04/25	1300 *	CB/MF	1	
1	2020/04/26	0900	AW	-	SC
2	2020/04/27	0930	AW	-	YSL
3	2020/04/28	0930	AW	-	JP
4	2020/04/29	0920	ST	1	AW

Sample Information

Initial pH:	8.1
Initial EC (µS/cm):	2370
Initial DO (mg/L):	10.3
Initial Temp (°C):	15
Salinity (ppt):	2

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L : yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
10.0	9.8	9.7	9.6

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	7.2	7.9					
Day 4	7.8	7.7					

EC (uS/cm)

Day 0	483	2430					
Day 4	440	2130					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.9	9.6					
Day 4	8.6	8.6					

Temperature (°C) (range: 14-16°C)

Day 0	14	14					
Day 4	15	15					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	10	10					
Day 2	10	10					
Day 3	10	10					
Day 4	10	10(2)					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	3.8	0.6	20200318TR	
2	3.3	0.3	Source	Lyndon
3	3.2	0.4	Tank #	7
4	3.1	0.4	Days Held at 15± 2°C	35
5	3.6	0.5	(must be ≥14 days)	
6	3.4	0.4	Percent stock mortality	0.051
7	3.1	0.32*	(7 days prior to test, must be ≤2%)	
8	3.5	0.5	Test Volume (L)	18
9	3.6	0.6		
10	3.8	0.6		
Loading Density (g/L):			0.3	
(must be ≤0.5 g/L)				
Mean Length (cm):			3.4	
Length Range (cm):			3.1-3.8	
Mean Weight (g):			0.5	
(Must be ≥0.3g)				
Weight Range (g):			0.3-0.6	

Comments :

96hr: ppt on walls + bottom of tank

Reviewed By: CB

Date Reviewed: 2020/05/10

Method TRS Client TEC164 Reference 1920-1132-02 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/04/25	1300 *	CB/MF	1	
1	2020/04/26	0900	AW	-	SC
2	2020/04/27	0930	AW	-	SC
3	2020/04/28	0930	AW	-	TP
4	2020/04/29	0920	ST	1	TP

Sample Information

Initial pH:	8.0
Initial EC (µS/cm):	1147
Initial DO (mg/L):	10.5
Initial Temp (°C):	14
Salinity (ppt):	3

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
10.0	9.8	9.7	9.6

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	7.4	7.9					
Day 4	7.8	7.8					

EC (uS/cm)

Day 0	581	1045					
Day 4	453	929					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.9	9.6					
Day 4	8.4	8.4					

Temperature (°C) (range: 14-16°C)

Day 0	14	14					
Day 4	15	15					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	10	10					
Day 2	10	10					
Day 3	10	10					
Day 4	10	10					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)		
1	3.7	0.6	Loading Density (g/L): (must be ≤0.5 g/L)	Batch <u>20200318TR</u>
2	3.1	0.5		Source <u>CB Lydo Lyndon</u>
3	3.3	0.5		Tank # <u>7</u>
4	3.7	0.6		Days Held at 15± 2°C <u>35</u>
5	2.7	0.5		(must be ≥14 days)
6	3.1	0.5		Percent stock mortality <u>0-0.5%</u>
7	3.6	0.5		(7 days prior to test, must be ≤2%)
8	3.4	0.5		Test Volume (L) <u>18</u>
9	3.6	0.5		
10	3.3	0.4		
			Mean Length (cm): <u>3.5</u>	
			Length Range (cm): <u>3.1-3.7</u>	
			Mean Weight (g): <u>0.5</u>	
			Weight Range (g): <u>0.3-0.6</u>	

Comments :

96hr: No ppt

Reviewed By: CB

Date Reviewed: 2020/05/01

Method TRS Client TEC164 Reference 1920-1132-03 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/25	1300 *	CB/MF	1	CC	Initial pH: 7.3
1	2020/04/26	0900	AW	-	KK	Initial EC (µS/cm): 1666
2	2020/04/27	0930	AW	-	JP	Initial DO (mg/L): 11.9
3	2020/04/28	0930	AW	-	JP	Initial Temp (°C): 14
4	2020/04/29	0830	ST/AW	1	KK	Salinity (ppt): 3

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
10.9	10.1	10.1	9.8

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	7.3	7.2					
Day 4	8.0	8.1					

EC (uS/cm)

Day 0	511	1589					
Day 4	475	1438					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.9	9.8					
Day 4	8.7	8.8					

Temperature (°C) (range: 14-16°C)

Day 0	14	14					
Day 4	14	14					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	10	10					
Day 2	10	10					
Day 3	10	10					
Day 4	10	10					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)		
1	3.3	0.4	Loading Density (g/L): (must be ≤0.5 g/L)	Batch <u>20200318TR</u>
2	3.4	0.5		Source <u>Lynden</u>
3	3.0	0.4		Tank # <u>7</u>
4	3.5	0.6		Days Held at 15± 2°C (must be ≥14 days) <u>35</u>
5	3.5	0.5		Percent stock mortality <u>0.05%</u> (7 days prior to test, must be ≤2%)
6	3.4	0.5		Test Volume (L) <u>18</u>
7	3.3	0.5		
8	3.1	0.4		
9	3.5	0.5		
10	3.9	0.7		
			Mean Length (cm): <u>3.4</u>	
			Length Range (cm): <u>3.0-3.9</u>	
			Mean Weight (g): <u>0.5</u>	
			Weight Range (g): <u>0.4-0.7</u>	

Comments :

96 hr: PPT on walls + bottom of tank

Reviewed By: CB

Date Reviewed: 2020/05/10

Method TRS Client TEC164 Reference 1920-1132-04 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020/04/25	1300 *	CB/MF	1	SC
1	2020/04/26	0900	AW	-	KL
2	2020/04/27	0930	AW	-	JP
3	2020/04/28	0930	AW	-	JP
4	2020/04/29	0830	STAW	1	KL

Sample Information

Initial pH: 7.4
 Initial EC (µS/cm): 1186
 Initial DO (mg/L): 10.4
 Initial Temp (°C): 15
 Salinity (ppt): 3

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.8</u>	<u>10.1</u>	<u>9.9</u>	<u>9.8</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.2</u>	<u>7.7</u>					
Day 4	<u>8.0</u>	<u>8.1</u>					

EC (uS/cm)

Day 0	<u>510</u>	<u>1145</u>					
Day 4	<u>478</u>	<u>1014</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>9.8</u>					
Day 4	<u>8.5</u>	<u>8.6</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>					
Day 4							

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)		
1	<u>3.1</u>	<u>0.3</u>	Loading Density (g/L): (must be ≤0.5 g/L)	Batch <u>20200318TR</u>
2	<u>3.6</u>	<u>0.5</u>		Source <u>Lyndon</u>
3	<u>3.5</u>	<u>0.6</u>	Mean Length (cm): <u>3.4</u>	Tank # <u>7</u>
4	<u>3.6</u>	<u>0.6</u>		Days Held at 15± 2°C (must be ≥14 days) <u>35</u>
5	<u>3.5</u>	<u>0.5</u>	Length Range (cm): <u>3.1-3.7</u>	Percent stock mortality (7 days prior to test, must be ≤2%) <u>0.075^{LB}</u>
6	<u>3.3</u>	<u>0.4</u>		Test Volume (L) <u>18</u>
7	<u>3.3</u>	<u>0.4</u>	Mean Weight (g): (Must be ≥0.3g) <u>0.5</u>	
8	<u>3.4</u>	<u>0.5</u>		
9	<u>3.1</u>	<u>0.4</u>	Weight Range: (g): <u>0.3-0.6</u>	
10	<u>3.7</u>	<u>0.6</u>		

Comments :

96 hr: No ppt

Reviewed By: CB

Date Reviewed: 2020/05/10

Daphnia Bench Sheet

Method DAS 20

Client TEC164

Reference 1920-1132-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/24	1400	ME/JC	3		Initial pH: <u>8.1</u>
1	2020/04/25	0800	SC	-	MM	Initial EC (µS/cm): <u>2370</u>
2	2020/04/26	0830	IF	3	MF KL	Initial DO (mg/L): <u>10.3</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>
2	<u>8.0</u>	<u>8.0</u>	<u>8.1</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>416</u>	<u>424</u>	<u>426</u>	<u>2430</u>	<u>2360</u>	<u>2500</u>
2	<u>435</u>	<u>434</u>	<u>432</u>	<u>2230</u>	<u>2410</u>	<u>2390</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.8</u>	<u>8.8</u>	<u>8.8</u>
2	<u>7.9</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>7(7I)</u>	<u>5(5I)</u>	<u>5(5I)</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture
Young jar D1 Jar(s) mortality 7 days prior to test (must be ≤25%) 12

QA (previous month)
Days to first brood (≤12 days) 9
Average number of young produced (≥15 young) 37
Were test treatments randomized on test tray? Yes No

Control Validity Criteria
Mean % mortality at 48 hours - (must be ≤10%) 0/

Sample
DO % of sample prior to aeration: 110 Is aeration required (<40% or >100%)? Yes No
Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes No
Hardness (mg CaCO₃/L) of 100%: 1610 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) —
Alkalinity of 100% sample (mg CaCO₃/L): 288

Dilution Water
Pail label / preparation date 1.04/16
Hardness of dilution water (mg/L) 192

DO Levels (40-100% saturation) - corrected for altitude -
3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
3.2 to 7.9 mg/L at 20°C

Comments/Observations: 0hr: no ppt
48h: ppt present in vessel jar, water surface, on organisms

Reviewed By: CB

Date Reviewed: 2020/05/01

Daphnia 10°C Bench Sheet

Method DAS 10

Client TEC164

Reference 1920-1132-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information		
0	2020/04/24	1350	MF/SC	3	MWJ	Initial pH:	8.1	
1	2020/04/25	0800	SC	-	MF	Initial EC (µS/cm):	2370	
2	2020/04/26	0855	LF	3	KL	Initial DO (mg/L):	10.3	
						Initial Temp (°C):	15	
						Salinity (ppt):	2	

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	7.9	8.0	8.0	7.9	7.9	8.0
2	8.2	8.2	8.2	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	421	424	424	2380	2400	2410
2	445	436	439	2370	2400	2380

	DO (mg/L) (40-100% saturation at test temp.)					
0	9.4	9.4	9.4	9.4	9.4	9.4
2	9.4	9.5	9.4	9.5	9.5	9.5

	Temperature (°C) (range: 8-12 °C)					
0	12	12	12	12	12	12
2	11	11	11	11	11	11

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture
Young jar P1 Jar(s) mortality 7 days prior to test (must be ≤25%) 12

QA (previous month)
Days to first brood (≤12 days) 9
Average number of young produced (≥15 young) 37
Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
Mean % mortality at 48 hours - 0%
(must be ≤10%)

Sample
DO % of sample prior to aeration: 100 Is aeration required (<40% or >100%)? Yes or No
Duration of aeration (37.5 +/- 12.5 mL/min/L): — Filtered with 110µm screen prior to testing Yes or No
Hardness (mg CaCO₃/L) of 100%: 11010 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) —
Alkalinity of 100% sample (mg CaCO₃/L): 189 258

Dilution Water
Pail label / preparation date 1:24/16
Hardness of dilution water (mg/L) 192

DO Levels (40-100% saturation) - corrected for altitude -
4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C
4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C
3.9 to 9.8 mg/L at 10°C

Comments/Observations: 0hr: no ppt
48h: no ppt

Reviewed By: CB Date Reviewed: 2020/05/10

Daphnia Antiscalant Bench Sheet

Method DAS AS Client TEC164 Reference 1920-1132-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/24	1615	MF/MW	3	SC	Initial pH: <u>8.1</u>
1	2020/04/25	0800	C	-	MF	Initial EC (µS/cm): <u>2370</u>
2	2020/04/26	0840	LF	3	VF	Initial DO (mg/L): <u>10.3</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day	pH (units) (range: 6.0-8.5)								
0	8.2	8.2	8.2	8.1	8.1	8.1			
2	8.2	8.2	8.2	8.4	8.4	8.4			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (uS/cm)								
0	420	423	425	2460	2360	2490			
2	440	435	436	2780	2350	2320			

day	DO (mg/L) (40-100% saturation at test temp.)								
0	8.1	8.1	8.1	8.1	8.1	8.1			
2	7.9	7.9	7.9	7.8	7.8	7.8			

day	Temperature (°C) (range: 18-22 °C)								
0	19	19	19	19	19	19			
2	20	20	20	20	20	20			

day	Number Alive (I, immobile)								
0	10	10	10	10	10	10			
1	10	10	10	10	10	10			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>17</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>37</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>110</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>1610</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>288</u>	
Dilution Water	Pail label / preparation date <u>1:04/16</u>	Antiscalant
	Hardness of dilution water (mg/L) <u>192</u>	Final Concentration in Sample: <u>2 mg/L</u>
		Volume of sample: <u>500mL</u> Volume of antiscalant: <u>15.8 µL</u>
Comments/Observations:	<u>0hr: no ppt</u>	
	<u>48h: no ppt</u>	
	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C	

Reviewed By: CB Date Reviewed: 2020/05/10

Method DAS 20

Client TEC164

Reference 1920-1132-02

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information		
0	2020/04/24	1400	MF/SC	3	MW	Initial pH:	8.0	
1	2020/04/25	0800	SC	-	MF	Initial EC (µS/cm):	1147	
2	2020/04/26	0850	IF	3	KL	Initial DO (mg/L):	10.5	
						Initial Temp (°C):	14	
						Salinity (ppt):	3	

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C			

day pH (units) (range: 6.0-8.5)

0	7.9	8.0	8.0	8.0	8.0	8.0			
2	8.2	8.2	8.2	8.1	8.1	8.1			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (µS/cm)

0	411	422	423	1036	1039	1065			
2	444	438	446	1004	1025	1016			

DO (mg/L) (40-100% saturation at test temp.)

0	8.1	8.1	8.1	8.2	8.2	8.2			
2	7.9	7.9	7.9	7.9	7.9	7.8			

Temperature (°C) (range: 18-22 °C)

0	19	19	19	18	18	18			
2	20	20	20	20	20	20			

Number Alive
(l, immobile)

0	10	10	10	10	10	10			
1	10	10	10	10	10	10			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>D1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>12</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>9</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Average number of young produced (≥15 young) <u>37</u>	
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>110</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>540</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>189</u>	
Dilution Water	DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date <u>1:04/16</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
Hardness of dilution water (mg/L) <u>192</u>	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations: <u>0hr: no ppt</u> <u>48h: no ppt</u>	

Reviewed By: CB

Date Reviewed: 2020/05/01

Method DAS 10

Client TEC164

Reference 1920-1132-02

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/04/24	1350	MF/SC	3	MF	8.0	1147	10.5	14	3
1	2020/04/25	0800	SC	-	MF					
2	2020/04/26	0850	IF	3	KL					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day 0 pH (units) (range: 6.0-8.5)

0	8.2	8.2	8.2	7.8	7.8	7.8			
2	8.1	8.1	8.1	8.3	8.3	8.3			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (uS/cm)

0	416	422	424	1052	1075	1074			
2	444	435	436	1010	1071	1068			

DO (mg/L) (40-100% saturation at test temp.)

0	9.4	9.4	9.4	9.4	9.4	9.4			
2	9.5	9.5	9.5	9.4	9.5	9.5			

Temperature (°C) (range: 8-12 °C)

0	12	12	12	12	12	12			
2	11	11	11	11	11	11			

Number Alive (I, immobile)

0	10	10	10	10	10	10			
1	10	10	10	10	10	10			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>12</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>37</u>	Mean % mortality at 48 hours - <u>0%</u>
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No		(must be ≤10%)
Sample	DO % of sample prior to aeration: <u>100</u>	Is aeration required (<40% or >100%)? Yes or <input checked="" type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>—</u>	Filtered with 110um screen prior to testing	Yes or <input checked="" type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>540</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)?	Yes or <input checked="" type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>—</u>		
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>189</u>		
Dilution Water	Pail label / preparation date <u>1:04/16</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>192</u>		4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C
		4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C
		3.9 to 9.8 mg/L at 10°C
Comments/Observations:	<u>Onr: no ppt</u>	
	<u>48h: no ppt</u>	

Reviewed By: CB

Date Reviewed: 2020/05/10

Daphnia Antiscalant Bench Sheet

Method DAS AS Client TEC164 Reference 1920-1132-02

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/24	1615	ME/MW	3	SC	Initial pH: <u>8.0</u>
1	2020/04/25	0800	CC	-	MF	Initial EC (µS/cm): <u>147</u>
2	2020/04/26	0845	LF	B	KL	Initial DO (mg/L): <u>10.5</u>
						Initial Temp (°C): <u>14</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day	pH (units) (range: 6.0-8.5)									
0	7.9	8.0	8.0	8.0	8.0	8.0				
2	8.2	8.2	8.2	8.3	8.4	8.4				

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)									
0	420	425	425	1051	1063	1061				
2	443	441	442	1039	1051	1046				

day	DO (mg/L) (40-100% saturation at test temp.)									
0	8.1	8.1	8.1	8.1	8.1	8.1				
2	8.0	7.8	7.9	7.9	7.9	7.9				

day	Temperature (°C) (range: 18-22 °C)									
0	19	19	19	19	19	19				
2	19	20	20	20	20	20				

day	Number Alive (I, immobile)									
0	10	10	10	10	10	10				
1	10	10	10	10	10	10				
2	10	10	10	10	10	10				

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>17</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>37</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0/</u>
Were test treatments randomized on test tray?	Yes/No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>110</u>	Is aeration required (<40% or >100%)? <u>Yes</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing	<u>Yes</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>340</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)?	<u>No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>189</u>		
Dilution Water	Pail label / preparation date <u>1.04/110</u>	Antiscalant
Hardness of dilution water (mg/L) <u>192</u>	Final Concentration in Sample: <u>2 mg/L</u>	Volume of sample: <u>500mL</u>
		Volume of antiscalant: <u>15.8 µL</u>
Comments/Observations: <u>0hr: no ppt</u>	DO Levels (40-100% saturation) - corrected for altitude -	
<u>48hr: no ppt</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C	
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C	
	3.2 to 7.9 mg/L at 20°C	

Reviewed By: CB Date Reviewed: 2020/05/10

Method DAS 20

Client TEC164

Reference 1920-1132-03

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/04/24	1515	MW/MF	3	SC	7.3	1666	11.9	14	3
1	2020/04/25	0800	SC	-	MF					
2	2020/04/26	0715	KL	3	AW					

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	7.8	7.8	7.8
2	8.2	8.2	8.2	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	418	424	424	1664	1675	1675
2	431	478	430	1640	1652	1637

	DO (mg/L) (40-100% saturation at test temp.)					
0	9.2	8.2	8.2	8.6	8.7	8.7
2	7.9	7.9	7.9	7.8	7.8	7.8

	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	18	18	18
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	2018	
Young jar	<u>D2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)		Control Validity Criteria
Days to first brood (≤12 days)	<u>9</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Average number of young produced (≥15 young)	<u>37</u>	
Were test treatments randomized on test tray?	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	
Sample		
DO % of sample prior to aeration:	<u>130</u>	Is aeration required (<40% or >100%)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>20</u>	Filtered with 110um screen prior to testing <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness (mg CaCO ₃ /L) of 100%:	<u>924</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>189</u>	
Dilution Water		DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date	<u>1:04/16</u>	3.3 to 8.2 mg/L at 18°C
Hardness of dilution water (mg/L)	<u>192</u>	3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C
		3.0 to 7.6 mg/L at 22°C
Comments/Observations:	<u>OK! No PPT</u>	
	<u>48hr: no ppt</u>	

Reviewed By: CB

Date Reviewed: 2020/05/01

Method DAS 10

 Client TEC164

 Reference 1920-1132-03
Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information		
0	2020/04/24	1530	MW/CB	3	MF	Initial pH:	<u>7.3</u>	
1	2020/04/25	0800	SC	-	MF	Initial EC (µS/cm):	<u>1666</u>	
2	2020/04/26	0925	KK	3	AW	Initial DO (mg/L):	<u>11.9</u>	
						Initial Temp (°C):	<u>14</u>	
						Salinity (ppt):	<u>3</u>	
Lab Code	CTLA	CTLB	CTLC	100A	100B	100C		

day	pH (units) (range: 6.0-8.5)								
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>7.6</u>	<u>7.6</u>	<u>7.6</u>			
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)								
0	<u>423</u>	<u>424</u>	<u>424</u>	<u>1678</u>	<u>1693</u>	<u>1695</u>			
2	<u>440</u>	<u>438</u>	<u>435</u>	<u>1671</u>	<u>1608</u>	<u>1691</u>			

	DO (mg/L) (40-100% saturation at test temp.)								
0	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>			
2	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.5</u>	<u>9.5</u>			

	Temperature (°C) (range: 8-12 °C)								
0	<u>12</u>	<u>12</u>	<u>12</u>	<u>11</u>	<u>11</u>	<u>11</u>			
2	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>			

	Number Alive (I, immobile)								
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D2 2018</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>37</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Were test treatments randomized on test tray?	Yes/No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>117</u>	Is aeration required (<40% or >100%)? <u>Yes</u> or No
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>20 min</u>	Filtered with 110µm screen prior to testing <u>Yes</u> or No
Hardness (mg CaCO ₃ /L) of 100%:	<u>924</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes</u> or No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>189</u>	
Dilution Water	Pail label / preparation date <u>1:04/16</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L)	<u>192</u>	4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C
		4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C
		3.9 to 9.8 mg/L at 10°C
Comments/Observations:	<u>0 hrs no ppt</u>	
	<u>48 hr: no ppt</u>	

 Reviewed By: CB

 Date Reviewed: 2020/05/10

Daphnia Antiscalant Bench Sheet

Method DAS AS

Client TEC164

Reference 1920-1132-03

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/04/24	1550	MW/MF	3	SC	7.3	1666	11.9	14	3
1	2020/04/25	0900	SC	-	MF					
2	2020/04/26	0920	KK	3	AW					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

pH (units) (range: 6.0-8.5)

day	1	2	3	4	5	6	7	8	9	10
0	8.2	8.2	8.3	7.9	7.9	7.9				
2	8.3	8.3	8.2	8.4	8.4	8.4				

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (uS/cm)

day	1	2	3	4	5	6	7	8	9	10
0	420	424	425	1650	1666	1669				
2	430	431	430	1635	1630	1645				

DO (mg/L) (40-100% saturation at test temp.)

day	1	2	3	4	5	6	7	8	9	10
0	8.1	8.1	8.1	8.7	8.7	8.7				
2	7.9	7.9	7.9	7.8	7.8	7.8				

Temperature (°C) (range: 18-22 °C)

day	1	2	3	4	5	6	7	8	9	10
0	19	19	19	18	18	18				
2	20	20	20	20	20	20				

Number Alive (I, immobile)

day	1	2	3	4	5	6	7	8	9	10
0	10	10	10	10	10	10				
1	10	10	10	10	10	10				
2	10	10	10	10	10	10				

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar D4 ²⁶¹⁸ Jar(s) mortality 7 days prior to test (must be ≤25%) 17/16.7%

QA (previous month)
 Days to first brood (≤12 days) 9
 Average number of young produced (≥15 young) 37
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
 DO % of sample prior to aeration: 130 Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 30 min Filtered with 110µm screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 924 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) —
 Alkalinity of 100% sample (mg CaCO₃/L): 189

Dilution Water
 Pail label / preparation date 7:04/16
 Hardness of dilution water (mg/L) 192

Antiscalant
 Final Concentration in Sample: 2 mg/L
 Volume of sample: 500 mL Volume of antiscalant: 15.3 µL

Comments/Observations: obs: NO PPT
 90hr: no PPT

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Reviewed By: CB

Date Reviewed: 2020/05/01

Method DAS 20

Client TEC164

Reference 1920-1132-04

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/24	1510	MW/MF	3	SC	Initial pH: <u>7.4</u>
1	2020/04/25	0800	SC	-	MF	Initial EC (µS/cm): <u>1186</u>
2	2020/04/26	0915	KK	3	AW	Initial DO (mg/L): <u>10.4</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.0</u>	<u>8.1</u>	<u>8.1</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>
2	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.3</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	<u>419</u>	<u>425</u>	<u>425</u>	<u>1178</u>	<u>1178</u>	<u>1175</u>
2	<u>433</u>	<u>432</u>	<u>432</u>	<u>1160</u>	<u>1163</u>	<u>1170</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D2 2018</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>37</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0+</u>
Were test treatments randomized on test tray?	Yes / No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>121</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>20 min</u>	Filtered with 110um screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%:	<u>610</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>194</u>	
Dilution Water	Pail label / preparation date <u>1:04/16</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
Hardness of dilution water (mg/L)	<u>192</u>	
Comments/Observations: <u>0 hrs: No ppt</u> <u>4 hrs: no ppt</u>		

Reviewed By: CB

Date Reviewed: 2020/05/01

Method DAS 10

Client TEC164

Reference 1920-1132-04

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information			
0	2020/04/24	1525	MW/CB	3	MF	Initial pH:	7.4		
1	2020/04/25	0800	SC	-	MF	Initial EC (µS/cm):	1186		
2	2020/04/26	0925	KX	3	AW	Initial DO (mg/L):	10.4		
						Initial Temp (°C):	15		
						Salinity (ppt):	3		

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C			

7.9 pH (units) (range: 6.0-8.5)

day									
0	8.1	8.1	8.1	8.1	7.9	7.9			
2	8.2	8.2	8.2	8.3	8.3	8.3			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (µS/cm)

day									
0	425	426	426	1182	1194	1190			
2	434	436	433	1172	1185	1179			

DO (mg/L) (40-100% saturation at test temp.)

day									
0	9.4	9.4	9.4	9.6	9.6	9.6			
2	9.6	9.6	9.6	9.5	9.5	9.5			

Temperature (°C) (range: 8-12 °C)

day									
0	12	12	12	11	11	11			
2	11	11	11	11	11	11			

Number Alive (I, immobile)

day									
0	10	10	10	10	10	10			
1	10	10	10	10	10	10			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	2018	
Young jar	<u>D2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)		Control Validity Criteria
Days to first brood (≤12 days)	<u>9</u>	Mean % mortality at 48 hours - <u>0%</u>
Average number of young produced (≥15 young)	<u>37</u>	(must be ≤10%)
Were test treatments randomized on test tray?	<u>Yes</u> / No	
Sample		
DO % of sample prior to aeration:	<u>116</u>	Is aeration required (<40% or >100%)? <u>Yes</u> or No
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>2 min</u>	Filtered with 110µm screen prior to testing <u>Yes</u> or No
Hardness (mg CaCO ₃ /L) of 100%:	<u>610</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes</u> or No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L):	<u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>194</u>	
Dilution Water		DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date	<u>1:04/16</u>	4.1 to 10.3 mg/L at 8°C 3.8 to 9.6 mg/L at 11°C
Hardness of dilution water (mg/L)	<u>192</u>	4.0 to 10.0 mg/L at 9°C 3.7 to 9.4 mg/L at 12°C
		3.9 to 9.8 mg/L at 10°C
Comments/Observations:	<u>0 HRS & NO PPT</u>	
	<u>48 hrs. no ppt</u>	
Reviewed By:	<u>CB</u>	Date Reviewed: <u>2020/05/10</u>

Daphnia Antiscalant Bench Sheet

Method DAS AS Client TEC164 Reference 1920-1132-04

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/04/24	1545	MW/MF	3	SC	Initial pH: <u>7.4</u>
1	2020/04/25	0810	SC	-	MW/MF	Initial EC (µS/cm): <u>1186</u>
2	2020/04/26	0915	KV	3	AW	Initial DO (mg/L): <u>10.4</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day	pH (units) (range: 6.0-8.5)					
0	8.1	8.1	8.2	8.2	8.0	8.0
2	8.2	8.2	8.2	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	422	426	425	1174	1175	1174
2	435	430	433	1162	1163	1170

day	DO (mg/L) (40-100% saturation at test temp.)					
0	8.2	8.2	8.2	8.2	8.2	8.2
2	7.9	7.9	7.9	7.8	7.9	7.8

day	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	18	18	18
2	20	20	20	20	20	20

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D2</u> ²⁰¹⁸	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>37</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Were test treatments randomized on test tray?	Yes / No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>121</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>20 min</u>	Filtered with 110µm screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%:	<u>610</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>194</u>	
Dilution Water	Pail label / preparation date <u>1:04/16</u>	Antiscalant
Hardness of dilution water (mg/L)	<u>192</u>	Final Concentration in Sample: <u>2mg/L</u>
		Volume of sample: <u>500mL</u> Volume of antiscalant: <u>15.84L</u>
Comments/Observations:	<u>0Hrs NO PPT</u>	
	<u>40hr: no ppt</u>	
	DO Levels (40-100% saturation) - corrected for altitude -	
	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C	
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C	
	3.2 to 7.9 mg/L at 20°C	

Reviewed By: CB Date Reviewed: 2020/05/01

APPENDIX C – Chain-of-custody form

COC ID: 2020-04-23 Toxicity EFS

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD	
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
								Email 4:	Tricia.Hill@teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Marty.Hafke@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 6:				
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115			

SAMPLE DETAILS								ANALYSIS REQUESTED											
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)											
								ANALYSIS	NAUT_96Hr_RT_Single_Conce ntration_Toxicity Test	NAUT_48Hr_DM_Single_Conce ntration_Toxicity Test @ 20C	NAUT_48Hr_DM_Single_Conce ntration_Toxicity Test @ 10C	NAUT_48Hr_DM_Single_Conce ntration_Toxicity Test @ 20C + Antiscalant							
2020/04/24 10:26 Manitocalin JC 16x 20L canbays, 20x 1L bottles NoSINo2 Good Condition																			
WL_WLC1_SP01_2020-04-23_N_1100	-01 WL_WLC1_SP01	WS		4/23/2020	11:00	G	9		X	X	X	X	3.80						
WL_LCI_SP02_2020-04-23_N_1100	-02 WL_LCI_SP02	WS		4/23/2020	11:00	G	9		X	X	X	X	4.79						
WL_BFWB_OUT_SP21_2020-04-23_N_1100	-03 WL_BFWB_OUT_SP21	WS		4/23/2020	11:00	G	9		X	X	X	X	3.80						
LC_LC3_2020-04-23_N_1100	-04 LC_LC3	WS		4/23/2020	11:00	G	9		X	X	X	X	4.68						

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Rudy Brown	4/23/2020				

SERVICE REQUEST (rush - subject to availability)		Sampler's Name	Mobile #
Regular (default)	X	Rudy Brown	
Priority (2-3 business days) - 50% surcharge			
Emergency (1 Business Day) - 100% surcharge			
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus			
		Sampler's Signature	Date/Time
			23-Apr-20

END OF REPORT



Acute Toxicity Test Results

Sample collected May 4, 2020

Final Report

May 18, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_ 2020-05-04_N_0900 / 1920-1188	4-May-20 at 0900h	5-May-20 at 1150h	6-May-20 at 1245h	5-May-20 at 1540h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_202 0-05-04_N_0900	6.1°C	843	187

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 05-04_N_0900	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 05-04_N_0900	0

Precipitate observations

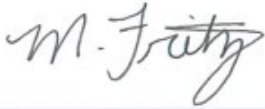
Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-05-04_N_0900	Rainbow trout	Precipitate observed on the sides of test vessel	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.5 (3.0-3.8) g/L KCl ¹	6.2 (5.9-6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-5.0) g/L KCl	6.1 (5.1-7.3) g/L NaCl
Reference toxicant CV	11.9%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, April 7, 2020; ² Test Date April 27, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC164 Reference 1920-1188 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/05/06	1245 *	CB MF	1	JS	Initial pH: <u>7.1</u>
1	2020/05/07	0815	MW	-	JP	Initial EC (µS/cm): <u>1569</u>
2	2020/05/08	0800	CB	-	JP	Initial DO (mg/L): <u>12.3</u>
3	2020/05/09	0850	MW	-	CB	Initial Temp (°C): <u>10.7</u>
4	2020/05/10	1030	ST/AW	1	YR	Salinity (ppt): <u>3</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
 Preaeration time
 DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
<u>yes</u>	<u>12.0</u>	<u>10.0</u>	<u>9.5</u>	<u>8.8</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
-------	-----	-----	--	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>7.3</u>	<u>7.2</u>					
Day 4	<u>7.8</u>	<u>8.2</u>					

EC (µS/cm)

Day 0	<u>371</u>	<u>1417</u>					
Day 4	<u>357</u>	<u>1376</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.6</u>	<u>8.5</u>					
Day 4	<u>8.5</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>11.8</u>	<u>15</u>					
Day 4							

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.8</u>	<u>0.7</u>	<u>20200318TR</u>	
2	<u>3.9</u>	<u>0.7</u>	Source	<u>Lyndon</u>
3	<u>3.9</u>	<u>0.8</u>	Tank #	<u>6</u>
4	<u>3.7</u>	<u>0.6</u>	Days Held at 15± 2°C	<u>46</u>
5	<u>3.3</u>	<u>0.5</u>	(must be ≥14 days)	
6	<u>3.8</u>	<u>0.7</u>	Percent stock mortality	<u>0.10</u>
7	<u>3.7</u>	<u>0.6</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.8</u>	<u>0.7</u>	Test Volume (L)	<u>18</u>
9	<u>3.5</u>	<u>0.6</u>		
10	<u>3.7</u>	<u>0.7</u>		

Loading Density (g/L): 0.4
 (must be ≤0.5 g/L)
 Mean Length (cm): 3.7
 Length Range (cm): 3.3-3.9
 Mean Weight (g): 0.7
 (Must be ≥0.3g)
 Weight Range (g): 0.5-0.8

Comments: 0hr: no ppt
96hr: Light ppt on tank walls

Reviewed By: 10

Date Reviewed: 2020/05/12

Method DAS 20

 Client TEC164

 Reference 1920-1188
Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/05/05	1540	AW/ST	3	WU
1	2020/05/06	0910	MF	-	JP
2	2020/05/07	0910	CS	2	LC

Sample Information

Initial pH:	<u>7.1</u>
Initial EC (µS/cm):	<u>1569</u>
Initial DO (mg/L):	<u>12.3</u>
Initial Temp (°C):	<u>10.7</u>
Salinity (ppt):	<u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day	pH (units) (range: 6.0-8.5)					
0	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>
2	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (uS/cm)					
0	<u>463</u>	<u>468</u>	<u>477</u>	<u>1551</u>	<u>1563</u>	<u>1571</u>
2	<u>487</u>	<u>482</u>	<u>486</u>	<u>1498</u>	<u>1559</u>	<u>1576</u>

day	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.7</u>	<u>8.6</u>	<u>8.6</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.8</u>

day	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

day	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>CS</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤ 12 days) <u>7</u>	Average number of young produced (≥15 young) <u>31</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / No	Control Validity Criteria
		Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Sample	DO % of sample prior to aeration: <u>130%</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or No
	Hardness (mg CaCO ₃ /L) of 100%: <u>843</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>—</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>187</u>	
Dilution Water	Pail label / preparation date <u>2:04/22</u>	DO Levels (40- 100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>183</u>	
Comments/Observations:	0hr: <u>NO ppt</u> 48hr: <u>NO ppt</u>	

 Reviewed By: W

 Date Reviewed: 2020/05/12

APPENDIX C – Chain-of-custody form



COC ID: 2020-05-04 Toxicity SP21

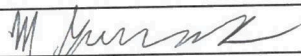
TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115			

SAMPLE DETAILS								ANALYSIS REQUESTED						
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)						
								NAUT_96Hr_RT_Single_Concentration_Toxicity_Test	NAUT_48Hr_DM_Single_Concentration_Toxicity_Test @ 20C					
2020/05/05 11:50 Monitors in OC 3x 20L canisters, 5x 1L bottles N ₂ /N ₂ O ₅ Good Condition														
WL_BFWB_OUT_SP21_2020-05-04_N_0900	WL_BFWB_OUT_SP21	WS		5/4/2020	9:00	G	6	X	X					

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	5/4/2020				

SERVICE REQUEST (rush - subject to availability)		Sampler's Name	Mobile #
Regular (default)	X	Mark Gaizauskas	
Priority (2-3 business days) - 50% surcharge			
Emergency (1 Business Day) - 100% surcharge			
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus			
		 Date/Time	4-May-20

END OF REPORT



Acute Toxicity Test Results

Sample collected May 18, 2020

Final Report

June 1, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_ 2020-05-18_N / 1920-1248	18-May-20 at 0900h	19-May-20 at 0821h	20-May-20 at 1400h	19-May-20 at 1530h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_202 0-05-18_N	13.3°C	997	261

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 05-18_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020- 05-18_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-05-18_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.8 (3.3-4.2) g/L KCl ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-4.9) g/L KCl	6.1 (5.0-7.4) g/L NaCl
Reference toxicant CV	11.5%	6.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, May 8, 2020; ² Test Date May 25, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1248 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/05/20	1400 *	CB / SC	1	MF	Initial pH: <u>7.2</u>
1	2020/05/21	0810	MF	-	JP	Initial EC (µS/cm): <u>178</u>
2	2020/05/22	0845	CS	-	MF	Initial DO (mg/L): <u>1.9</u>
3	2020/05/23	0800	CB	-	MF	Initial Temp (°C): <u>12.9</u>
4	2020/05/24	1010	LC	1	KL	Salinity (ppt): <u>1</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
 Preaeration time
 DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
<u>yes</u>	<u>8.7</u>			

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

Test Chemistry and Biology

Conc.	CTL	100				
-------	-----	-----	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>7.7</u>	<u>8.1</u>				
Day 4						

EC (uS/cm)

Day 0	<u>386</u>	<u>1163</u>				
Day 4	<u>383</u>	<u>1636</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.6</u>	<u>8.7</u>				
Day 4	<u>8.9</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information		
Control Fish	Length (cm)	Weight (g)	Batch	<u>20200311 TR</u>	
1	<u>3.8</u>	<u>0.6</u>	Source	<u>Trout Lodge</u>	
2	<u>3.5</u>	<u>0.4</u>	Tank #	<u>4</u>	
3	<u>3.0</u>	<u>0.3</u>	Days Held at 15± 2°C	<u>26</u>	
4	<u>3.0</u>	<u>0.6</u>	(must be ≥14 days)		
5	<u>3.5</u>	<u>0.4</u>	Mean Length (cm):	<u>3.5</u>	
6	<u>3.3</u>	<u>0.3</u>	Length Range (cm):	<u>30-38</u>	
7	<u>3.3</u>	<u>0.4</u>	Mean Weight (g):	<u>0.4</u>	
8	<u>3.5</u>	<u>0.4</u>	(Must be ≥0.3g)		
9	<u>3.4</u>	<u>0.4</u>	Weight Range (g):	<u>0.3-0.6</u>	
10	<u>3.6</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>	
			(7 days prior to test, must be ≤2%)		
			Test Volume (L)	<u>16</u>	
Comments: <u>0hr: no ppt</u>					
<u>96hr: no ppt</u>					

Reviewed By: W

Date Reviewed: 2020/05/25

Method DAS

Client TEC164

Reference 1920-1248

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:
0	2020/05/19	1530	KLAW	3	SF	7.2
1	2020/05/20	0815	ME	-	DP	Initial EC (µS/cm): 1720
2	2020/05/21	0930	CB	3	SC	Initial DO (mg/L): 1.9
						Initial Temp (°C): 11
						Salinity (ppt): 1

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.0	8.0	8.0	7.7	7.7	7.7
2	8.8	8.0	8.0	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	346	344	345	1610	1628	1623
2	353	356	357	1540	1596	1600

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	8.5	8.5	8.6
2	7.8	7.8	7.8	7.8	7.8	7.8

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	20	20	20
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>0</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>9</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Average number of young produced (≥15 young)	
Were test treatments randomized on test tray? <u>Yes</u> / No <u>30</u>	
Sample	
DO % of sample prior to aeration: <u>181%</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>997</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>-</u>
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>261</u>	
Dilution Water	
Pail label / preparation date <u>Drum 1 / 05/19 14</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>154</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations:	
0hr: <u>no ppt</u>	
48hr: <u>No ppt</u>	

Reviewed By: 10

Date Reviewed: 10/05/25

APPENDIX C – Chain-of-custody form

COC ID: 2020-05-18 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO													
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD										
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X									
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X									
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	Teck.Coal@equisonline.com			X									
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X									
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X									
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115												
SAMPLE DETAILS																					
<p>2020/05/18 08:21 R&W Hotshot OC 3x20L canbays, 3x1L bottles NoS/NoT Good Condition 13.3°C</p>																					
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS													
WL_BFWB_OUT_SP21_2020-05-18_N	WL_BFWB_OUT_SP21	WS		5/18/2020	9:00	G	6	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	X	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C	X										
<p>1926-1248</p>																					
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS				RELINQUISHED BY/AFFILIATION				Date	Time	Accepted By/Affiliation	Date	Time									
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.				Tara Gentile				5/18/2020													
SERVICE REQUEST (rush - subject to availability)																					
Regular (default)				X	Sampler's Name			Tafi Mugadza		Mobile #											
Priority (2-3 business days) - 50% surcharge					Sampler's Signature					Date/Time		18-May-20									
Emergency (1 Business Day) - 100% surcharge																					
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus																					

END OF REPORT



Acute Toxicity Test Results

Sample collected May 26, 2020

Final Report

June 10, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP 21_2020-05-26_N / 1920-1308	26-May-20 at 0900h	27-May-20 at 0900h	28-May-20 at 1600h	27-May-20 at 1355h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-05-26_N	8.6°C	1012	295

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-05-26_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-05-26_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-05-26_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.8 (3.3-4.2) g/L KCl ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-4.9) g/L KCl	6.1 (5.0-7.4) g/L NaCl
Reference toxicant CV	11.5%	6.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, May 8, 2020; ² Test Date May 25, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Kayla Knol, BSc
Biologist



Reviewed By:
Leila Oosterbroek, BSc
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC 164 Reference 1920-1308 Chamber 9

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/05/28	1600	MW / SC	1	WAF	Initial pH: <u>7.5</u>
1	2020/05/29	1600	CB	-	STP	Initial EC (µS/cm): <u>1672</u>
2	2020/05/30	0920	MW	-	SC	Initial DO (mg/L): <u>10.5</u>
3	2020/05/31	0805	KEL	-	AW	Initial Temp (°C): <u>19</u>
4	2020/06/01	1125	AD	1	ST	Salinity (ppt): <u>1</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.7</u>	<u>9.5</u>	<u>9.4</u>	<u>9.3</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					

pH (units) (range: 5.5-8.5)

Day 0							
	<u>7.4</u>	<u>7.8</u>					
Day 4	<u>7.7</u>	<u>7.9</u>					

EC (uS/cm)

Day 0							
	<u>402</u>	<u>1680</u>					
Day 4	<u>395</u>	<u>1504</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0							
	<u>8.9</u>	<u>9.3</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0							
	<u>14</u>	<u>14</u>					
Day 4	<u>13</u>	<u>13</u>					

Number Alive (In brackets number stressed)

Day 0							
	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.3</u>	<u>0.5</u>	<u>20200311TR</u>	
2	<u>3.3</u>	<u>0.4</u>	Source	<u>Troutlodge</u>
3	<u>3.7</u>	<u>0.6</u>	Tank #	<u>8</u>
4	<u>3.4</u>	<u>0.4</u>	Days Held at 15± 2°C	<u>34</u>
5	<u>3.3</u>	<u>0.3</u>	(must be ≥14 days)	
6	<u>3.5</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>
7	<u>3.5</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.4</u>	<u>0.5</u>	Test Volume (L)	<u>16</u>
9	<u>3.6</u>	<u>0.6</u>		
10	<u>3.2</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.4</u>				
Length Range (cm): <u>3.2-3.7</u>				
Mean Weight (g): <u>0.5</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.6</u>				
Comments: 0 Hrs: <u>No PPT</u> 96Hrs: <u>Small amt of brown PPT + No PPT</u>				

Reviewed By: 10

Date Reviewed: 2020/06/01

Method DAS 20

Client TEC164

Reference 1920-1308

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information	
0	2020/05/27	1355	ST/ML	3	AW	Initial pH:	7.5
1	2020/05/28	1100	IC	-	STP	Initial EC (µS/cm):	1632
2	2020/05/29	0955	MF	3	MW	Initial DO (mg/L):	10.5
						Initial Temp (°C):	19
						Salinity (ppt):	1

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.3	8.2	8.2	7.8	7.8	7.8
2	8.1	8.1	8.1	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	375	376	373	1684	1697	1698
2	367	315	378	1631	1614	1670

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	7.9	7.9	7.9
2	7.9	7.9	7.9	7.9	7.9	7.9

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	20	20	20
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture
Young jar C2 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
Days to first brood (≤12 days) 7
Average number of young produced (≥15 young) 40
Were test treatments randomized on test tray? Yes No

Control Validity Criteria
Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
DO % of sample prior to aeration: 153% Is aeration required (<40% or >100%)? Yes No
Duration of aeration (37.5 +/- 12.5 mL/min/L): 20 min Filtered with 110µm screen prior to testing Yes No
Hardness (mg CaCO₃/L) of 100%: 1012 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) 295
Alkalinity of 100% sample (mg CaCO₃/L): 295

Dilution Water
Pail label / preparation date Drum 1, 05/21
Hardness of dilution water (mg/L) 167

DO Levels (40-100% saturation) - corrected for altitude -
3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
3.2 to 7.9 mg/L at 20°C


Comments/Observations:
0hr: no ppt
48hr: no ppt

Reviewed By: W

Date Reviewed: 2020/06/01

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-05-26 Toxicity SP21		TURNAROUND TIME: Regular (default)		RUSH:	
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO	
Facility Name WLC AWTf	Lab Name Nautilus Environmental	Report Format / Distribution DL-WLC-Lab@teck.com	Excel	PDF	EDD
Project Manager Thomas Davidson	Lab Contact Tamara Pomeroy	Email 1: Thomas.Davidson@teck.com	Email 2: TeckCoal@equisonline.com	Email 3: TeckCoal@equisonline.com	Email 4: TeckCoal@equisonline.com
Email thomas.davidson@teck.com	Address #4, 6125 - 12 Street SE	Email 5: Marty.Hahe@teck.com	Email 6: Marty.Hahe@teck.com	Email 7: Marty.Hahe@teck.com	Email 8: Marty.Hahe@teck.com
Address 15 Km North HWY 43	City Sparwood	Province BC	Country Canada	Province AB	Country Canada
Postal Code V0B 2G0	City Calgary	Province AB	Country Canada	Province AB	Country Canada
Phone Number (250) 603 - 9417	Phone Number 403 253 7121	Phone Number 403 253 7121	PO number VPO00692115	PO number VPO00692115	PO number VPO00692115
SAMPLE DETAILS					
Sample ID WL_BFWB_OUT_SP21_2020-05-26_N	Sample Location WL_BFWB_OUT_SP21	Field Matrix WS	Date 5/26/2020	Time (24hr) 9:00	G-Grab C-Comp G 6
1920-1308 2020/05/27 0900 MONTAULIN AE 3x20 L CARBOYS GOOD COND PLO S/NO 1					
ANALYSIS					
ANALYSIS REQUESTED					
Please indicate below Filtered, Perserved or both (F, P, F/P)					
NAUT_96HR_RT_Single_Concentration_Toxicity Test @ 20C					
NAUT_48HR_DM_Single_Concentration_Toxicity Test @ 20C					
NAUT_96HR_RT_Single_Concentration_Toxicity Test @ 8.6°C					
RELINQUISHED BY/AFFILIATION					
Date 5/26/2020					
Time 15:00					
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS					
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.					
SERVICE REQUEST (rush - subject to availability)					
Regular (default) X					
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus					
Grant Fleming		Mobile #		Date/Time	
		26-May-20			

END OF REPORT



Acute Toxicity Test Results

Sample collected June 1, 2020

Final Report

June 16, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-06-01_N / 1920-1352	1-Jun-20 at 0900h	2-Jun-20 at 1147h	3-Jun-20 at 1530h	3-Jun-20 at 1650h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-06-01_N	10.9°C	864	287

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-06-01_N	100	100

Sample ID	Percent Immobility in 100 (% v/v) <i>Daphnia magna</i> 20°C
	WL_BFWB_OUT_SP21_2020-06-01_N

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-06-01_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.8 (3.3-4.2) g/L KCl ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.4-4.9) g/L KCl	6.1 (5.0-7.4) g/L NaCl
Reference toxicant CV	11.5%	6.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, May 8, 2020; ² Test Date May 25, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC 164 Reference 1920-1352 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/06/03	1530 *	MW/AD	1	MF	Initial pH: <u>7.2</u> ^{MW} 7.2
1	2020/06/04	0900	AD	-	STP	Initial EC (µS/cm): <u>240</u> ^{MW} 45.1
2	2020/06/05	0830	AD	-	STP	Initial DO (mg/L): <u>9.1</u> ^{MW} 10.1
3	2020/06/06	1045	MW	-	FC	Initial Temp (°C): <u>15.17</u> ^{MW} 1
4	2020/06/07	0930	AD	1	AL	Salinity (ppt): <u>2</u> ^{MW} 1

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 12.4 11.8 11.4 10.9

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc. CTL 100

pH (units) (range: 5.5-8.5)

Day 0	<u>7.4</u>	<u>7.4</u>				
Day 4	<u>7.7</u>	<u>8.2</u>				

EC (µS/cm)

Day 0	<u>360</u>	<u>1378</u>				
Day 4	<u>375</u>	<u>1285</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>10.9</u>				
Day 4	<u>8.3</u>	<u>8.5</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	10	10				
Day 2	10	10				
Day 3	10	10				
Day 4	10	10				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200311TR
1	<u>3.8</u>	<u>0.8</u>	Source	Troutlodge
2	<u>4.1</u>	<u>0.9</u>	Tank #	<u>8</u>
3	<u>4.1</u>	<u>0.8</u>	Days Held at 15± 2°C	<u>MW-39-40</u>
4	<u>3.5</u>	<u>0.5</u>	(must be ≥14 days)	
5	<u>3.5</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>
6	<u>3.7</u>	<u>0.6</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.6</u>	<u>0.6</u>	Test Volume (L)	<u>18</u>
8	<u>3.6</u>	<u>0.5</u>		
9	<u>3.3</u>	<u>0.4</u>		
10	<u>3.5</u>	<u>0.5</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.7</u>				
Length Range (cm): <u>3.3-4.1</u>				
Mean Weight (g): <u>0.6</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.4-0.9</u>				

Comments: 0Hrs: NO PPT
 96Hrs: NO PPT

Reviewed By: JP

Date Reviewed: 2020/06/08

Method DAS 20

Client TEC164

Reference 1920-1352

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/06/03	1650	SCMF	3	MMW	7.2	1451	10.1	17	1
1	2020/06/04	0755	MF	-	JP					
2	2020/06/05	0900	SC	2	MF					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.1	8.1	8.1	7.6	7.6	7.7
2	7.9	8.0	8.0	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	405	398	389	1421	1420	1427
2	363	362	343	1324	1348	1353

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	8.2	8.2	8.2
2	7.9	7.9	7.9	7.9	7.9	7.9

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	18	18	18
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>DY</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>7</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>39</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>120</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>864</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>—</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>287</u>	
Dilution Water	Pail label / preparation date <u>2:05/21</u>	DO Levels (40-100% saturation) - corrected for altitude -
	Hardness of dilution water (mg/L) <u>167</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:		
0hr: <u>NO PPT</u>		
48hr: <u>NO PPT</u>		

Reviewed By: JP

Date Reviewed: 2020/06/08

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-06-01_Toxicity_SP21		TURNAROUND TIME: Regular (default)		RUSH:	
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO	
Facility Name WLC A WTF	Lab Name Nautilus Environmental	Report Format / Distribution	Excel	PDF	EDD
Project Manager Thomas Davidson	Lab Contact Tamara Pomeroy	Email 1:	DL-WLC-Lab@teck.com	X	X
Email thomas.davidson@teck.com	Email tamara@nautilusenvironmental.ca	Email 2:	Thomas.Davidson@teck.com	X	X
Address 15 Km North HWY 43	Address #4, 6125 - 12 Street SE	Email 3:	TeckCoal@episonline.com	X	X
City Sparwood	City Calgary	Email 4:	Tricia.Hill@teck.com	X	X
Postal Code V0B 2G0	Postal Code T2H 2K1	Email 5:	Marty.Hafke@teck.com	X	X
Province BC	Province AB	Email 6:			
Country Canada	Country Canada				
Phone Number (250) 603 - 9417	Phone Number 403 253 7121	PO number	VPO00692115		
SAMPLE DETAILS					
Sample ID 1926-1362	Sample Location WL_BFWB_OUT_SP21	Field Matrix WS	Hazardous Material (Yes/No)	Time (24hr) 9:00	Date 6/1/2020
2020/5/6/02	11:47	Manitowlin	DC	3x20L carboys, 3x1L bottles	NOx/NO2
Good Condition					
ANALYSIS					
NAUT_96Hr_RT_Single_Con	X	X			
NAUT_48Hr_DM_Single_Con	X	X			
NAUT_96Hr_RT_Single_Con	X	X			
Please indicate below: Filtered, Preserved or both (F, P, F/P)					
RELINQUISHED BY/AFFILIATION					
Tara Gentile		Date	6/1/2020	Time	
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS					
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.					
SERVICE REQUEST (rush - subject to availability)					
Regular (default)		X			
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus					
Sampler's Name	Mark Gaizauskas	Mobile #			
Sampler's Signature		Date/Time	1-Jun-20		

END OF REPORT



Acute Toxicity Test Results

Sample collected June 15, 2020

Final Report

June 30, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-06-15_N / 1920-1429	15-Jun-20 at 0900h	16-Jun-20 at 1000h	17-Jun-20 at 1500h	16-Jun-20 at 1445h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-06-15_N	9.7°C	715	205

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-06-15_N	100	100

Sample ID	Percent Immobility in 100 (% v/v) <i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-06-15_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-06-15_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.6 (3.4-3.7) g/L KCl ¹	6.0 (5.6-6.3) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4-4.9) g/L KCl	6.1 (5.0-7.4) g/L NaCl
Reference toxicant CV	11.3%	6.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, June 8, 2020; ² Test Date June 8, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Biologist

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1429 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020-06-17	1500 *	SC/MF	1 MW	MW	Initial pH: <u>7.2</u>
1	2020-06-18	0815	AD	-	DP	Initial EC (µS/cm): <u>1283</u>
2	2020-06-19	0915	AD	-	DP	Initial DO (mg/L): <u>10.9</u>
3	2020-06-20	6855	MW	-	SC	Initial Temp (°C): <u>16</u>
4	2020-06-21	0930	AD/ST	1	LL	Salinity (ppt): <u>1</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min.L : yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>11.5</u>	<u>9.5</u>	<u>8.8</u>	

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.6</u>	<u>7.3</u>				
Day 4	<u>7.5</u>	<u>8.2</u>				

EC (uS/cm)

Day 0	<u>389</u>	<u>1345</u>				
Day 4	<u>390</u>	<u>1265</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.8</u>				
Day 4	<u>8.4</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>15</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0		10	10			
Day 1		10	10			
Day 2		10	10			
Day 3		10	10			
Day 4		10	10			

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200311TR
1	<u>3.8</u>	<u>0.7</u>	Source	Troutlodge
2	<u>4.3</u>	<u>1.1</u>	Tank #	<u>4</u>
3	<u>3.9</u>	<u>0.7</u>	Days Held at 15± 2°C	<u>54</u>
4	<u>3.9</u>	<u>0.7</u>	(must be ≥14 days)	
5	<u>4.2</u>	<u>0.9</u>	Percent stock mortality	<u>0</u>
6	<u>4.2</u>	<u>0.9</u>	(7 days prior to test, must be ≤2%)	
7	<u>4.2</u>	<u>1.0</u>	Test Volume (L)	<u>18L</u>
8	<u>4.1</u>	<u>1.0</u>		
9	<u>4.2</u>	<u>1.0</u>		
10	<u>3.9</u>	<u>0.7</u>		
Loading Density (g/L): <u>0.5</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>4.1</u>				
Length Range (cm): <u>3.8-4.2</u>				
Mean Weight (g): <u>0.943</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.7-1.1</u>				
Comments : 0 hr: <u>NO PPT</u>				
96 hr: <u>NO PPT</u>				

Reviewed By: JP

Date Reviewed: 2020/06/23

Method DAS 20

Client TEC164

Reference 1920-1429

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/06/16	1445	AW/SJ	3	KCL	7.7	1283	10.9	16	1
1	2020/06/17	0950	MW	-	SIP					
2	2020/06/18	0940	AW	3	SJ					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	7.7	7.7	7.7
2	8.0	8.1	8.1	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	362	365	364	1339	1358	1372
2	370	370	368	1335	1355	1344

	DO (mg/L) (40-100% saturation at test temp.)					
0	0.1	0.1	0.1	0.6	0.8	0.8
2	2.9	2.9	2.9	2.9	2.9	2.9

	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	18	18	18
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>D1/C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>2.5/7</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>30</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Were test treatments randomized on test tray?	Yes / No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>145-1</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L):	<u>20 min</u>	Filtered with 110µm screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%:	<u>715</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>✓</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L):	<u>205</u>	
Dilution Water	Pail label / preparation date <u>1:06/08</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L)	<u>153</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	0hr: <u>NO PPT</u> 48hr: <u>NO PPT</u>	

Reviewed By: JP

Date Reviewed: 2020/06/23

APPENDIX C – Chain-of-custody form

COC ID: 2020-06-15 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00692115			

SAMPLE DETAILS								ANALYSIS REQUESTED					
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test (@ 20C)	Please indicate below Filtered, Preserved or both (F, P, F/P)			
1920-1429	WL_BFWB_OUT_SP21	WS		6/15/2020	9:00	G	6	X	X	4.700			

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Julia Johnson	6/15/2020				

SERVICE REQUEST (rush - subject to availability)			
Regular (default)	X	Sampler's Name	Tafi Mugadza
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	
Emergency (1 Business Day) - 100% surcharge		Date/Time	15-Jun-20
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus			

END OF REPORT



Acute Toxicity Test Results

Sample collected June 29, 2020

Final Report

July 16, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-06-29_N / 1920-1557	29-Jun-20 at 0900h	30-Jun-20 at 1040h	3-Jul-20 at 1115h	1-Jul-20 at 1615h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-06-29_N	11.3°C	696	210

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-06-29_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-06-29_N	0

Precipitate observations

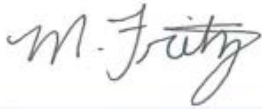
Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
LC_WTF_IN_2020-06-29_NP	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.9 (2.6-3.3) g/L KCl ¹	6.0 (5.6-6.3) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4-4.7) g/L KCl	6.1 (5.1-7.1) g/L NaCl
Reference toxicant CV	11.0%	5.6%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, July 3, 2020; ² Test Date June 22, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Daphnia Bench Sheet

Method DAS

Client TEC164

Reference 1920-1557

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/07/01	1615	MF/SC	3	MMW	Initial pH: <u>7.3</u>
1	2020/07/02	1245	SC	-	SP	Initial EC (µS/cm): <u>1392</u>
2	2020/07/03	1045	MMW	3	CC	Initial DO (mg/L): <u>9.5</u>
						Initial Temp (°C): <u>19</u>
						Salinity (ppt): <u>1</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.2	8.3	8.3	7.6	7.6	7.6
2	8.1	8.2	8.1	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	347	353	353	1489	1514	1515
2	365	368	370	1510	1531	1520

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	9.4	9.4	9.4
2	7.8	7.8	7.8	7.9	7.9	7.9

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	18	18	18
2	20	20	20	20	20	20

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar 04 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 7
 Average number of young produced (≥15 young) 34
 Were test treatments randomized on test tray? Yes / No

Control Validity Criteria
 Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
 DO % of sample prior to aeration: 135 Is aeration required (<40% or >100%)? Yes or No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes or No
 Hardness (mg CaCO₃/L) of 100%: 196 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes or No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -
 Alkalinity of 100% sample (mg CaCO₃/L): 210

Dilution Water
 Pail label / preparation date 2:06/23
 Hardness of dilution water (mg/L) 135

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Comments/Observations: 0ppr: no ppt
48hrs: NO ppt

Reviewed By: W

Date Reviewed: 2020/07/03

Method TRS Client TEC164 Reference 1920-1557 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/07/03	11:55	CB / MW	1	MF	Initial pH: <u>7.3</u>
1	2020/07/04	09:55	MF	-	CB	Initial EC (µS/cm): <u>1392</u>
2	2020/07/05	09:00	AW	-	CB	Initial DO (mg/L): <u>9.5</u>
3	2020/07/06	09:00	AW	-	CB	Initial Temp (°C): <u>19</u>
4	2020/07/07	09:30	AD/4W/5L	1	CB	Salinity (ppt): <u>1</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.4</u>	<u>8.9</u>		

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100							
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pH (units) (range: 5.5-8.5)

Day 0	<u>8.0</u>	<u>7.5</u>					
Day 4	<u>8.0</u>	<u>8.0</u>					

EC (uS/cm)

Day 0	<u>394</u>	<u>1467</u>					
Day 4	<u>434</u>	<u>1453</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>8.9</u>					
Day 4	<u>8.8</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>14</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0		10	10				
Day 1		<u>10</u>	<u>10</u>				
Day 2		<u>10</u>	<u>10</u>				
Day 3		<u>10</u>	<u>10</u>				
Day 4		<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data				Test Organism Information		
Control Fish	Length (cm)	Weight (g)		Batch		
1	<u>2.7</u>	<u>0.3</u>	Loading Density (g/L): (must be ≤ 0.5 g/L)	<u>20200521TR</u>	Source	<u>Troutlodge</u>
2	<u>2.9</u>	<u>0.3</u>			Tank #	<u>8</u>
3	<u>3.2</u>	<u>0.3</u>			Days Held at 15± 2°C	<u>14</u>
4	<u>2.7</u>	<u>0.3</u>	Mean Length (cm):	<u>2.9</u>	(must be ≥ 14 days)	
5	<u>2.8</u>	<u>0.3</u>	Length Range (cm):	<u>2.6-3.2</u>	Percent stock mortality	<u>0.54</u>
6	<u>3.0</u>	<u>0.3</u>			(7 days prior to test, must be ≤ 2%)	
7	<u>2.6</u>	<u>0.3</u>	Mean Weight (g):	<u>0.3</u>	Test Volume (L)	<u>18</u>
8	<u>3.0</u>	<u>0.3</u>	(Must be ≥ 0.3g)			
9	<u>2.9</u>	<u>0.3</u>	Weight Range (g):	<u>0.2-0.3</u>		
10	<u>3.1</u>	<u>0.3</u>				

Comments :

Oh: NO ppt
9/6h: NO ppt

Reviewed By: lw

Date Reviewed: 2020/07/08

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-06-29 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	Teck.Coal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00707765			

SAMPLE DETAILS								ANALYSIS REQUESTED													
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)													
								NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C												
2020/06/30 10:40 Mnitecalin JC 3x 20L carboys, 3x 1L bottles NAs/NAs Good Condition																					
Sample ID 1920-1557	WL_BFWB_OUT_SP21	WS		6/29/2020	9:00	G	6	X	X	1130C											

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	6/29/2020				
SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Tara Gentile	Mobile #		
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	<i>T. Gentile</i>	Date/Time	29-Jun-20	
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Sample collected July 13, 2020

Final Report

July 30, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP 21_2020-07-13_N / 1920-1658	13-Jul-20 at 0900h	14-Jul-20 at 1300h	15-Jul-20 at 1240h	15-Jul-20 at 1517h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020- 07-13_N	11.8°C	1077	254

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-07-13_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-07-13_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-07-13_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.9 (2.6-3.3) g/L KCl ¹	6.5 (6.0-6.9) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4-4.7) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	11.0%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, July 3, 2020; ² Test Date July 6, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Biologist

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Trout Bench Sheet

Method TRS Client TEC164 Reference 1920-1658 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/07/15	12:40 *	CB / KK	1	JC	Initial pH: <u>7.4</u>
1	2020/07/16	07:40	ST	-	JP	Initial EC (µS/cm): <u>1723</u>
2	2020/07/17	08:32	BS	-	JP	Initial DO (mg/L): <u>9.1</u>
3	2020/07/18	08:00	CB	-	MF	Initial Temp (°C): <u>15</u>
4	2020/07/19	07:00	AW/ST/KK	1	SS	Salinity (ppt): <u>2</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L : yes/no
 Preaeration time 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100% 8.8

DO in mg/L (70% - 100% saturation)**
6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.1</u>	<u>7.7</u>				
Day 4	<u>8.0</u>	<u>8.2</u>				

EC (uS/cm)

Day 0	<u>411</u>	<u>1560</u>				
Day 4	<u>422</u>	<u>1459</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.4</u>	<u>8.8</u>				
Day 4	<u>8.6</u>	<u>8.4</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0		10	10			
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>	<u>10</u>			

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200521TR
1	<u>3.4</u>	<u>0.5</u>	Source	Troutlodge
2	<u>3.4</u>	<u>0.4</u>	Tank #	<u>2</u>
3	<u>3.5</u>	<u>0.4</u>	Days Held at 15 ± 2°C	<u>26</u> ¹⁸
4	<u>3.1</u>	<u>0.3</u>	(must be ≥14 days)	
5	<u>3.3</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>
6	<u>3.5</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.2</u>	<u>0.4</u>	Test Volume (L)	<u>18</u>
8	<u>3.6</u>	<u>0.5</u>		
9	<u>3.0</u>	<u>0.3</u>		
10	<u>3.0</u>	<u>0.4</u>		
Loading Density (g/L):			<u>0.2</u>	
(must be ≤0.5 g/L)				
Mean Length (cm):			<u>3.3</u>	
Length Range (cm):			<u>3.0-3.6</u>	
Mean Weight (g):			<u>0.4</u>	
(Must be ≥0.3g)				
Weight Range (g):			<u>0.2-0.5</u>	

Comments: 96hr: Noppt

Reviewed By: LO

Date Reviewed: 2020/07/20

Method DAS 20

Client TEC164

Reference 1920-1658

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information			
0	2020/07/15	1517	CB/MW	3		Initial pH:			<u>7.4</u>
1	2020/07/16	0815	LF	-		Initial EC (µS/cm):			<u>1723</u>
2	2020/07/17	0835	MF	3		Initial DO (mg/L):			<u>9.1</u>
						Initial Temp (°C):			<u>18</u>
						Salinity (ppt):			<u>2</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C			

day

	pH (units) (range: 6.0-8.5)								
0	<u>8.2</u>	<u>8.1</u>	<u>8.1</u>	<u>7.7</u>	<u>7.8</u>	<u>7.8</u>			
2	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)								
0	<u>452</u>	<u>438</u>	<u>467</u>	<u>1545</u>	<u>1724</u>	<u>1737</u>			
2	<u>471</u>	<u>474</u>	<u>471</u>	<u>1012</u>	<u>1708</u>	<u>1719</u>			

	DO (mg/L) (40-100% saturation at test temp.)								
0	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>			
2	<u>7.8</u>	<u>7.8</u>	<u>7.8</u>	<u>7.7</u>	<u>7.7</u>	<u>7.7</u>			

	Temperature (°C) (range: 18-22 °C)								
0	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>			
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>			

	Number Alive (l, immobile)								
0	10	10	10	10	10	10			
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>DI</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Days to first brood (≤12 days) <u>7</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>32</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>130</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20mins</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>107</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>254</u>	
Dilution Water	Pail label / preparation date <u>2:07/07</u>	DO Levels (40-100% saturation) - corrected for altitude -
	Hardness of dilution water (mg/L) <u>170</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	0hr: <u>NO ppt</u>	
	48hr: <u>NO ppt</u>	

Reviewed By: LO

Date Reviewed: 2020/07/20

APPENDIX C – Chain-of-custody form

END OF REPORT



Acute Toxicity Test Results

Sample collected July 27, 2020

Final Report

August 18, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-07-27_N / 1920-1770	27-Jul-20 at 0900h	28-Jul-20 at 1153h	29-Jul-20 at 1130h	29-Jul-20 at 1220h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-07-27_N	11.1°C	813	256

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-07-27_N	100	100

Sample ID	Percent Immobility in 100% (v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-07-27_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-07-27_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	Surficial precipitate observed	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	2.9 (2.6-3.3) g/L KCl ¹	6.1 (5.8-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4-4.7) g/L KCl	6.0 (5.2-7.1) g/L NaCl
Reference toxicant CV	11.0%	5.1%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, July 3, 2020; ² Test date July 20, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Linda Fan, BSc
Biologist



Reviewed By:
Leila Oosterbroek, BSc
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1770 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/07/29	1130 *	LB / MF	1	ALJ	Initial pH: <u>7.2</u>
1	2020/07/30	0830	MW	-	JP	Initial EC (µS/cm): <u>1748</u>
2	2020/07/31	0840	MW	-	JP	Initial DO (mg/L): <u>11.4</u>
3	2020/08/01	1005	MW	-	S	Initial Temp (°C): <u>20</u>
4	2020/08/02	1000	AW	-	ICL	Salinity (ppt): <u>2</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
 Preaeration time
 DO(mg/L) of 100%

DO in mg/L (70% - 100% saturation)**
0.5 hours
1 hour
1.5 hours
2 hours

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C
 **corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.3</u>	<u>7.6</u>				
Day 4	<u>7.7</u>	<u>7.8</u>				

EC (µS/cm)

Day 0	<u>923</u>	<u>1688</u>				
Day 4	<u>426</u>	<u>1681</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.4</u>	<u>8.8</u>				
Day 4	<u>8.9</u>	<u>8.9</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>				
Day 4	<u>14</u>	<u>14</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200521TR
1	<u>3.6</u>	<u>0.6</u>	Source	<u>Troutlodge</u>
2	<u>3.7</u>	<u>0.6</u>	Tank #	<u>4</u>
3	<u>3.4</u>	<u>0.5</u>	Days Held at 15± 2°C	<u>40</u>
4	<u>3.4</u>	<u>0.4</u>	Percent stock mortality	<u>0</u>
5	<u>3.0</u>	<u>0.3</u>	(7 days prior to test, must be ≤2%)	
6	<u>3.7</u>	<u>0.7</u>	Test Volume (L)	<u>18</u>
7	<u>3.8</u>	<u>0.7</u>		
8	<u>3.5</u>	<u>0.5</u>		
9	<u>3.5</u>	<u>0.4</u>		
10	<u>3.5</u>	<u>0.5</u>		

Loading Density (g/L): 0.3
 (must be ≤0.5 g/L)
 Mean Length (cm): 3.5
 Length Range (cm): 3.0-3.8
 Mean Weight (g): 0.5
 (Must be ≥0.3g)
 Weight Range (g): 0.3-0.7

Comments: 0 hrs. no ppt
9 hrs. No ppt

Reviewed By: BS

Date Reviewed: 2020/08/05

Method DAS20

Client TEC164

Reference 1920-1770

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information	
0	2020/07/29	1220	MF/AW	3	ST	Initial pH:	7.2
1	2020/07/30	0855	KL	-	TP	Initial EC (µS/cm):	1748
2	2020/07/31	0815	MF	3	LC	Initial DO (mg/L):	11.4
						Initial Temp (°C):	20
						Salinity (ppt):	2
Lab Code	<u>Q1A</u>	<u>CTLB</u>	<u>CTLC</u>	<u>100A</u>	<u>100B</u>	<u>100C</u>	

day	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	7.6	7.6	7.6
2	8.1	8.1	8.1	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	432	435	435	1803	1828	1830
2	406	413	416	1059	1058	1084

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	8.6	8.6	8.6
2	7.9	7.9	7.9	7.9	7.9	7.9

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	18	18	18
2	20	20	20	20	20	20

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>D5</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>5</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>9</u>	Mean % mortality at 48 hours - <u>0</u>
Average number of young produced (≥15 young) <u>33</u>	(must be ≤10%)
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>114</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>83</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>254</u>	
Dilution Water	
Pail label / preparation date <u>2:07120</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>30</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations:	
0 hr: <u>no ppt</u>	
48 hr: <u>slight surficial ppt</u>	

Reviewed By: Bj

Date Reviewed: 2020/08/05

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-07-27 Toxicity SP21		TURNAROUND TIME: Regular (default)		RUSH:	
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO	
Facility Name	WLC AWTF	Lab Name	Nautilus Environmental	Report Format / Distribution	Excel
Project Manager	Brett Mason	Lab Contact	Tamara Pomeroy	Email 1:	DL-WLC-Lab@teck.com
Email	brett.mason@teck.com	Email	tamara@nautilusenvironmental.ca	Email 2:	Thomas.Davidson@teck.com
Address	15 Km North HWY 43	Address #4:	6125 - 12 Street SE	Email 3:	TeckCoal@equisonline.com
City	Sparwood	City	Calgary	Email 4:	Tricia.Hill@teck.com
Postal Code	V0B 2G0	Province	BC	Email 5:	Mary.Hafler@teck.com
Country	Canada	Postal Code	T2H 2K1	Email 6:	
Phone Number	(250) 603 - 9417	Phone Number	403 253 7121	PO number	VPO00707765
SAMPLE DETAILS					
Sample ID	WL_BFWB_OUT_SP21_2020-07-27_N	Sample Location	WL_BFWB_OUT_SP21	Field Matrix	WS
Time (24hr)	9:00	G=Grab	G	# Of Cont.	6
Date	7/27/2020	C=Comp			
Hazardous Material (Yes/No)					
<p>ANALYSIS</p> <p>NAUT_96hr_RT_Single_Concentration_Toxicity Test X</p> <p>NAUT_48hr_DM_Single_Concentration_Toxicity Test @ 20C X</p> <p>11/10</p>					
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS					
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.					
SERVICE REQUEST (rush - subject to availability)					
Regular (default)		X			
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus					
RELINQUISHED BY/AFFILIATION		Date		Time	
Julia Johnson		7/27/2020			
SAMPLER'S NAME		Date		Time	
Brittany Campbell					
SAMPLER'S SIGNATURE		Date		Time	
		27-Jul-20			

END OF REPORT



Acute Toxicity Test Results

Sample collected August 10, 2020

Final Report

August 31, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-08-10_N/ 1920-1872	10-Aug-20 at 1400h	11-Aug-20 at 0950h	12-Aug-20 at 1440h	11-Aug-20 at 1615h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-08-10_N	11.5°C	1007	267

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-08-10_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-08-10_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-08-10_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.0 (3.7 - 4.4) g/L KCl ¹	6.2 (5.7 - 6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4 - 4.7) g/L KCl	6.0 (5.1 - 7.0) g/L NaCl
Reference toxicant CV	10.8%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, August 3, 2020; ² Test Date August 3, 2020

LC = Lethal Concentration; CL = Confidence Limit

Lindsay Clothier

Report By:
Lindsay Clothier, MSc
Environmental Scientist

Jacklyn Poole

Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-1872 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/08/12	13:00	16/MF	1	S	Initial pH: <u>7.4</u> Initial EC (µS/cm): <u>1827</u>
1	2020/08/13	09:00	SC	-	S	Initial DO (mg/L): <u>9.8</u>
2	2020/08/14	09:00	BS	-	TP	Initial Temp (°C): <u>20</u>
3	2020/08/15	08:00	BS	-	ME	Salinity (ppt): <u>1</u>
4	2020/08/16	10:55	AL/ST	1	LC	

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
Preaeration time
DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
<u>yes</u>	<u>9.8</u>	<u>8.9</u>	<u>8.9</u>	<u>8.9</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.7</u>	<u>7.7</u>				
Day 4	<u>7.9</u>	<u>8.0</u>				

EC (µS/cm)

Day 0	<u>398</u>	<u>1634</u>				
Day 4	<u>410</u>	<u>1607</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.3</u>	<u>8.9</u>				
Day 4	<u>8.9</u>	<u>8.9</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>14</u>	<u>14</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200521TR
1	<u>3.7</u>	<u>0.6</u>	Loading Density (g/L):	<u>0.3</u>
2	<u>3.4</u>	<u>0.5</u>	(must be ≤0.5 g/L)	
3	<u>3.8</u>	<u>0.7</u>	Mean Length (cm):	<u>3.6</u>
4	<u>3.6</u>	<u>0.7</u>	Length Range (cm):	<u>3.3-3.9</u>
5	<u>3.3</u>	<u>0.4</u>	Mean Weight (g):	<u>0.6</u>
6	<u>3.7</u>	<u>0.7</u>	(Must be ≥0.3g)	
7	<u>3.8</u>	<u>0.7</u>	Weight Range (g):	<u>0.4-0.7</u>
8	<u>3.3</u>	<u>0.4</u>		
9	<u>3.7</u>	<u>0.7</u>	Batch	<u>20200521TR</u>
10	<u>3.8</u>	<u>0.7</u>	Source	<u>Troutlodge</u>
			Tank #	<u>3</u>
			Days Held at 15± 2°C	<u>54</u>
			(must be ≥14 days)	
			Percent stock mortality	<u>0</u>
			(7 days prior to test, must be ≤2%)	
			Test Volume (L)	<u>18</u>

Comments :

96 hrs. no ppt

Reviewed By: TP

Date Reviewed: 2020/08/10

Method DAS20

 Client TEC164

 Reference 1920-1872
Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/08/11	1615	AW/SJ	3	1615	Initial pH: <u>7.4</u>
1	2020/08/12	1055	MF		1055	Initial EC (µS/cm): <u>1627</u>
2	2020/08/13	0930	SC	3	0930	Initial DO (mg/L): <u>9.8</u>
						Initial Temp (°C): <u>20</u>
						Salinity (ppt): <u>1</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day	pH (units) (range: 6.0-8.5)					
0	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>
2	<u>8.0</u>	<u>8.0</u>	<u>8.0</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	<u>453</u>	<u>451</u>	<u>452</u>	<u>1668</u>	<u>1687</u>	<u>1702</u>
2	<u>455</u>	<u>452</u>	<u>450</u>	<u>1613</u>	<u>1658</u>	<u>1671</u>

day	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

day	Temperature (°C) (range: 18-22 °C)					
0	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

day	Number Alive (l, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C5/05</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/1</u>
QA (previous month)	Days to first brood (≤12 days) <u>9</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>31</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>160%</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>30 min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>1007</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L): <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>267</u>	
Dilution Water	Pail label / preparation date <u>2:08/04</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>182</u>	
Comments/Observations:	<u>0 hr: no ppt</u> <u>48 hr: no ppt</u>	

 Reviewed By: [Signature]

 Date Reviewed: 2020/08/10

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-08-10 Toxicity SP21 TURNAROUND TIME: Regular (default) RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Brett Mason			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	brett.mason@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
								Email 4:	Tricia.Hill@teck.com	X	X	X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 5:	Marty.Hafke@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 6:				
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00707765			

SAMPLE DETAILS								ANALYSIS REQUESTED													
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)													
								NAUT_96Hr_RT_Single_Conc entration_Toxicity Test	NAUT_48Hr_DM_Single_Con centration_Toxicity Test @ 20C												
1920-1872	WL_BFWB_OUT_SP21	WS		8/10/2020	14:00	G	6	X	X												

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	8/10/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Blair Peebles		Mobile #	
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	<i>Blair Peebles</i>		Date/Time	10-Aug-20
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

2020/08/11
09:50
Manitowlin
30
3x20L carboys; 3x1L bottles
NaOH/NaI
Good Condition
11.5°C

END OF REPORT



Acute Toxicity Test Results

Sample collected August 24, 2020

Final Report

September 8, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-08-24_N / 1920-2022	24-Aug-20 at 0900h	25-Aug-20 at 1030h	25-Aug-20 at 1510h	25-Aug-20 at 1415h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-08-24_N	13.3°C	954	273

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-08-24_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-08-24_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-08-24_N	Rainbow trout	Precipitate observed on test vessel	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.0 (3.7-4.4) g/L KCl ¹	5.8 (5.3-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.4-4.7) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	10.8%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, August 3, 2020; ² Test Date August 17, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Biologist



Reviewed By:
Jacklyn Poole, BSc
Laboratory Supervisor

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 1920-2022 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/08/25	1510	V/L/AW	1/2	ST	Initial pH: <u>7.3</u>
1	2020/08/26	0845	K/L	-	SP	Initial EC (µS/cm): <u>1058</u>
2	2020/08/27	0850	MW	-	DP	Initial DO (mg/L): <u>10.0</u>
3	2020/08/28	0917	RS	-	TP	Initial Temp (°C): <u>16</u>
4	2020/08/29	1005	MW/ME	1	CB	Salinity (ppt): <u>2</u>

Note: *: time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
Preaeration time
DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
<u>no</u>	<u>9.16</u>	<u>8.0</u>		

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					

pH (units) (range: 5.5-8.5)

Day 0							
Day 0	<u>7.7</u>	<u>7.6</u>					
Day 4	<u>7.9</u>	<u>8.0</u>					

EC (µS/cm)

Day 0							
Day 0	<u>409</u>	<u>1558</u>					
Day 4	<u>400</u>	<u>1515</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0							
Day 0	<u>8.8</u>	<u>9.88</u>					
Day 4	<u>8.9</u>	<u>8.8</u>					

Temperature (°C) (range: 14-16°C)

Day 0							
Day 0	<u>15</u>	<u>15</u>					
Day 4	<u>14</u>	<u>14</u>					

Number Alive (In brackets number stressed)

Day 0							
Day 0	<u>10</u>	<u>10</u>					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>4.0</u>	<u>0.8</u>	<u>20200521TR</u>	
2	<u>3.8</u>	<u>0.6</u>	Source	<u>Troutlodge</u>
3	<u>3.8</u>	<u>0.6</u>	Tank #	<u>2</u>
4	<u>3.8</u>	<u>0.7</u>	Days Held at 15± 2°C	<u>67</u>
5	<u>3.7</u>	<u>0.6</u>	(must be ≥14 days)	
6	<u>3.6</u>	<u>0.6</u>	Percent stock mortality	<u>0</u>
7	<u>4.0</u>	<u>0.7</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.8</u>	<u>0.7</u>	Test Volume (L)	<u>18</u>
9	<u>4.0</u>	<u>0.8</u>		
10	<u>3.7</u>	<u>0.6</u>		
Loading Density (g/L): (must be ≤0.5 g/L)			<u>0.4</u>	
Mean Length (cm):			<u>3.8</u>	
Length Range (cm):			<u>3.6-4.0</u>	
Mean Weight (g): (Must be ≥0.3g)			<u>0.7</u>	
Weight Range (g):			<u>0.6-0.8</u>	

Comments: 0hr: no ppt
96hr: slight red coating tank

Reviewed By: W

Date Reviewed: 2020/08/31

Method DAS20

Client TEC164

Reference 1920-2022

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/08/25	1415	AW/SL	3/2	KL	7.3	165.9	10.0	18	2
1	2020/08/26	0830	AW		DP					
2	2020/08/27	1030	MF	3	ST					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

Day	0	1	2	3	4	5	6	7	8	9	10
0	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
2	8.2	8.3	8.3	8.3	8.3	8.4	8.4				

pH (units) (range: 6.0-8.5) 7.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

Day	0	1	2	3	4	5	6	7	8	9	10
0	406	408	411	1173	1120	1729					
2	400	398	400	1000	1020	1018					

EC (µS/cm)

Day	0	1	2	3	4	5	6	7	8	9	10
0	7.9	7.9	7.9	8.1	8.1	8.1					
2	7.9	7.9	7.9	7.9	7.9	7.9					

DO (mg/L) (40-100% saturation at test temp.)

Day	0	1	2	3	4	5	6	7	8	9	10
0	20	20	20	19	19	19					
2	20	20	20	20	20	20					

Temperature (°C) (range: 18-22 °C)

Day	0	1	2	3	4	5	6	7	8	9	10
0	10	10	10	10	10	10					
1	10	10	10	10	10	10					
2	10	10	10	10	10	10					

Number Alive
(I, immobile)

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture Young jar <u>D4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0.1</u>
QA (previous month) Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria Mean % mortality at 48 hours - (must be ≤10%) <u>0.1</u>
Average number of young produced (≥15 young) <u>36</u>	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No
Sample DO % of sample prior to aeration: <u>97.1</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>-</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>954</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>273</u>	
Dilution Water Pail label / preparation date <u>2.02/16</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
Hardness of dilution water (mg/L) <u>160</u>	
Comments/Observations: 0 hr: <u>no ppt</u> 48 hr: <u>no ppt</u>	

Reviewed By: W

Date Reviewed: 2020/08/31

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-08-24 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO									
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution			Excel	PDF	EDD				
Project Manager	Thomas Davidson			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com		X	X	X				
Email	thomas.davidson@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com		X	X	X				
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com				X				
City	Sparwood		Province	BC		City	Calgary		Province	AB		Email 4:	Tricia.Hill@teck.com		X	X	X
Postal Code	V0B 2G0		Country	Canada		Postal Code	T2H 2K1		Country	Canada		Email 5:	Marty.Hafke@teck.com		X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number		VPO00692115							

SAMPLE DETAILS								ANALYSIS REQUESTED														
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)														
1920-2024	WL_BFWB_OUT_SP21	WS		24/08/20	9:00	G	6	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	X													
								NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C	X													

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	8/24/2020				
SERVICE REQUEST (rush - subject to availability)						
Regular (default) X		Priority (2-3 business days) - 50% surcharge		Emergency (1 Business Day) - 100% surcharge		For Emergency <1 Day, ASAP or Weekend - Contact Nautilus
Sampler's Name		Gilroy James		Mobile #		
Sampler's Signature				Date/Time		24-Aug-20

2020/08/25
10:30
Manitowlin
SC
3x 20L canbays, 3x 1L bottles
N5/N5b
Good Condition

ANALYSIS
15.3°C

END OF REPORT



Acute Toxicity Test Results

Sample collected September 7, 2020

Final Report

September 28, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-09-07_N / 2021-0055	7-Sep-20 at 0900h	8-Sep-20 at 0850h	8-Sep-20 at 1600h	8-Sep-20 at 1555h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-09-07_N	6.0°C	957	249

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-09-07_N	100	100

¹According to information provided by Nautilus Environmental (Burnaby, BC)

Sample ID	Percent Immobility in 100% (v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-09-07_N	3

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-09-07_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	Surficial precipitate observed	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.6 (3.2-3.9) g/L KCl ¹	6.5 (6.0-7.0) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.4 (2.6-4.6) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	9.7%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, August 24, 2020; ² Test Date August 31, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Senior Biologist



Reviewed By:
Leila Oosterbroek, BSc
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-1055 2021-0055 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/09/08	11:00 *	KK/MN	1	MF	Initial pH: <u>7.3</u> Initial EC (µS/cm): <u>1055</u>
1	2020/09/09	09:30	KK	-	OP	Initial DO (mg/L): <u>11.2</u>
2	2020/09/10	08:20	MF	-	OP	Initial Temp (°C): <u>14</u>
3	2020/09/11	08:35	BS	-	OP	Salinity (ppt): <u>2</u>
4	2020/09/12	09:35	MN	L	ST	

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 10.4 9.8 9.5 8.9

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>8.1</u>	<u>7.4</u>				
Day 4	<u>8.1</u>	<u>8.3</u>				

EC (uS/cm)

Day 0	<u>474</u>	<u>1497</u>				
Day 4	<u>404</u>	<u>1484</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>8.9</u>				
Day 4	<u>8.7</u>	<u>8.7</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	<u>20200731TR</u>
1	<u>3.4</u>	<u>0.5</u>	Source	<u>Sam Livingston</u>
2	<u>3.6</u>	<u>0.6</u>	Tank #	<u>5</u>
3	<u>3.5</u>	<u>0.5</u>	Days Held at 15± 2°C	<u>39</u>
4	<u>3.5</u>	<u>0.5</u>	(must be ≥14 days)	
5	<u>3.5</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>
6	<u>3.5</u>	<u>0.6</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.2</u>	<u>0.4</u>	Test Volume (L)	<u>18</u>
8	<u>3.2</u>	<u>0.5</u>		
9	<u>3.0</u>	<u>0.4</u>		
10	<u>3.3</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.4</u>				
Length Range (cm): <u>3.0-3.6</u>				
Mean Weight (g): <u>0.5</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.4-0.6</u>				
Comments: 0hr: no ppt 96hr: <u>No ppt</u>				

Reviewed By: MLG

Date Reviewed: 2020/09/14

Method DAS 20

Client TEC164

Reference 2021-0055

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information	
0	2020/08/08	1555	SS/LC	3	KK	Initial pH:	7.3
1	2020/09/09	0820	KK	-	DT	Initial EC (µS/cm):	1655
2	2020/09/10	0805	CB	3		Initial DO (mg/L):	11.2
						Initial Temp (°C):	14
						Salinity (ppt):	2

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

day	pH (units) (range: 6.0-8.5)					
0	8.3	8.3	8.3	7.9	7.9	8.0
2	8.4	8.3	8.3	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	419	422	422	1635	1679	1681
2	433	431	433	1583	1600	1657

day	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	7.9	7.9	7.9
2	7.9	7.9	7.9	7.9	7.9	7.9

day	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	20	20	20
2	20	20	20	20	20	20

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>D2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>9</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Average number of young produced (≥15 young)	
Were test treatments randomized on test tray? <input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No <u>37.4 MG</u>	
Sample	
DO % of sample prior to aeration: <u>162</u>	Is aeration required (<40% or >100%)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>957</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>—</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>249</u>	
Dilution Water	DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date <u>2: 08/28</u>	3.3 to 8.2 mg/L at 18°C
Hardness of dilution water (mg/L) <u>189</u>	3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C
	3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations: Oh: no ppt 4th: v slight surficial ppt	

Reviewed By: MG

Date Reviewed: 2020/09/14

APPENDIX C – Chain-of-custody form

COC ID: 2020-09-07 Toxicity_SP21		LABORATORY		OTHER INFO	
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO	
Facility Name	WLC AWF	Lab Name	Nautilus Environmental	Report Format / Distribution	Excel PDF
Project Manager	Brett Mason	Lab Contact	Tamara Pomeroy	Email 1:	DL-WLC-Lab@teck.com
Email	brett.mason@teck.com	Email	tamara@nautilusenvironmental.ca	Email 2:	Thomas.Davidson@teck.com
Address	15 Km North HWY 43	Address	#4, 6125 - 12 Street SE	Email 3:	TeckCoal@episonline.com
City	Sparwood	City	Calgary	Email 4:	Tricia.Hill@teck.com
Postal Code	V0B 2G0	Province	BC	Email 5:	Mary.Harke@teck.com
Country	Canada	Country	Canada	Email 6:	
Phone Number	(250) 603 - 9417	Phone Number	403 253 7121	PO number	VPO00707765
SAMPLE DETAILS					
Sample ID	2021-0055	Sample Location	WL_BFWB_OUT_SP21	Field Matrix	WS
Sample ID	2020-09-07_N	Sample Location	WL_BFWB_OUT_SP21	Field Matrix	WS
<p><i>2020/09/06</i> <i>08:50</i> <i>RAW Hotshot</i> <i>3x 20L carboys, 3x 1L bottles</i> <i>NCS/Na</i> <i>Good Condition</i> <i>B.OC</i></p>					
<p>ANALYSIS</p> <p>Time (24hr) 9:00 Date 9/7/2020</p> <p>G=Grab C=Comp Cont. 6</p> <p>NAT_96Hr_RT_Single_Concentration_Toxicity Test X</p> <p>NAT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C X</p>					
<p>RELINQUISHED BY/AFFILIATION: Tara Gentile</p> <p>Date: 9/8/2020</p>					
<p>ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS</p> <p>Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.</p>					
<p>SERVICE REQUEST (rush - subject to availability)</p> <p>Regular (default) X</p> <p>Priority (2-3 business days) - 50% surcharge</p> <p>Emergency (1 Business Day) - 100% surcharge</p> <p>For Emergency <1 Day, ASAP or Weekend - Contact Nautilus</p>					
Sampler's Name		Tara Gentile		Mobile #	
Sampler's Signature		Tara Gentile		Date/Time	
		Tara Gentile		7-Sep-20	

END OF REPORT



Acute Toxicity Test Results

Sample collected September 22, 2020

Final Report

October 13, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-09-22_N / 2021-0184	22-Sep-20 at 0900h	23-Sep-20 at 1050h	24-Sep-20 at 1400h	23-Sep-20 at 1455h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-09-22_N	8.7°C	888	259

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-09-22_N	100	100

Sample ID	Percent Immobility in 100% (v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-09-22_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-09- 22_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.5 (3.1-4.0) g/L KCl ¹	5.8 (5.5-6.0) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.6-4.6) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	9.6%	5.2%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, September 14, 2020; ² Test Date September 28, 2020

LC = Lethal Concentration; CL = Confidence Limit

Michael Wrubleski

Report By:
Michael Wrubleski, BSc
Biologist

Leila Oosterbroek

Reviewed By:
Leila Oosterbroek, BSc
Environmental Scientist

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0184 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/09/24	1400 *	CB/BS	1	SF	Initial pH: <u>7.8</u>
1	2020/09/25	0900	LC	-	JP	Initial EC (µS/cm): <u>1523</u>
2	2020/09/26	0930	AE	-	JT	Initial DO (mg/L): <u>9.1</u>
3	2020/09/27	0830	MF	-	KL	Initial Temp (°C): <u>19</u>
4	2020/09/28	0745	LC/AW	1	KL	Salinity (ppt): <u>1</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 8.8

DO in mg/L (70% - 100% saturation)**
6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.9</u>	<u>8.0</u>				
Day 4	<u>8.1</u>	<u>8.2</u>				

EC (uS/cm)

Day 0	<u>386</u>	<u>1521</u>				
Day 4	<u>409</u>	<u>1554</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>8.8</u>				
Day 4	<u>8.7</u>	<u>8.7</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0		10	10			
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	<u>20200826TR</u>
1	<u>3.1</u>	<u>0.3</u>	Source	<u>Sam Livingston</u>
2	<u>3.0</u>	<u>0.3</u>	Tank #	<u>78B</u>
3	<u>3.2</u>	<u>0.4</u>	Days Held at 15± 2°C	<u>29</u>
4	<u>3.4</u>	<u>0.4</u>	(must be ≥14 days)	
5	<u>3.3</u>	<u>0.3</u>	Percent stock mortality	<u>0</u>
6	<u>3.3</u>	<u>0.4</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.2</u>	<u>0.3</u>	Test Volume (L)	<u>18</u>
8	<u>3.6</u>	<u>0.4</u>		
9	<u>3.2</u>	<u>0.3</u>		
10	<u>3.5</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.3</u>				
Length Range (cm): <u>3.0-3.6</u>				
Mean Weight (g): <u>0.4</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.4</u>				
Comments:				
<u>96hr: No ppt</u>				

Reviewed By: BS

Date Reviewed: 2020/09/29

Method DAS

 Client TEC164

 Reference 2021-0184
Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/09/23	1455	ME/KK	3	JK
1	2020/09/24	0740	ST	-	JP
2	2020/09/25	1040	CS	2	SC

Sample Information

Initial pH:	<u>7.8</u>
Initial EC (µS/cm):	<u>1573</u>
Initial DO (mg/L):	<u>9.1</u>
Initial Temp (°C):	<u>19</u>
Salinity (ppt):	<u>85 @ 1</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>
2	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>	<u>8.5</u>	<u>8.6</u>	<u>8.5</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>415</u>	<u>400</u>	<u>400</u>	<u>1593</u>	<u>1611</u>	<u>1602</u>
2	<u>405</u>	<u>608</u>	<u>405</u>	<u>1510</u>	<u>1583</u>	<u>1572</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.7</u>	<u>7.7</u>	<u>7.7</u>	<u>7.5</u>	<u>7.5</u>	<u>7.5</u>

	Temperature (°C) (range: 18-22 °C)					
0	<u>20</u>	<u>20</u>	<u>20</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>DI</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>7</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Average number of young produced (≥15 young) <u>31</u>	
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No	
Sample	
DO % of sample prior to aeration: <u>109</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>888</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>259</u>	
Dilution Water	
Pail label / preparation date <u>1:09/19</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
Hardness of dilution water (mg/L) <u>193</u>	
Comments/Observations: <u>0 hr: no ppt</u> <u>48h: no ppt</u>	

 Reviewed By: BS

 Date Reviewed: 2020/09/29

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-09-22_Toxicity_SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO

Facility Name: **WLC_AWTF**
 Project Manager: Brett Mason
 Email: brett.mason@teck.com
 Address: 15 Km North HWY 43

LABORATORY

Lab Name: Nautilus Environmental
 Lab Contact: Tamara Pomroy
 Email: tamara@nautilusenvironmental.ca
 Address: #4, 6125 - 12 Street SE

OTHER INFO

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 Email 3: Tricia Hill@teck.com
 Email 4: Marty.Hafke@teck.com
 Email 5:
 Email 6:

Province: BC
 Country: Canada
 City: Sparwood
 Postal Code: V0B 2G0

City: Calgary
 Province: AB
 Country: Canada
 Postal Code: T2H 2K1

Excel
 PDF
 EDD

Phone Number (250) 603 - 9417

Phone Number 403 253 7121

PO number VPO00707765

SAMPLE DETAILS

*2020/09/28
 10:50
 Manitowlin
 DC
 3x20L carbonyls, 3x1L bottles
 NaOH
 Good Condition
 8.7°C*

Sample ID: 2021-0184
 Sample Location: WLC_BFWB_OUT_SP21
 Field Matrix: WS
 Date: 9/22/2020
 Time (24hr): 9:00
 G=Grab
 C=Comp
 # Of Cont.: 6

ANALYSIS REQUESTED

ANALYSIS

NAUT_96HR_RT_Single_Concentration_Toxicity Test
 NAUT_48HR_DM_Single_Concentration_Toxicity Test @ 20C

Please indicate below Filtered, Preserved or both (F, P, F/P)

RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Julia Johnson	9/22/2020				

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.

SERVICE REQUEST (rush - subject to availability)

Regular (default) X
 Priority (2-3 business days) - 50% surcharge
 Emergency (1 Business Day) - 100% surcharge
 For Emergency <1 Day, ASAP or Weekend - Contact Nautilus

Sampler's Name: Julia Johnson
 Mobile #:
 Sampler's Signature:
 Date/Time: 22-Sep-20

END OF REPORT



Acute Toxicity Test Results

Samples collected December 7, 2020

Final Report

December 23, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
F2_BPO_WG_2020-12-07_N-SRF / 2021-0701-01	7-Dec-20 at 0855h	8-Dec-20 at 1020h	8-Dec-20 at 1600h	8-Dec-20 at 1510h	8-Dec-20 at 1510h	-
F2_BPO_WG_2020-12-07_N-SRF-AS / 2021-0701-02	7-Dec-20 at 0856h	8-Dec-20 at 1020h	-	-	-	8-Dec-20 at 1505h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
F2_BPO_WG_2020-12-07_N-SRF	1.6°C	1285	483
F2_BPO_WG_2020-12-07_N-SRF-AS	2.6°C	1285	483

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 20 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
F2_BPO_WG_2020-12-07_N-SRF	90	100	100	-
F2_BPO_WG_2020-12-07_N-SRF-AS	-	-	-	100

Sample ID	Percent Immobility in 100% (v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
F2_BPO_WG_2020-12-07_N-SRF	0	0	-
F2_BPO_WG_2020-12-07_N-SRF-AS	-	-	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
F2_BPO_WG_2020-12-07_N-SRF	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None
F2_BPO_WG_2020-12-07_N-SRF-AS	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	4.3 (3.8-4.7) g/L KCl ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.8-4.6) g/L KCl	6.2 (5.4-7.1) g/L NaCl
Reference toxicant CV	8.6%	4.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, November 25, 2020; ² Test Date December 7, 2020

LC = Lethal Concentration; CL = Confidence Limit

Shae Cole

Report By:
Shae Cole, BSc
Biologist

Leila Oosterbroek

Reviewed By:
Leila Oosterbroek, BSc
Environmental Scientist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 20 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC 164 Reference 2021-0701-01 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	12/8/2020	1600 *	MW/ST	1	MJ	Initial pH: <u>7.7</u>
1	12/9/2020	0800	MW	-	JP	Initial EC (µS/cm): <u>2230</u>
2	12/10/2020	0815	MW	-	JP	Initial DO (mg/L): <u>9.9</u>
3	12/11/2020	0845	MW	-	JP	Initial Temp (°C): <u>15</u>
4	12/12/2020	1215	MW	1	LC	Salinity (ppt): <u>3</u>

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>9.9</u>	<u>9.7</u>	<u>9.5</u>	<u>9.4</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				

pH (units) (range: 5.5-8.5)

Day 0	<u>7.5</u>	<u>7.7</u>				
Day 4	<u>8.3</u>	<u>8.3</u>				

EC (uS/cm)

Day 0	<u>455</u>	<u>2010</u>				
Day 4	<u>570</u>	<u>1898</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>9.4</u>				
Day 4	<u>8.4</u>	<u>8.9</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>16</u>				
Day 2	<u>10</u>	<u>16</u>				
Day 3	<u>10</u>	<u>16</u>				
Day 4	<u>10</u>	<u>16</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.3</u>	<u>0.4</u>	<u>20201109TR</u>	
2	<u>3.2</u>	<u>0.4</u>	Source	<u>Smoky Trout Farm</u>
3	<u>3.2</u>	<u>0.4</u>	Tank #	<u>8</u>
4	<u>3.2</u>	<u>0.5</u>	Mean Length (cm):	<u>3.3</u>
5	<u>3.2</u>	<u>0.4</u>	Length Range (cm):	<u>3.2-3.6</u>
6	<u>3.2</u>	<u>0.4</u>	Mean Weight (g):	<u>0.5</u>
7	<u>3.5</u>	<u>0.5</u>	Weight Range (g):	<u>0.4-0.6</u>
8	<u>3.2</u>	<u>0.4</u>	Days Held at 15± 2°C	<u>29</u>
9	<u>3.3</u>	<u>0.5</u>	Percent stock mortality	<u>0</u>
10	<u>3.6</u>	<u>0.6</u>	Test Volume (L)	<u>18</u>

Comments: 0 Hrs: NO PAT
96 Hrs: NO PPT

Reviewed By: W

Date Reviewed: 2020/12/14

Method DAS20

Client TEC164

Reference 2021-0701-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/12/08	1510	YKISC	3	S	Initial pH: <u>7.7</u>
1	2020/12/09	0805	IF	-	DP	Initial EC (µS/cm): <u>2270</u>
2	2020/12/10	0900	SC	3	VXL	Initial DO (mg/L): <u>7.9</u>
						Initial Temp (°C): <u>19</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

day	pH (units) (range: 6.0-8.5)					
0	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.4</u>	<u>8.4</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	<u>434</u>	<u>443</u>	<u>440</u>	<u>2180</u>	<u>2170</u>	<u>2200</u>
2	<u>456</u>	<u>441</u>	<u>442</u>	<u>2190</u>	<u>2150</u>	<u>2100</u>

day	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

day	Temperature (°C) (range: 18-22 °C)					
0	<u>20</u>	<u>20</u>	<u>20</u>	<u>19</u>	<u>19</u>	<u>19</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture
Young jar D1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
Days to first brood (≤12 days) 8
Average number of young produced (≥15 young) 27
Were test treatments randomized on test tray? Yes No

Control Validity Criteria
Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
DO % of sample prior to aeration: 117 Is aeration required (<40% or >100%)? Yes No
Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes No
Hardness (mg CaCO₃/L) of 100%: 1285 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -
Alkalinity of 100% sample (mg CaCO₃/L): 483

Dilution Water
Pail label / preparation date 2112101
Hardness of dilution water (mg/L) 190

DO Levels (40-100% saturation) - corrected for altitude -
3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
3.2 to 7.9 mg/L at 20°C

Comments/Observations:
0h: no ppt
48h: sublethal ppt

Reviewed By: 10

Date Reviewed: 20211210

Method DAS10

Client TEC164

Reference 2021-0701-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/12/08	1510	KRISC	3	S
1	2020/12/09	0815	LF	-	JP
2	2020/12/10	0910	JC	3	YLL

Sample Information

Initial pH:	<u>7.7</u>
Initial EC (µS/cm):	<u>2230</u>
Initial DO (mg/L):	<u>9.9</u>
Initial Temp (°C):	<u>13</u>
Salinity (ppt):	<u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C
----------	------	------	------	------	------	------

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.4</u>	<u>8.4</u>	<u>8.3</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>428</u>	<u>433</u>	<u>440</u>	<u>2180</u>	<u>2190</u>	<u>2180</u>
2	<u>461</u>	<u>459</u>	<u>451</u>	<u>2110</u>	<u>2140</u>	<u>2130</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>
2	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>	<u>9.4</u>

	Temperature (°C) (range: 8-12 °C)					
0	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>
2	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>

	Number Alive (l, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	
Days to first brood (≤12 days) <u>0</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>30</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Were test treatments randomized on test tray? <u>Yes</u> / No	
Sample	
DO % of sample prior to aeration: <u>112</u>	Is aeration required (<40% or >100%)? <u>Yes</u> or No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <u>Yes</u> or No
Hardness (mg CaCO ₃ /L) of 100%: <u>1285</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes</u> or No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>483</u>	
Dilution Water	
Pail label / preparation date <u>2:12/01</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>190</u>	
Comments/Observations: <u>0hr: no ppt</u> <u>48hr: no ppt</u>	

Reviewed By: W

Date Reviewed: 20201214

Daphnia Antiscalant Bench Sheet

Method DAS AS Client TEC164 Reference 2021-0701-02

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/12/08	1505	KEISC	3	SP	Initial pH: <u>7.7</u>
1	2020/12/09	0805	LE	-	SP	Initial EC (µS/cm): <u>2250</u>
2	2020/12/10	0900	XC	3	UL	Initial DO (mg/L): <u>9.9</u>
						Initial Temp (°C): <u>15</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day pH (units) (range: 6.0-8.5)

0	8.3	8.3	8.3	8.1	8.1	8.1			
2	8.3	8.3	8.3	8.4	8.4	8.4			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (µS/cm)

0	437	439	440	2150	2150	2170			
2	446	490	452	2150	2200	2100			

DO (mg/L) (40-100% saturation at test temp.)

0	7.9	7.9	7.9	8.1	8.1	8.1			
2	7.9	7.9	7.9	7.9	7.9	7.9			

Temperature (°C) (range: 18-22 °C)

0	20	20	20	19	19	19			
2	20	20	20	20	20	20			

Number Alive (l, immobile)

0	10	10	10	10	10	10			
1	10	10	10	10	10	10			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control
 Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
 Unless otherwise noted, behaviour is considered to be normal

Culture
 Young jar C1 Jar(s) mortality 7 days prior to test (must be ≤25%) 0%

QA (previous month)
 Days to first brood (≤12 days) 8
 Average number of young produced (≥15 young) 30
 Were test treatments randomized on test tray? Yes No

Control Validity Criteria
 Mean % mortality at 48 hours - (must be ≤10%) 0%

Sample
 DO % of sample prior to aeration: 112 Is aeration required (<40% or >100%)? Yes No
 Duration of aeration (37.5 +/- 12.5 mL/min/L): 20min Filtered with 110µm screen prior to testing Yes No
 Hardness (mg CaCO₃/L) of 100%: 1285 Is hardness adjustment required (<25 mg CaCO₃/L)? Yes No
 Hardness of sample after adjustment (must be between 25 - 30 mg CaCO₃/L) -
 Alkalinity of 100% sample (mg CaCO₃/L): 483

Dilution Water
 Pail label / preparation date 2:12/01
 Hardness of dilution water (mg/L) 190

Antiscalant
 Final Concentration in Sample: 20mg/L
 Volume of sample: 500mL Volume of antiscalant: 158µL

Comments/Observations: 0hr: no ppt
48hr: no ppt

DO Levels (40-100% saturation) - corrected for altitude -
 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
 3.2 to 7.9 mg/L at 20°C

Reviewed By: W

Date Reviewed: 20201214

APPENDIX C – Chain-of-custody form

COC ID: **F2 Weekly Tox 07 2020**

TURNAROUND TIME:

RUSH

PROJECT/CLIENT INFO

LABORATORY

OTHER INFO

Facility Name / Job#	F2 SRF	Lab Name	Nauticus Environmental - BC	Report Format / Distribution	Excel	PDF	EDD
Project Manager	Group 1: BRETT MASON	Lab Contact		Email 1:	420.lab.results@teck.com	X	X
Email		Email	jacklyn@nauticusemvironmental.ca	Email 2:	Amie.Larriere@teck.com	X	X
Address	RRI HWY 3	Address	#4 6125 12 Street SE	Email 3:	Joeylin.Traverse@teck.com	X	X
City	Sparwood	City	Calgary	Email 4:	Smitiriba.Usher@teck.com	X	X
Province	BC	Province	AB	Email 5:	Brynn.Osler@teck.com	X	X
Country	Canada	Country	Canada	Email 6:	beckson@equionline.com	X	X
Postal Code	V0B 2G0	Postal Code	T2H 2K1	Email 7:	MaryV.Haire@teck.com	X	X
Phone Number	250-425-6179	Phone Number	403-253-7121	Email 8:	Kennedy.Allan@teck.com	X	X
				Email 9:			
				Email 10:			
				Email 11:			
				Email 12:			
				Email 13:	teckson@equionline.com	X	X

SAMPLE DETAILS

ANALYSIS REQUESTED

PROJID 709471

Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Com P	# OF Cont.	ANALYSIS	FIELD	LAB
F2_BPO_WS_2020-12-07_N-SRF	701	WS		2020/12/07	8:55	G	12	48hr Daphnia Magna Single Concentration Acute Toxicity 20C		
								48hr Daphnia Magna Single Concentration Acute Toxicity 10C		
								48hr Daphnia Magna Single Concentration Acute Toxicity Antiscalent		
								96hr Rainbow Trout Single Concentration Acute Toxicity		
								48hr Daphnia Magna Single Concentration Toxicity 15C		
F2_BPO_WS_2020-12-07_N-SRF-AS	-02	WS		2020/12/07	8:56	G	1			

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION

DATE/TIME

ACCEPTED BY/AFFILIATION

DATE/TIME

Field Temperatures
BCI: degrees C
GTI: degrees C

SERVICE REQUEST (rush - subject to availability)

Regular (default) X
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend - Contact ALS

Sampler's Name
Sampler's Signature

Mobile #
Date/Time

Cole Viegas
701

2.894

1.894

2020/12/08
10:20
Merritt
AC
8x10L carboys, 8x1L bottles
NoS/NoT
Good condition

END OF REPORT



Acute Toxicity Test Results

Samples collected December 14, 2020

Final Report

December 26, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates					
	Collected	Received	Rainbow trout test initiation ¹	<i>Daphnia magna</i> 10°C test initiation	<i>Daphnia magna</i> 20°C test initiation	<i>Daphnia magna</i> antiscalant test initiation
F2_BPO_WG_2020- 12-14_N-SRF/ 2021-0756-01	14-Dec-20 at 0905h	15-Dec-20 at 0930h	17-Dec-20 at 1555h	16-Dec-20 at 1330h	16-Dec-20 at 1350h	-
F2_BPO_WG_2020- 12-14_N-SRF-AS/ 2021-0756-02	14-Dec-20 at 0906h	15-Dec-20 at 0930h	-	-	-	16-Dec-20 at 1405h

¹According to information provided by Nautilus Environmental (Burnaby, BC)

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
F2_BPO_WG_2020- 12-14_N-SRF	2.7°C	1468	481
F2_BPO_WG_2020- 12-14_N-SRF-AS	4.6°C	1468	481

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test (conducted at 10°C)
- *Daphnia magna* 48-h single concentration screening test (conducted with 20 mg/L antiscalant)

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample			
	Rainbow trout ¹	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
F2_BPO_WG_2020-12-14_N-SRF	100	100	100	-
F2_BPO_WG_2020-12-14_N-SRF-AS	-	-	-	100

¹According to information provided by Nautilus Environmental (Burnaby, BC)

Sample ID	Percent Immobility in 100 (% v/v)		
	<i>Daphnia magna</i> 10°C	<i>Daphnia magna</i> 20°C	<i>Daphnia magna</i> antiscalant
F2_BPO_WG_2020-12-14_N-SRF	0	0	-
F2_BPO_WG_2020-12-14_N-SRF-AS	-	-	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
F2_BPO_WG_2020-12-14_N-SRF	Rainbow trout ¹	Precipitate observed on the bottom of test vessel	None
	<i>Daphnia magna</i>	Precipitate observed on the surface of 20 degree test	None
F2_BPO_WG_2020-12-14_N-SRF-AS	<i>Daphnia magna</i>	None	None

¹According to information provided by Nautilus Environmental (Burnaby, BC)

QA/QC

QA/QC summary	Rainbow trout³	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	98.4 (71.9-141.6) µg/L Zn ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	79.9 (29.5-211.0) µg/L Zn	6.2 (5.4-7.1) g/L NaCl
Reference toxicant CV	52%	4.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date December 17, 2020; ² Test Date December 7, 2020; ³According to information provided by Nautilus Environmental (Burnaby, BC)

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Courtney Bogstie, BSc
Senior Biologist



Reviewed By:
Kayla Knol, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.¹

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	20-L glass aquarium
Test volume	10 to 20 L (depending on size of fish)
Test solution depth	≥ 15 cm
Test concentrations	100% (undiluted) sample, plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	Dechlorinated Metro Vancouver municipal tapwater
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light / 8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test measurements	Temperature, dissolved oxygen and pH measured daily; salinity measured in the undiluted sample at test initiation; conductivity measured at test initiation and termination; survival checked daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Test endpoint	Survival
Test acceptability criterion for controls	Survival ≥ 90%
Reference toxicant	Zinc (added as ZnSO ₄)

¹According to information provided by Nautilus Environmental (Burnaby, BC)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Control/dilution water for antiscalant test	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L), Na ₂ SeO ₄ (2 µg Se/L) and 20 mg/L antiscalant
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

Table 3. Summary of test conditions: 48-h *Daphnia magna* survival test at 10°C.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	10 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Rainbow Trout Summary Sheet

Client:

Nautilus Environmental Calgary Start Date/Time: Dec 17/20 @ 15:55h

Work Order No.:

202433

Test Species: Oncorhynchus mykiss

Sample Information:

Sample ID:

2021-0756-01

Sample Date:

December 14, 2020

Date Received:

December 16, 2020

Sample Volume:

1X20L

Other:

-

Test Validity Criteria:

≥ 90% control survival

WQ Ranges:

T (°C) = 15 ± 1; DO (mg/L) = 7.0 to 10.3; pH = 5.5 to 8.5

Dilution Water:

Type:

Dechlorinated Municipal Tap Water

Hardness (mg/L CaCO₃):

12

Alkalinity (mg/L CaCO₃):

10

Test Organism Information:

Batch No.:

120320

Source:

Lyndon Fish Hatcheries

No. Fish/Volume (L):

10/12L

Loading Density (g/L):

0.26

Mean Length ± SD (mm):

34 ± 2

Mean Weight ± SD (g):

0.31 ± 0.04

Range: 32 - 38

Range: 0.22 - 0.38

Zinc Reference Toxicant Results:

Reference Toxicant ID:

RTZnL072

Stock Solution ID:

20Zn03

Date Initiated:

December 17, 2020

96-h LC50 (95% CL):

98.4 (71.9 - 141.6) µg/L Zn

Reference Toxicant Mean and Historical Range:

79.9 (29.5 - 211.0) µg/L Zn

Reference Toxicant CV (%):

52%

Test Results:

0% mortality at 96h in the 100% (viv) undiluted sample

Reviewed by:

[Signature]

Date reviewed:

Dec 21, 2020

96-Hour Rainbow Trout Toxicity Test Data Sheet

Client/Project#: Nautilus Environmental Calgary
 Sample I.D.: 2021-0756-01
 W.O. #: 202433
 RBT Batch #: 11920-220322
 Date Collected/Time: Dec 14/20 @ 09:05h
 Date Setup/Time: Dec 17/20 @ 15:57h
 CER #: 8
 Sample Setup By: as / PYK

Number Fish/Volume: 10/12L
 7-d % Mortality: 0.0%
 Total Pre-aeration Time (mins): 30
 Aeration rate adjusted to 6.5 ± 1 mL/min/L? (Y/N): Y

Parameters	Undiluted Sample WQ		
	Initial WQ	Adjustment	30 min WQ
Temp °C	14.5		14.5
D.O. (mg/L)	8.7		9.4
pH	7.2		7.3
Cond. (µS/cm)	2320		
Salinity (ppt)	1.2		1.2

Thermometer: CEB
 D.O. meter/probe: 212
 Cond./Salinity meter/probe: 212
 pH meter/probe: 212

Concentration	# Survivors						Temperature (°C)						Dissolved Oxygen (mg/L)						pH						Conductivity (µS/cm)				
	1	2	4	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
(% v/v)																													
Ctrl				10	10	10	10	14.5	14.5	14.5	14.5	15.0	9.7	9.8	9.7	9.5	9.5	7.1	6.6	7.1	7.1	6.6	3.2	3.2	3.2	3.2	3.2	44	44
100				10	10	10	10	14.5	14.5	14.5	14.5	15.0	9.4	9.9	9.8	9.6	9.6	7.3	8.2	8.4	8.2	8.1	2350	2350	2350	2350	2350	2200	2200
Initials																													

Sample Description/Comments: whenever, slightly sparse sediment no ppt.
 Fish Description at 96 h: light a whenever, remaining fish appear normal! Number of Stressed Fish at 96 h: 0
 Other Observations: precipitate observed @ 24h at bottom of tank
 Reviewed by: [Signature] Date Reviewed: Dec 21, 2020

Rainbow trout (*Oncorhynchus mykiss*) Length and Weight Sheet

Client: Nautilus Environmental Calgary
 Sample ID: 2021-0756 -01
 W.O. #: 202433


Balance ID: Bal - 2
 Date Measured: ~~11/20~~ Dec 21/20
 Batch #: ~~11920~~ 120320

	Length (mm)	Weight (g)
1	<u>32</u>	<u>0.31</u>
2	<u>37</u>	<u>0.34</u>
3	<u>36</u>	<u>0.32</u>
4	<u>33</u>	<u>0.30</u>
5	<u>34</u>	<u>0.30</u>
6	<u>35</u>	<u>0.34</u>
7	<u>33</u>	<u>0.26</u>
8	<u>34</u>	<u>0.31</u>
9	<u>38</u>	<u>0.38</u>
10	<u>33</u>	<u>0.22</u>

Total	<u>345</u>	<u>3.08</u>
Mean	<u>34</u>	<u>0.31</u>
Std. Dev.	<u>2</u>	<u>0.04</u>
Low	<u>32</u>	<u>0.22</u>
High	<u>38</u>	<u>0.38</u>

Loading Density (g/L) 0.26

Initials 

Reviewed by:  Date Reviewed: Dec 21, 2020

Method DAS-20

Client TEC 164

Reference 2021-0756-01

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/12/16	1350	LEIMW	3	SP	7.3	2260	8.5	18	4
1	2020/12/17	0840	IP	-	TP					
2	2020/12/18	0945	MW	3	AW					

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day	pH (units) (range: 6.0-8.5)					
0	8.4	8.4	8.3	7.5	7.5	7.5
2	8.3	8.3	8.2	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	439	441	436	2290	2180	2200
2	449	445	450	2100	2210	2100

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.1	8.1	8.1	8.1	8.1	8.1
2	7.7	7.7	7.7	7.8	7.7	7.7

	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	19	19	19
2	20	20	20	20	20	20

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C2</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>5/</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
	Average number of young produced (≥15 young)	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No <u>33</u>	
Sample	DO % of sample prior to aeration: <u>100/</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>-</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>1468</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>481</u>	
Dilution Water	Pail label / preparation date <u>2:12/09</u>	DO Levels (40-100% saturation) - corrected for altitude -
	Hardness of dilution water (mg/L) <u>224</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	0 Hrs: <u>no ppt</u>	
	48 Hrs: <u>slight surficial ppt</u>	

Reviewed By: CP

Date Reviewed: 2020/12/21

Daphnia 10°C Bench Sheet

Method DAS-10

Client TEC 164

Reference 2021-0756-01

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/12/16	1330	LFIMW	3	SE	Initial pH: <u>7.3</u>
1	2020/12/17	0855	JE		TP	Initial EC (µS/cm): <u>2260</u>
2	2020/12/18	1010	MW	3	AW	Initial DO (mg/L): <u>8.5</u>
						Initial Temp (°C): <u>13</u>
						Salinity (ppt): <u>4</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day

	pH (units) (range: 6.0-8.5)					
0	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>7.4</u>	<u>7.4</u>	<u>7.4</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.4</u>	<u>8.5</u>	<u>8.5</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	<u>443</u>	<u>436</u>	<u>439</u>	<u>2280</u>	<u>2140</u>	<u>2260</u>
2	<u>476</u>	<u>472</u>	<u>465</u>	<u>2180</u>	<u>2260</u>	<u>2176</u>

	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>
2	<u>9.5</u>	<u>9.5</u>	<u>9.5</u>	<u>9.6</u>	<u>9.6</u>	<u>9.6</u>

	Temperature (°C) (range: 8-12 °C)					
0	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>
2	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>	<u>11</u>

	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>D1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - <u>0</u>
Average number of young produced (≥15 young)	(must be ≤10%)
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes <input type="radio"/> No <u>29</u>	
Sample	
DO % of sample prior to aeration: <u>100%</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>-</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>1468</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes <input type="radio"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>-</u>
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>481</u>	
Dilution Water	DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date <u>2-12109</u>	4.1 to 10.3 mg/L at 8°C
Hardness of dilution water (mg/L) <u>226</u>	3.8 to 9.6 mg/L at 11°C
	4.0 to 10.0 mg/L at 9°C
	3.7 to 9.4 mg/L at 12°C
	3.9 to 9.8 mg/L at 10°C
Comments/Observations:	
0 Hrs: <u>no ppt</u>	
48 Hrs: <u>no ppt</u>	
Reviewed By: <u>CBS</u>	Date Reviewed: <u>2020/12/21</u>

Daphnia Antiscalant Bench Sheet

Method DAS-AS Client TEC 164 Reference 2021-0756-02

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/12/16	1405	LFMILW	3	ST	7.3	2260	8.5	13	4
1	2020/12/17	0835	JE	-	TP					
2	2020/12/18	0955	MW	3	AW					

Sample Information

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day	pH (units) (range: 6.0-8.5)					
0	8.3	8.4	8.4	7.6	7.6	7.6
2	8.3	8.3	8.3	8.4	8.4	8.5

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	442	438	436	2180	2250	2250
2	447	443	447	2260	2060	2186

day	DO (mg/L) (40-100% saturation at test temp.)					
0	8.1	8.1	8.1	8.2	8.2	8.2
2	7.8	7.8	7.8	7.8	7.8	7.8

day	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	18	18	18
2	20	20	20	20	20	20

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move
Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>C3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>
QA (previous month)	
Days to first brood (≤12 days) <u>8 of 4</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>33</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Were test treatments randomized on test tray? <u>Yes</u> / No	
Sample	
DO % of sample prior to aeration: <u>100%</u>	Is aeration required (<40% or >100%)? <u>Yes</u> or No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>-</u>	Filtered with 110µm screen prior to testing <u>Yes</u> or No
Hardness (mg CaCO ₃ /L) of 100%: <u>1468</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes</u> or No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>481</u>	
Dilution Water	
Pail label / preparation date <u>2:12/109</u>	Antiscalant
Hardness of dilution water (mg/L) <u>2260</u>	Final Concentration in Sample: <u>20 mg/L</u>
	Volume of sample: <u>500ml</u> Volume of antiscalant: <u>158µL</u>
Comments/Observations:	
0 Hrs: <u>no ppt</u>	DO Levels (40-100% saturation) - corrected for altitude -
48 Hrs: <u>No ppt</u>	3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C

Reviewed By: CB Date Reviewed: 2020/12/21

APPENDIX C – Chain-of-custody form

COC ID: F2 Weekly Tox 14 2020		TURNAROUND TIME:		RUSH:	
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO	
Facility Name / Job#: F2 SRF		Lab Name: Nautilus Environmental - BC		Report Format / Distribution	
Project Manager: Group 1; BRETT MASON		Lab Contact: Email: jacklyn@nautilusenvironmental.ca		Email 1: H20 lab results@teck.com	
Email: BRETT.MASON@TECK.COM		Address #4 6125 12 Street SE		Email 2: Annie.Larriere@teck.com	
Address RRI HWY 3		City: Calgary		Email 3: Jocelyn.Traverse@teck.com	
Province: BC		Province: AB		Email 4: Samantha.Usher@teck.com	
Country: Canada		Country: Canada		Email 5: Bryan.Ojeda@teck.com	
City: Sparwood		City: Calgary		Email 6: teckcoal@equisonline.com	
Postal Code: V0B 2G0		Postal Code: T2H 2K1		Email 7: teckcoal@equisonline.com	
Phone Number: 250-425-6179		Phone Number: 403-253-7121		Email 8: Mary.Hafke@teck.com	
				Email 9: Kennedy.Allen@teck.com	
				Email 10:	
				Email 11:	
				Email 12:	
				Email 13: teckcoal@equisonline.com	
				Excel	
				PDF	
				EDD	

SAMPLE DETAILS					ANALYSIS REQUESTED					
Sample ID	Sample Location (sys loc code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=C	p	Cont.	Analysis	PO number
2020/12/15 09:30 Manitowlin DC 4x 20L carboys, 85x1L bottles No6/No7 Good Condition	F2_BPO	WG		2020/12/14	9:05	G		8	48hr Daphnia Magna Single Concentration Acute Toxicity 20C	170000709471
	F2_BPO	WG		2020/12/14	9:06	G		1	48hr Daphnia Magna Single Concentration Acute Toxicity 10C	
									48hr Daphnia Magna Single Concentration Acute Toxicity	
									96hr Rainbow Trout Single Concentration Acute Toxicity	
									48hr Daphnia Magna Single Concentration Acute Toxicity Antiscant	
									48hr Daphnia Magna Single Concentration Toxicity 15C	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS		RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Field Temperatures BCI: degrees C GTI: degrees C		Kate Mussett	12/14/2020		
SERVICE REQUEST (rush - subject to availability) Regular (default) X Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge For Emergency <1 Day, ASAP or Weekend - Contact ALS					
Sampler's Name: KATE MUSSETT		Mobile #		Date/Time	
Sampler's Signature: <i>KM</i>		902 877 7230		DEC 14, 2020	

END OF REPORT



Acute Toxicity Test Results

Sample collected October 7, 2020

Final Report

October 26, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-10-07_N/ 2021-0278	7-Oct-20 at 0900h	8-Oct-20 at 0930h	9-Oct-20 at 1620h	8-Oct-20 at 1520h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-10-07_N	10.3°C	987	272

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-10-07_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-10-07_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-10-07_N	Rainbow trout	Precipitate observed on the bottom of test vessel	None
	<i>Daphnia magna</i>	Surficial precipitate observed	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.2 (3.0-3.5) g/L KCl ¹	6.7 (6.4-6.9) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.6-4.6) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	9.6%	5.4%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, October 5, 2020; ² Test Date October 12, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Shae Cole, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0278 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/10/09	1620 *	SMW	1	CB	Initial pH: <u>7.2</u>
1	2020/10/10	0845	MW	-	SC	Initial EC (µS/cm): <u>1717</u>
2	2020/10/11	0835	AW	-	AW	Initial DO (mg/L): <u>9.4</u>
3	2020/10/12	0900	AW	-	MF	Initial Temp (°C): <u>16</u>
4	2020/10/13	1005	MF/AW	1	KL	Salinity (ppt): <u>3</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>10.3</u>	<u>10.3</u>	<u>9.8</u>	<u>9.5</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				

pH (units) (range: 5.5-8.5)

Day 0	<u>8.0</u>	<u>7.5</u>				
Day 4	<u>8.1</u>	<u>8.3</u>				

EC (µS/cm)

Day 0	<u>416</u>	<u>1573</u>				
Day 4	<u>431</u>	<u>1612</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.8</u>	<u>9.5</u>				
Day 4	<u>8.0</u>	<u>8.6</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15</u>	<u>15</u>				
Day 4	<u>16</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	<u>10</u>	<u>10</u>				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.3</u>	<u>0.4</u>	<u>20200820TR</u>	
2	<u>3.4</u>	<u>0.4</u>	Source	<u>Troutlodge</u>
3	<u>3.0</u>	<u>0.3</u>	Tank #	<u>8</u>
4	<u>3.7</u>	<u>0.6</u>	Days Held at 15± 2°C	<u>27-28</u>
5	<u>3.2</u>	<u>0.3</u>	(must be ≥14 days)	
6	<u>3.2</u>	<u>0.3</u>	Percent stock mortality	<u>0</u>
7	<u>3.4</u>	<u>0.4</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.3</u>	<u>0.4</u>	Test Volume (L)	<u>18</u>
9	<u>3.4</u>	<u>0.4</u>		
10	<u>3.5</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.3</u>				
Length Range (cm): <u>3.0-3.7</u>				
Mean Weight (g): <u>0.4</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.6</u>				
Comments:				
<u>96hr: ppt coating bottom of tank</u>				

Reviewed By: JP

Date Reviewed: 2020/10/13

Method DAS

Client TEC164

Reference 2021-0278

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information
0	2020/10/08	1570	ST/UB	3	MW	Initial pH: <u>7.2</u>
1	2020/10/09	0800	LC	-	JP	Initial EC (µS/cm): <u>147</u>
2	2020/10/10	0800	ST	2	JP	Initial DO (mg/L): <u>9.4</u>
						Initial Temp (°C): <u>16</u>
						Salinity (ppt): <u>3</u>

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

day	pH (units) (range: 6.0-8.5)					
0	8.1	8.3	8.3	7.6	7.6	7.6
2	8.3	8.3	8.2	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	433	432	435	1712	1721	1728
2	430	429	438	1676	1690	1699

day	DO (mg/L) (40-100% saturation at test temp.)					
0	8.7	8.7	8.2	8.1	8.1	8.1
2	7.9	7.9	7.9	7.8	7.8	7.8

day	Temperature (°C) (range: 18-22 °C)					
0	18	18	18	19	19	19
2	20	20	20	20	20	20

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>e1</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/.</u>
QA (previous month)	Days to first brood (≤12 days) <u>7</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>35</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0/.</u>
Were test treatments randomized on test tray?	Yes <input checked="" type="checkbox"/> / No <input type="checkbox"/>	
Sample	DO % of sample prior to aeration: <u>127%</u>	Is aeration required (<40% or >100%)? <input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing	<input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness (mg CaCO ₃ /L) of 100%: <u>987</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)?	<input checked="" type="checkbox"/> Yes or <input type="checkbox"/> No
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>-</u>		
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>272</u>		
Dilution Water	Pail label / preparation date <u>1:09/128</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>190</u>		3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	<u>0h: No ppt</u> <u>48h: v. light surficial ppt</u>	

Reviewed By: JP

Date Reviewed: 2020/10/13

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-10-07 Toxicity_SP21		TURNAROUND TIME: Regular (default)		RUSH: OTHER INFO		
PROJECT/CLIENT INFO		LABORATORY		OTHER INFO		
Facility Name	WLC AWTF	Lab Name	Nautilus Environmental	Report Format / Distribution	Excel	PDF
Project Manager	Brett Mason	Lab Contact	Tamara Pomerooy	Email 1:	DL-WLC-Lab@teck.com	X
Email	brett.mason@teck.com	Email	tamara@nautilusenvironmental.ca	Email 2:	Thomas.Davidson@teck.com	X
Address	15 Km. North HWY 43	Address	#4, 6125 - 12 Street SE	Email 3:	TeckCoal@equisonline.com	X
City	Sparwood	City	Calgary	Email 4:	Tricia.Hill@teck.com	X
Postal Code	V0B 2G0	Postal Code	T2H 2K1	Email 5:	Marty.Harfke@teck.com	X
Phone Number	(250) 603 - 9417	Phone Number	403 253 7121	Email 6:		
SAMPLE DETAILS		PO number: VPO00723080				
2020/10/08 09:30 Minitoclin 3x 20L carboys, 3x 1L bottles Nos/Ngs Good Condition 10.3°C Sample ID: 2021-0278	Field Matrix	Time (24hr)	G-Grab C-Comp	# Of Cont.	ANALYSIS REQUESTED	
WS	10/7/2020	9:00	G	6	Please indicate below Filtered, Preserved or both (F, P, FP)	
WLBFWB_OUT_SP21	10/7/2020				ANALYSIS	
					NAUT_96Hr_RT_Single_Cone	
					entration_Toxicity Test	
					NAUT_48Hr_DM_Single_Cone	
					entration_Toxicity Test @ 20C	
ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS		RELINQUISHED BY/AFFILIATION		Date	Accepted By/Affiliation	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.		Julia Johnson		10/7/2020		
SERVICE REQUEST (rush - subject to availability)		Sampler's Name		Mobile #		
Regular (default) X		Bella Chen				
Priority (2-3 business days) - 50% surcharge		Sampler's Signature		Date/Time		
Emergency (1 Business Day) - 100% surcharge				7-Oct-20		
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Sample collected October 19, 2020

Final Report

November 4, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-10-19_N / 2021-0345	19-Oct-20 at 0900h	20-Oct-20 at 0930h	20-Oct-20 at 1600h	20-Oct-20 at 1510h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-10-19_N	7.8°C	1440	197

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-10-19_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-10-19_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-10-19_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.2 (3.0-3.5) g/L KCl ¹	6.7 (6.4-6.9) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.6-4.6) g/L KCl	6.0 (5.1-7.0) g/L NaCl
Reference toxicant CV	9.6%	5.4%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, October 5, 2020; ² Test Date October 12, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0345 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/10/20	1600 *	LL / LF	1	✓	Initial pH: <u>7.3</u> Initial EC (µS/cm): <u>1695</u>
1	2020/10/21	0820	LF	-	✓	Initial DO (mg/L): <u>12.1</u>
2	2020/10/22	0830	AE	-	✓	Initial Temp (°C): <u>15</u>
3	2020/10/23	0855	AE	-	✓	Salinity (ppt): <u>1</u>
4	2020/10/24	1125	LF	1	✓	

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
Preaeration time
DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
yes	9.4	8.9	8.8	8.8

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	8.2	7.6				
Day 4	8.1	8.3				

EC (uS/cm)

Day 0	421	1606				
Day 4	442	1572				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.5	8.9				
Day 4	8.7	8.8				

Temperature (°C) (range: 14-16°C)

Day 0	15	14				
Day 4	15	15				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	10	10				
Day 2	10	10				
Day 3	10	10				
Day 4	10	10				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information		
Control Fish	Length (cm)	Weight (g)			
1	3.8	0.6	Loading Density (g/L): (must be ≤0.5 g/L)	0.2	Batch <u>20200820TR</u>
2	3.8	0.6		Source <u>TroutHodge</u>	
3	3.2	0.3		Tank # <u>4</u>	
4	2.7	0.2		Days Held at 15± 2°C <u>39</u> (must be ≥14 days)	
5	3.6	0.5		Percent stock mortality <u>0.1</u> (7 days prior to test, must be ≤2%)	
6	3.0	0.3		Test Volume (L) <u>18</u>	
7	2.8	0.2			
8	3.0	0.3			
9	2.7	0.2			
10	3.7	0.6			
			Mean Length (cm): <u>3.2</u>		
			Length Range (cm): <u>2.7-3.8</u>		
			Mean Weight (g): <u>0.4</u>		
			Weight Range (g): <u>0.2-0.6</u>		

Comments : 96h: no ppt

Reviewed By: BS

Date Reviewed: 2020/10/26

Method DAS

Client TEC164

Reference 2021-0345

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/10/20	1510	AW/KK	3	LF	7.3	1695	12.1	15	1
1	2020/10/21	1145	ST	-	GP					
2	2020/10/22	1010	ST	3	LF					

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C			

day

	pH (units) (range: 6.0-8.5)								
0	8.3	8.3	8.5	7.9	7.9	7.9			
2	7.9	8.0	7.0	8.3	8.3	8.3			

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)								
0	481	477	480	1793	1811	1827			
2	495	493	495	1797	1800	1819			

	DO (mg/L) (40-100% saturation at test temp.)								
0	7.9	7.9	7.9	7.9	7.9	7.9			
2	7.9	7.9	7.9	7.9	7.9	7.9			

	Temperature (°C) (range: 18-22 °C)								
0	20	20	20	20	20	20			
2	20	20	20	20	20	20			

	Number Alive (I, immobile)								
0	10	10	10	10	10	10			
1	10	10	10	10	10	10 (IE)			
2	10	10	10	10	10	10			

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	
Young jar <u>D4</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0</u>
QA (previous month)	Control Validity Criteria
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Average number of young produced (≥15 young) <u>31</u>	
Were test treatments randomized on test tray? (Yes) / No	
Sample	
DO % of sample prior to aeration: <u>160</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>1440</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>197</u>	
Dilution Water	DO Levels (40-100% saturation) - corrected for altitude -
Pail label / preparation date <u>1:10/10</u>	3.3 to 8.2 mg/L at 18°C
Hardness of dilution water (mg/L) <u>186</u>	3.1 to 7.7 mg/L at 21°C
	3.2 to 8.1 mg/L at 19°C
	3.0 to 7.6 mg/L at 22°C
	3.2 to 7.9 mg/L at 20°C
Comments/Observations:	
0Hr: No PPT	
48Hr: <u>No ppt</u>	

Reviewed By: BS

Date Reviewed: 2020/10/26

APPENDIX C – Chain-of-custody form

COC ID: 2020-10-19 Toxicity SP21


TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Brett Mason			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	brett.mason@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	Thomas.Davidson@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	VOB 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	(250) 603 - 9417			Phone Number	403 253 7121			PO number	VPO00723080			

SAMPLE DETAILS								ANALYSIS REQUESTED													
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Please indicate below Filtered, Preserved or both (F, P, F/P)													
								ANALYSIS	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C											
2020/10/20 09:30 Manitowlin JC 3x20L carboys, 3x1L bottles NOS/NAB Good condition																					
Sample ID 2021-0345	Sample Location WL_BFWB_OUT_SP21	Field Matrix WS		Date 10/19/2020	Time 9:00	G=Grab C=Comp G	# Of Cont. 6		X	X	2.5°C										

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Tara Gentile	10/19/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Gilroy James		Mobile #	
Priority (2-3 business days) - 50% surcharge		Sampler's Signature			Date/Time	19-Oct-20
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Sample collected November 2, 2020

Final Report

November 18, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-11-02_N / 2021-0437	2-Nov-20 at 0900h	3-Nov-20 at 1000h	4-Nov-20 at 1545h	4-Nov-20 at 1430h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-11-02_N	7.0°C	933	223

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-02_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-02_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-11-02_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.3 (2.8-3.8) g/L KCl ¹	6.1 (5.8-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.7-4.5) g/L KCl	6.0 (5.0-7.2) g/L NaCl
Reference toxicant CV	8.4%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, November 5, 2020; ² Test Date November 9, 2020

LC = Lethal Concentration; CL = Confidence Limit

Michael Wrubleski

Report By:
Michael Wrubleski, BSc
Biologist

Sara Thiessen

Reviewed By:
Sara Thiessen, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0437 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	2020-11-04	1545	SC / LF	1	
1	2020-11-05	0935	LF		
2	2020-11-06	0910	LF		
3	2020-11-07	1100	MF		
4	2020-11-08	1010	KC / AW	1	

Sample Information

Initial pH:	7.2
Initial EC (µS/cm):	1478
Initial DO (mg/L):	10.8
Initial Temp (°C):	19
Salinity (ppt):	2

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no
 Preaeration time
 DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
12.1	10.4	9.7	8.8

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
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pH (units) (range: 5.5-8.5)

Day 0	7.8	7.3				
Day 4	8.0	8.3				

EC (µS/cm)

Day 0	431	1507				
Day 4	442	1474				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	8.8	8.8				
Day 4	8.3	8.4				

Temperature (°C) (range: 14-16°C)

Day 0	15	15				
Day 4	15	15				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	10	10				
Day 2	10	10				
Day 3	10	10				
Day 4	10	10				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200820TR
1	3.5	0.6	Loading Density (g/L): <u>0.3</u> Source <u>Troutlodge</u> Tank # _____ Days Held at 15± 2°C (must be ≥14 days) <u>54</u> Percent stock mortality (7 days prior to test, must be ≤2%) <u>0</u> Test Volume (L) <u>18L</u>	
2	2.1	0.4		
3	3.0	0.3		
4	3.8	0.6		
5	2.6	0.2		
6	4.5	1.1		
7	4.0	0.8		
8	2.0	0.3		
9	3.0	0.6		
10	3.0	0.2		
Mean Length (cm): <u>3.4</u>				
Length Range (cm): <u>2.0-4.5</u>				
Mean Weight (g): <u>0.5</u>				
Weight Range (g): <u>0.2-1.1</u>				
Comments: 0 hr: <u>no ppt</u> 96 hr: <u>no ppt</u>				

Reviewed By: 10

Date Reviewed: 2020/11/16

Method DAS 20

Client TEC164

Reference 2021-0437

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Sample Information	
0	2020/11/04	1430	ME/LC/MW	3	JC	Initial pH:	7.2
1	2020/11/05	0750	VKL	-	JP	Initial EC (µS/cm):	1478
2	2020/11/06	1155	MF	3	CB	Initial DO (mg/L):	10.8
						Initial Temp (°C):	19
						Salinity (ppt):	2

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

pH (units) (range: 6.0-8.5)						
0	8.3	8.3	8.3	7.8	7.7	7.8
2	8.1	8.2	8.2	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

EC (µS/cm)						
0	418	411	411	1543	15109	1570
2	424	422	415	1530	1570	1540

DO (mg/L) (40-100% saturation at test temp.)						
0	8.1	8.1	8.1	8.6	8.6	8.6
2	7.8	7.8	7.8	7.8	7.8	7.8

Temperature (°C) (range: 18-22 °C)						
0	19	19	19	19	19	19
2	20	20	20	20	20	20

Number Alive (I, immobile)						
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture		
Young jar <u>C3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0%</u>	
QA (previous month)	Control Validity Criteria	
Days to first brood (≤12 days) <u>8</u>	Mean % mortality at 48 hours - <u>0</u>	
Average number of young produced (≥15 young) <u>34</u>	(must be ≤10%)	
Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No		
Sample		
DO % of sample prior to aeration: <u>126</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No	
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No	
Hardness (mg CaCO ₃ /L) of 100%: <u>933</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No	
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u> </u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>223</u>		
Dilution Water		
Pail label / preparation date <u>2:10129</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C	
Hardness of dilution water (mg/L) <u>189</u>		
Comments/Observations:		
0hr: no ppt 48hr: <u>no ppt</u>		

Reviewed By: LD

Date Reviewed: 2020/11/16

APPENDIX C – Chain-of-custody form

Teck

COC ID: 2020-11-02 Toxicity SP21

TURNAROUND TIME: Regular (default)

RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO				
Facility Name	WLC AWTF			Lab Name	Nautilus Environmental			Report Format / Distribution	Excel	PDF	EDD	
Project Manager	Brett Mason			Lab Contact	Tamara Pomeroy			Email 1:	DL-WLC-Lab@teck.com	X	X	X
Email	brett.mason@teck.com			Email	tamara@nautilusenvironmental.ca			Email 2:	H20.lab.results@teck.com	X	X	X
Address	15 Km North HWY 43			Address	#4, 6125 - 12 Street SE			Email 3:	TeckCoal@equisonline.com			X
City	Sparwood	Province	BC	City	Calgary	Province	AB	Email 4:	Tricia.Hill@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	T2H 2K1	Country	Canada	Email 5:	Marty.Hafke@teck.com	X	X	X
Phone Number	250-425-4837			Phone Number	403 253 7121			PO number	VPO00723080			

SAMPLE DETAILS								ANALYSIS REQUESTED										
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	NAUT_96Hr_RT_Single_Concentration_Toxicity Test	NAUT_48Hr_DM_Single_Concentration_Toxicity Test @ 20C	Please indicate below Filtered, Preserved or both (F, P, F/P)								
2020/11/03 10:00 Monitoolin JC 3x20L carboys, 3x1L bottles NOS/NOS Good Condition																		
WL_BFWB_OUT_SP21_2020-11-02_N	WL_BFWB_OUT_SP21	WS		11/2/2020	9:00	G	6	X	X	2.0°C								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	Date	Time	Accepted By/Affiliation	Date	Time
Shipment includes 2 extra 20 L bladders and 2 extra 1 L plastic bottles.	Julia Johnson	11/2/2020				

SERVICE REQUEST (rush - subject to availability)						
Regular (default)	X	Sampler's Name	Tafi Mugadza		Mobile #	
Priority (2-3 business days) - 50% surcharge		Sampler's Signature			Date/Time	2-Nov-20
Emergency (1 Business Day) - 100% surcharge						
For Emergency <1 Day, ASAP or Weekend - Contact Nautilus						

END OF REPORT



Acute Toxicity Test Results

Sample collected November 16, 2020

Final Report

December 2, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-11-16_N / 2021-0528	16-Nov-20 at 0900h	17-Nov-20 at 1115h	17-Nov-20 at 1510h	17-Nov-20 at 1405h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-11-16_N	7.0°C	901	224

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-16_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-16_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-11-16_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.3 (2.8-3.8) g/L KCl ¹	6.1 (5.8-6.4) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.7-4.5) g/L KCl	6.0 (5.0-7.2) g/L NaCl
Reference toxicant CV	8.4%	6.0%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, November 5, 2020; ² Test Date November 9, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Sara Thiessen, BSc
Senior Biologist



Reviewed By:
Kayla Knol, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC 164 Reference 2021-0528 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review
0	11/17/2020	15:10 *	MW MF	1	YAL
1	11/18/2020	08:30	AW	-	JP
2	11/19/2020	08:00	AW	-	JP
3	11/20/2020	09:00	MF	-	TP
4	11/21/2020	09:05	MW	1	S

Sample Information

Initial pH: 7.3
 Initial EC (µS/cm): 1584
 Initial DO (mg/L): 11.9
 Initial Temp (°C): 11
 Salinity (ppt): 2

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes/no

Preaeration time

DO(mg/L) of 100%

0.5 hours	1 hour	1.5 hours	2 hours
<u>12.9</u>	<u>12.7</u>	<u>12.4</u>	<u>12.2</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C

6.1 mg/L - 8.8 mg/L at 15°C

6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100			

pH (units) (range: 5.5-8.5)

Day 0	<u>8.1</u>	<u>7.4</u>			
Day 4	<u>8.1</u>	<u>8.1</u>			

EC (µS/cm)

Day 0	<u>424</u>	<u>1426</u>			
Day 4	<u>431</u>	<u>1399</u>			

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>12.2</u>			
Day 4	<u>8.8</u>	<u>8.8</u>			

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>			
Day 4	<u>15</u>	<u>15</u>			

Number Alive (In brackets number stressed)

Day 0	10	10			
Day 1	<u>6</u>	<u>10</u>			
Day 2	<u>10</u>	<u>10</u>			
Day 3	<u>10</u>	<u>10</u>			
Day 4	<u>10</u>	<u>10</u>			

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	20200820TR
1	<u>3.5</u>	<u>0.5</u>	Batch	<u>20200820TR</u>
2	<u>3.3</u>	<u>0.5</u>	Source	<u>Troutlodge</u>
3	<u>3.3</u>	<u>0.4</u>	Tank #	<u>2</u>
4	<u>3.0</u>	<u>0.3</u>	Days Held at 15± 2°C	<u>67</u>
5	<u>3.6</u>	<u>0.7</u>	(must be ≥14 days)	
6	<u>3.0</u>	<u>0.4</u>	Percent stock mortality	<u>0.07</u>
7	<u>3.5</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.5</u>	<u>0.5</u>	Test Volume (L)	<u>18</u>
9	<u>3.5</u>	<u>0.6</u>		
10	<u>3.3</u>	<u>0.4</u>		
Loading Density (g/L): <u>0.3</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.4</u>				
Length Range (cm): <u>3.0-3.6</u>				
Mean Weight (g): <u>0.5</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.7</u>				

Comments: 0 Hrs: NO PAT
 96 Hrs: NO PPT

Reviewed By: W

Date Reviewed: 2020/11/22

Method DAS 20

Client TEC164

Reference 2021-0528

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/11/17	1405	MF/AW	3	IF
1	2020/11/18	0825	IF	-	JP
2	2020/11/19	0925	MF	3	IF

Sample Information

Initial pH:	<u>7.3</u>
Initial EC (µS/cm):	<u>1584</u>
Initial DO (mg/L):	<u>11.9</u>
Initial Temp (°C):	<u>11</u>
Salinity (ppt):	<u>2</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day	pH (units) (range: 6.0-8.5)					
0	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>
2	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.3</u>	<u>8.2</u>	<u>8.2</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	<u>434</u>	<u>430</u>	<u>430</u>	<u>1582</u>	<u>1590</u>	<u>1594</u>
2	<u>450</u>	<u>449</u>	<u>443</u>	<u>1535</u>	<u>1570</u>	<u>1570</u>

day	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>9.0</u>	<u>9.0</u>	<u>9.0</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.7</u>	<u>7.7</u>	<u>7.7</u>

day	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

day	Number Alive (I, immobile)					
0	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>5%</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>34</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>120</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>25min</u>	Filtered with 110µm screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100%: <u>901</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L): <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>224</u>	
Dilution Water	Pail label / preparation date <u>2:11/10</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>213</u>	
Comments/Observations:	0 hr: <u>no ppt</u> 48hr: <u>no ppt</u>	

Reviewed By: VP

Date Reviewed: 2020/11/22

APPENDIX C – Chain-of-custody form

END OF REPORT



Acute Toxicity Test Results

Sample collected November 30, 2020

Final Report

December 16, 2020

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> test initiation
WL_BFWB_OUT_SP21_2020-11-30_N / 2021-0651	30-Nov-20 at 0900h	01-Dec-20 at 1015h	01-Dec-20 at 1600h	01-Dec-20 at 1410h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-11-30_N	5.3°C	939	211

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-30_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i>
WL_BFWB_OUT_SP21_2020-11-30_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-11-30_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.3 (2.8-3.8) g/L KCl ¹	6.9 (6.6-7.2) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.5 (2.7-4.5) g/L KCl	6.2 (5.4-7.1) g/L NaCl
Reference toxicant CV	8.4%	4.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, November 5, 2020; ² Test Date December 7, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Adam Wilson, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TR5 Client TEC164 Reference 2021-0651 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020-12-01	1600*	ST / MF	1		Initial pH: <u>7.3</u>
1	2020-12-02	0900	UF	-	OK	Initial EC (µS/cm): <u>11071</u>
2	2020-12-03	0900	AN	-	TD	Initial DO (mg/L): <u>11.0</u>
3	2020-12-04	0900	AN	-	TP	Initial Temp (°C): <u>11</u>
4	2020-12-05	1210	DW/UC	1	SS	Salinity (ppt): <u>3</u>

Note: * ; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
Preaeration time
DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
<u>yes</u>	<u>11.9</u>	<u>11.3</u>	<u>10.7</u>	<u>10.2</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
6.1 mg/L - 8.8 mg/L at 15°C
6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100					
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pH (units) (range: 5.5-8.5)

Day 0	<u>7.8</u>	<u>7.4</u>					
Day 4	<u>8.2</u>	<u>8.3</u>					

EC (µS/cm)

Day 0	<u>492</u>	<u>1101</u>					
Day 4	<u>498</u>	<u>1591</u>					

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>10.2</u>					
Day 4	<u>8.6</u>	<u>8.7</u>					

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>					
Day 4	<u>15</u>	<u>15</u>					

Number Alive (In brackets number stressed)

Day 0	10	10					
Day 1	<u>10</u>	<u>10</u>					
Day 2	<u>10</u>	<u>10</u>					
Day 3	<u>10</u>	<u>10</u>					
Day 4	<u>10</u>	<u>10</u>					

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	
1	<u>3.3</u>	<u>0.4</u>	<u>20200820TR</u>	
2	<u>3.2</u>	<u>0.4</u>	Source	<u>Troutlodge</u>
3	<u>3.8</u>	<u>0.7</u>	Tank #	<u>5</u>
4	<u>2.9</u>	<u>0.3</u>	Days Held at 15± 2°C	<u>10</u>
5	<u>3.2</u>	<u>0.4</u>	(must be ≥14 days)	<u>138</u>
6	<u>3.7</u>	<u>0.6</u>	Percent stock mortality	<u>0</u>
7	<u>3.5</u>	<u>0.5</u>	(7 days prior to test, must be ≤2%)	
8	<u>3.5</u>	<u>0.6</u>	Test Volume (L)	<u>18</u>
9	<u>3.0</u>	<u>0.8</u>		
10	<u>3.5</u>	<u>0.6</u>		
Loading Density (g/L):			<u>0.3</u>	
(must be ≤0.5 g/L)				
Mean Length (cm):			<u>3.4</u>	
Length Range (cm):			<u>2.9-3.8</u>	
Mean Weight (g):			<u>0.5</u>	
(Must be ≥0.3g)				
Weight Range (g):			<u>0.3-0.7</u>	
Comments : <u>96h - no ppt</u>				

Reviewed By: to

Date Reviewed: 2020/12/07

Method DAS 20

Client TEC164

Reference 2021-0651

Test Log

Day	Date	Time	Technician	Chem. Cart	Daily Data Review
0	2020/12/01	1410	SL/MW	3	DL
1	2020/12/02	0855	ST	-	JP
2	2020/12/03	0855	ST	3	MF

Sample Information

Initial pH:	<u>7.3</u>
Initial EC (µS/cm):	<u>1671</u>
Initial DO (mg/L):	<u>11.0</u>
Initial Temp (°C):	<u>17</u>
Salinity (ppt):	<u>3</u>

Lab Code	CTL A	CTL B	CTL C	100 A	100 B	100 C

day	pH (units) (range: 6.0-8.5)					
0	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>7.7</u>	<u>7.7</u>	<u>7.7</u>
2	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.3</u>	<u>8.4</u>	<u>8.4</u>

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

day	EC (µS/cm)					
0	<u>456</u>	<u>452</u>	<u>450</u>	<u>1631</u>	<u>1630</u>	<u>1623</u>
2	<u>481</u>	<u>452</u>	<u>461</u>	<u>1609</u>	<u>1609</u>	<u>1606</u>

day	DO (mg/L) (40-100% saturation at test temp.)					
0	<u>8.1</u>	<u>8.1</u>	<u>8.1</u>	<u>8.2</u>	<u>8.2</u>	<u>8.2</u>
2	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>	<u>7.9</u>

day	Temperature (°C) (range: 18-22 °C)					
0	<u>19</u>	<u>19</u>	<u>19</u>	<u>18</u>	<u>18</u>	<u>18</u>
2	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>

day	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
2	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>E3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>6%</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
Average number of young produced (≥15 young)	<u>28</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0%</u>
Were test treatments randomized on test tray?	Yes / No <u>Yes</u>	
Sample	DO % of sample prior to aeration: <u>155</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110µm screen prior to testing	<u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>93</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)?	<u>Yes or No</u>
Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L)	<u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>21</u>		
Dilution Water	Pail label / preparation date <u>1:11/27</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>190</u>		3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
		3.2 to 7.9 mg/L at 20°C
Comments/Observations:	<u>0h: no ppt</u> <u>48hr: No ppt</u>	

Reviewed By: lo

Date Reviewed: 2020/12/07

APPENDIX C – Chain-of-custody form

END OF REPORT



Acute Toxicity Test Results

Sample collected December 20, 2020

Final Report

January 1, 2021

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-12-20_N / 2021-0796	20-Dec-20 at 0900h	23-Dec-20 at 1100h	24-Dec-20 at 1305h	23-Dec-20 at 1415h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-12-20_N	6.1°C	851	183

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-12-20_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-12-20_N	0

Precipitate observations

Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-12-20_N	Rainbow trout	None	None
WL_BFWB_OUT_SP21_2020-12-20_N	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.9 (3.6 – 4.3) g/L KCl ¹	6.2 (5.9 – 6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.8 – 4.6) g/L KCl	6.2 (5.4 – 7.1) g/L NaCl
Reference toxicant CV	8.2%	4.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, December 21, 2020; ² Test Date December 21, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Dana Wong, BSc
Biologist



Reviewed By:
Sara Thiessen, BSc
Senior Biologist

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APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0796-01 Chamber 9

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020/12/24	1305 *	AW / DW	1	CC	Initial pH: <u>7.3</u> Initial EC (µS/cm): <u>1584</u>
1	2020/12/25	0845	MF	-	CC	Initial DO (mg/L): <u>10.9</u>
2	2020/12/26	0818	ST	-	CC	Initial Temp (°C): <u>13</u>
3	2020/12/27	0815	ST	-	CC	Salinity (ppt): <u>2</u>
4	2020/12/28	0825	MW	1	CC	

Note: *; time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L
 Preaeration time
 DO(mg/L) of 100%

yes/no	0.5 hours	1 hour	1.5 hours	2 hours
	<u>10.0</u>	<u>10.2</u>	<u>9.8</u>	<u>9.5</u>

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

**corrected for altitude

Test Chemistry and Biology

Conc.	CTL	100				
-------	-----	-----	--	--	--	--

pH (units) (range: 5.5-8.5)

Day 0	<u>7.8</u>	<u>7.5</u>				
Day 4	<u>8.1</u>	<u>8.2</u>				

EC (µS/cm)

Day 0	<u>438</u>	<u>1444</u>				
Day 4	<u>465</u>	<u>1489</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>9.5</u>				
Day 4	<u>8.9</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>15.14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	10	10				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control
 Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	<u>20201114TR</u>
1	<u>3.0</u>	<u>0.3</u>	Source	<u>Troutlodge</u>
2	<u>3.0</u>	<u>0.3</u>	Tank #	<u>7</u>
3	<u>3.0</u>	<u>0.3</u>	Days Held at 15± 2°C	<u>17</u>
4	<u>2.7</u>	<u>0.3</u>	(must be ≥14 days)	
5	<u>3.2</u>	<u>0.4</u>	Percent stock mortality	<u>0</u>
6	<u>3.0</u>	<u>0.3</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.0</u>	<u>0.3</u>	Test Volume (L)	<u>18</u>
8	<u>2.9</u>	<u>0.3</u>		
9	<u>3.2</u>	<u>0.4</u>		
10	<u>2.9</u>	<u>0.3</u>		
Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.0</u>				
Length Range (cm): <u>2.7-3.2</u>				
Mean Weight (g): <u>0.3</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.4</u>				
Comments: <u>0 hr: no ppt</u> <u>9 hr: no ppt</u>				

Reviewed By: CB

Date Reviewed: 2020/12/28

Method DAS20

Client TEC164

Reference 2021-0796

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:
0	2020-12-23	1415	KK/MWL	3	JL	7.3
1	2020-12-24	0800	SL	-	W	Initial EC (µS/cm): 1564
2	2020-12-25	0920	ZL	3	MF	Initial DO (mg/L): 10.9
						Initial Temp (°C): 13
						Salinity (ppt): 2

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	0.2	8.2	8.2	7.9	7.9	7.9
2	8.4	8.4	8.4	8.4	8.4	8.4

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (µS/cm)					
0	465	460	469	1635	1613	1624
2	460	465	469	1605	1628	1636

	DO (mg/L) (40-100% saturation at test temp.)					
0	7.9	7.9	7.9	8.0	8.0	8.0
2	8.0	8.0	8.0	8.0	8.0	8.0

	Temperature (°C) (range: 18-22 °C)					
0	20	20	20	19	19	19
2	19	19	19	19	19	19

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>DZ</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>5</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
Average number of young produced (≥15 young) <u>32</u>	Were test treatments randomized on test tray? Yes/No <u>Yes</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0</u>
Sample	DO % of sample prior to aeration: <u>113</u>	Is aeration required (<40% or >100%)? <u>Yes or No</u>
Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20min</u>	Filtered with 110µm screen prior to testing <u>Yes or No</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <u>Yes or No</u>
Hardness (mg CaCO ₃ /L) of 100%: <u>851</u>	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
Alkalinity of 100% sample (mg CaCO ₃ /L): <u>183</u>		
Dilution Water	Pail label / preparation date <u>2:12110</u>	DO Levels (40-100% saturation) - corrected for altitude -
Hardness of dilution water (mg/L) <u>207</u>		3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C
Comments/Observations: chr: no ppt		3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C
48hr: no ppt		3.2 to 7.9 mg/L at 20°C

Reviewed By: CB

Date Reviewed: 2020/12/28

APPENDIX C – Chain-of-custody form

END OF REPORT



Acute Toxicity Test Results

Sample collected December 28, 2020

Final Report

January 6, 2021

Submitted to: **Teck Coal Ltd.**
Sparwood, BC

SAMPLE INFORMATION

Sample ID/ Internal ID	Dates			
	Collected	Received	Rainbow trout test initiation	<i>Daphnia magna</i> 20°C test initiation
WL_BFWB_OUT_SP21_2020-12-28_N / 2021-0804	28-Dec-20 at 0900h	29-Dec-20 at 0830h	30-Dec-20 at 1555h	29-Dec-20 at 1405h

Sample chemistry

Sample ID	Receipt temperature	Hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
WL_BFWB_OUT_SP21_2020-12-28_N	4.6°C	952	211

TEST TYPES

- Rainbow trout 96-h single concentration screening test
- *Daphnia magna* 48-h single concentration screening test

RESULTS

Toxicity test results

Sample ID	Percent survival in 100% (v/v) sample	
	Rainbow trout	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-12-28_N	100	100

Sample ID	Percent Immobility in 100 (% v/v)
	<i>Daphnia magna</i> 20°C
WL_BFWB_OUT_SP21_2020-12-28_N	0

Precipitate observations

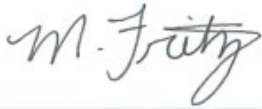
Sample ID	Species	Precipitate in test vessel at test termination	Precipitate on test organism at test termination
WL_BFWB_OUT_SP21_2020-12-28_N	Rainbow trout	None	None
	<i>Daphnia magna</i>	None	None

QA/QC

QA/QC summary	Rainbow trout	<i>Daphnia magna</i>
Reference toxicant LC50 (95% CL)	3.9 (3.6-4.3) g/L KCl ¹	6.2 (5.9-6.5) g/L NaCl ²
Reference toxicant historical mean (2 SD Range)	3.6 (2.8-4.6) g/L KCl	6.2 (5.4-7.1) g/L NaCl
Reference toxicant CV	8.2%	4.5%
Organism health history	Acceptable	Acceptable
Protocol deviations	None	None
Water quality range deviations	None	None
Control performance	Acceptable	Acceptable
Test performance	Valid	Valid

¹ Test date, December 21, 2020; ² Test Date December 21, 2020

LC = Lethal Concentration; CL = Confidence Limit



Report By:
Michelle Fritz, BSc
Biologist



Reviewed By:
Kayla Knol, BSc
Senior Biologist

This report has been prepared by Nautilus Environmental Company Inc. based on data and/or samples provided by our client and the results of this study are for their sole benefit. Any reliance on the data by a third party is at the sole and exclusive risk of that party. The results presented here relate only to the samples tested.

APPENDIX A – Summary of test conditions

Table 1. Summary of test conditions: 96-h rainbow trout (*Oncorhynchus mykiss*) survival test.

Test species	<i>Oncorhynchus mykiss</i>
Organism source	Fish Hatchery
Organism age	Juvenile
Test type	Static
Test duration	96 hours
Test vessel	5 gallon glass aquariums
Test volume	10 – 20 L, depending on size of fish
Test solution depth	Minimum 15 cm
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	1 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water
Test solution renewal	None
Test temperature	15 ± 1°C
Feeding	None
Light intensity	100 to 500 lux
Photoperiod	16 hours light/8 hours dark
Aeration	6.5 ± 1 mL/min/L
Test Measurements	pH, conductivity, dissolved oxygen and temperature were measured at test initiation and test completion; salinity measured at test initiation; evaluated for survival daily
Test protocol	Environment Canada (2000), EPS 1/RM/13, with 2007 & 2016 amendments
Statistical software	None
Test endpoints	Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Potassium chloride (KCl)

Table 2. Summary of test conditions: 48-h *Daphnia magna* survival test.

Test species	<i>Daphnia magna</i>
Organism source	In-house culture
Organism age	<24 hours
Test type	Static
Test duration	48 hours
Test vessel	375 mL glass vessels
Test volume	150 mL
Test concentrations	100% (undiluted) sample plus laboratory control
Test replicates	3 per treatment
Number of organisms	10 per replicate
Control/dilution water	De-chlorinated City of Calgary tap water amended with 4 mg/L KCl and with B12 (2 µg/L) and Na ₂ SeO ₄ (2 µg Se/L)
Test solution renewal	None
Test temperature	20 ± 2°C
Feeding	None
Light intensity	400 to 800 lux
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test measurements	pH, conductivity, dissolved oxygen and temperature measured at test initiation and completion; salinity and hardness measured at test initiation in undiluted sample; evaluated daily for survival
Test protocol	Environment Canada (2000), EPS 1/RM/14
Statistical software	None
Test endpoints	Mean Percent survival
Test acceptability criteria for controls	Survival ≥ 90%
Reference toxicant	Sodium chloride (NaCl)

APPENDIX B – Toxicity test data

Method TRS Client TEC164 Reference 2021-0804 Chamber 5

Test Log

Day	Date	Time	Initial	Chem. Cart	Daily Data Review	Sample Information
0	2020-12-30	1555 *	DW/AW	1	JL	Initial pH: <u>7.1</u>
1	2020-12-31	0745	MF	-	JL	Initial EC (µS/cm): <u>1540</u>
2	2021-01-01	0900	AW	-	JL	Initial DO (mg/L): <u>10.9</u>
3	2021-01-02	0830	AE	-	JL	Initial Temp (°C): <u>17</u>
4	2021-01-03	0930	LC	1	MW	Salinity (ppt): <u>1</u>

Note: * : time when the test was loaded with fish

Sample Pre-Aeration

Aeration rate adjusted to 6.5 +/- 1 mL/min/L: yes
 Preaeration time: 0.5 hours 1 hour 1.5 hours 2 hours
 DO(mg/L) of 100%: 13.0 11.3 10.1 9.5

DO in mg/L (70% - 100% saturation)**

6.2 mg/L - 8.9 mg/L at 14°C
 6.1 mg/L - 8.8 mg/L at 15°C
 6.0 mg/L - 8.6 mg/L at 16°C

Test Chemistry and Biology

Conc. CTL 100 ****corrected for altitude**

pH (units) (range: 5.5-8.5)

Day 0	<u>7.7</u>	<u>7.3</u>				
Day 4	<u>8.0</u>	<u>8.1</u>				

EC (µS/cm)

Day 0	<u>435</u>	<u>1445</u>				
Day 4	<u>456</u>	<u>1488</u>				

DO (mg/L) (70-100% saturation at test temp.)

Day 0	<u>8.9</u>	<u>9.5</u>				
Day 4	<u>8.8</u>	<u>8.8</u>				

Temperature (°C) (range: 14-16°C)

Day 0	<u>14</u>	<u>14</u>				
Day 4	<u>15</u>	<u>15</u>				

Number Alive (In brackets number stressed)

Day 0	<u>10</u>	<u>10</u>				
Day 1	<u>10</u>	<u>10</u>				
Day 2	<u>10</u>	<u>10</u>				
Day 3	<u>10</u>	<u>10</u>				
Day 4	<u>10</u>	<u>10</u>				

Validity Criteria: must be ≤ 10% mortality and/or stressed behavior in the control

Unless otherwise noted, behavior is considered to be normal

Control Organism Data			Test Organism Information	
Control Fish	Length (cm)	Weight (g)	Batch	<u>20201114TR</u>
1	<u>3.4</u>	<u>0.5</u>	Source	<u>Trout Lodge</u>
2	<u>3.6</u>	<u>0.5</u>	Tank #	<u>7</u>
3	<u>3.2</u>	<u>0.3</u>	Days Held at 15 ± 2°C	<u>23</u>
4	<u>3.5</u>	<u>0.4</u>	(must be ≥14 days)	
5	<u>3.3</u>	<u>0.3</u>	Percent stock mortality	<u>0</u>
6	<u>3.3</u>	<u>0.4</u>	(7 days prior to test, must be ≤2%)	
7	<u>3.5</u>	<u>0.5</u>	Test Volume (L)	<u>18</u>
8	<u>3.6</u>	<u>0.5</u>		
9	<u>3.1</u>	<u>0.3</u>		
10	<u>3.0</u>	<u>0.3</u>		
Loading Density (g/L): <u>0.2</u> (must be ≤0.5 g/L)				
Mean Length (cm): <u>3.3</u>				
Length Range (cm): <u>3.0-3.6</u>				
Mean Weight (g): <u>0.4</u> (Must be ≥0.3g)				
Weight Range (g): <u>0.3-0.5</u>				

Comments: qbn-no ppt

Reviewed By: JP

Date Reviewed: 2021/01/05

Method DAS 20

Client TEC164

Reference 2021-0804

Test Log

Sample Information

Day	Date	Time	Technician	Chem. Cart	Daily Data Review	Initial pH:	Initial EC (µS/cm):	Initial DO (mg/L):	Initial Temp (°C):	Salinity (ppt):
0	2020/12/29	1405	MW/X	3		7.1	1540	10.9	17	
1	2020/12/29	0830	CB	-	OK					
2	2020/12/29	1100	AW	3	MF					

Lab Code	CTLA	CTLB	CTLC	100A	100B	100C

day

	pH (units) (range: 6.0-8.5)					
0	8.2	8.2	8.2	7.4	7.4	7.4
2	8.3	8.3	8.2	8.3	8.3	8.3

The pH of the sample was not adjusted prior to test setting, unless noted in the comments below

	EC (uS/cm)					
0	412	413	412	1620	1619	1619
2	403	402	395	1572	1585	1599

	DO (mg/L) (40-100% saturation at test temp.)					
0	8.1	8.1	8.1	8.9	8.9	8.9
2	8.2	8.2	8.2	8.1	8.1	8.1

	Temperature (°C) (range: 18-22 °C)					
0	19	19	19	19	19	19
2	18	18	18	19	19	19

	Number Alive (I, immobile)					
0	10	10	10	10	10	10
1	10	10	10	10	10	10
2	10	10	10	10	10	10

Validity Criteria: must be ≤ 10% mortality and/or abnormal behavior in the control

Notes: Immobile; daphnid can't swim after 60 sec. even if antenna still move

Unless otherwise noted, behaviour is considered to be normal

Culture	Young jar <u>C3</u>	Jar(s) mortality 7 days prior to test (must be ≤25%) <u>0/</u>
QA (previous month)	Days to first brood (≤12 days) <u>8</u>	Control Validity Criteria
	Average number of young produced (≥15 young) <u>35</u>	Mean % mortality at 48 hours - (must be ≤10%) <u>0/</u>
	Were test treatments randomized on test tray? <input checked="" type="radio"/> Yes / <input type="radio"/> No	
Sample	DO % of sample prior to aeration: <u>175 %</u>	Is aeration required (<40% or >100%)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Duration of aeration (37.5 +/- 12.5 mL/min/L): <u>20 min</u>	Filtered with 110um screen prior to testing <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness (mg CaCO ₃ /L) of 100% : <u>952</u>	Is hardness adjustment required (<25 mg CaCO ₃ /L)? <input checked="" type="radio"/> Yes or <input type="radio"/> No
	Hardness of sample after adjustment (must be between 25 - 30 mg CaCO ₃ /L) <u>-</u>	
	Alkalinity of 100% sample (mg CaCO ₃ /L): <u>211</u>	
Dilution Water	Pail label / preparation date <u>2: KL10</u>	DO Levels (40-100% saturation) - corrected for altitude - 3.3 to 8.2 mg/L at 18°C 3.1 to 7.7 mg/L at 21°C 3.2 to 8.1 mg/L at 19°C 3.0 to 7.6 mg/L at 22°C 3.2 to 7.9 mg/L at 20°C
	Hardness of dilution water (mg/L) <u>207</u>	
Comments/Observations:	<u>0Hrs: No ppt</u> <u>40hr: No ppt</u>	

Reviewed By: JP

Date Reviewed: 2021/01/05

APPENDIX C – Chain-of-custody form

END OF REPORT
