Technical Report Overview

Report: Study of the Reproductive Effects of Selenium on Redside Shiner 2019

Overview: This report presents the summary of work undertaken in 2019 on a reproductive toxicity study of redside shiner from the Elk Valley. This report includes results from the three-year monitoring program (2014 to 2016) specific to selenium concentrations in redside shiner ovaries in the Koocanusa Reservoir.

This report was prepared for Teck by Golder Associates Ltd. In association with Minnow Environmental Inc. and Nautilus Environmental Company Inc.

For More Information

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







REPORT

Study of the Reproductive Effects of Selenium on Redside Shiner (*Richardsonius balteatus*) 2019

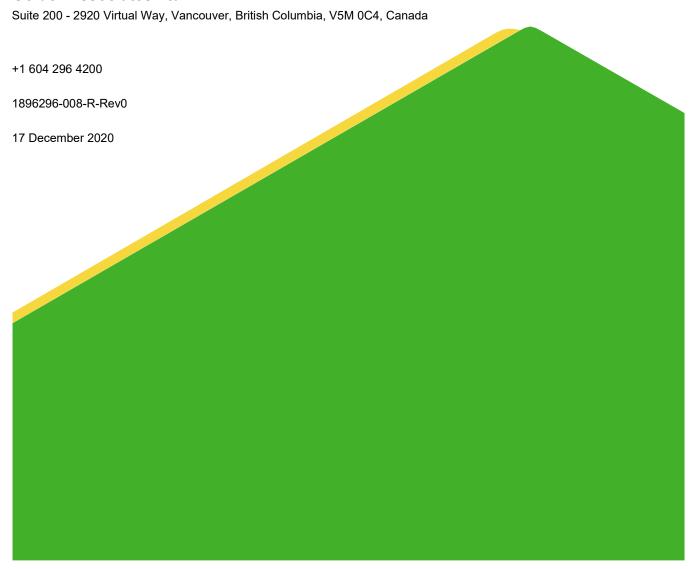
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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) in association with Minnow Environmental Inc. (Minnow) and Nautilus Environmental Company Inc. (Nautilus) are pleased to provide Teck Coal Limited (Teck) with the following summary of work undertaken in 2019 on a reproductive toxicity study for redside shiner (RSC, *Richardsonius balteatus*) from the Elk Valley, BC. The objective of this study was to characterize effects of maternally transferred selenium on early life stage development of RSC.

The study described herein was developed in response to findings of a three-year monitoring program (2014 to 2016) conducted in Koocanusa Reservoir to characterize and compare chemical and biological conditions in the reservoir downstream from the Elk River compared to upstream (Minnow 2018a). The monitoring program reported that selenium concentrations in RSC ovaries were greater than the British Columbia guideline (11 mg/kg dry weight [dw]), the United States Environmental Protection Agency (US EPA) selenium criterion (15.1 mg/kg dw), and the Elk Valley Water Quality Plan level 1 benchmark (18 mg/kg dw) (Teck 2014). Implications of these ovary selenium concentrations for RSC reproduction are uncertain because no toxicity data exist for this species.

RSC is a western minnow found throughout British Columbia and in the northwestern United States west of the Rocky Mountains. They occur in schools of thousands in large lakes, ponds, and moderately fast-moving streams, tolerating a wide variety of temperatures and trophic conditions. In lakes, smaller individuals tend to remain in the upper water column and/or close to shore. Other than during spawning migration, RSC exhibit very little directed movement aside from movements on and off shoals in lake environments related to changes in water temperature (Scott and Crossman 1998). RSC spawn in the early spring in groups of 30 to 40 fish, both in streams and in lakes when water temperatures reach approximately 10°C and show a strong affinity for natal spawning grounds (Scott and Crossman 1998). Eggs tend to hatch 3 to 15 days post-spawning, depending on water temperature. RSC usually reach sexual maturity by their third year. RSC fry feed mainly on plankton and demersal crustaceans, while larger fish are mainly insectivorous but feed on fish eggs opportunistically (Scott and Crossman 1998).

A pilot study was conducted in 2018 in an attempt to identify an effect level for selenium in RSC. The pilot study involved collection of adult RSC from a reference area (Loon Lake), an area with moderate exposure to selenium (Elk River Oxbow), and an area with relatively high exposure to selenium (Goddard Marsh). Fish were transported to a laboratory facility at Simon Fraser University (SFU), where temperature and photoperiod were manipulated in an attempt to stimulate gonadal development. These manipulations were unsuccessful, and despite multiple injections of Ovaprim, the fish did not develop further at the laboratory (Golder et al. 2018). These fish were held through the winter of 2018-2019 at SFU and fed a range of dietary selenium concentrations (control, ~10 mg/kg dw, ~20 mg/kg dw, and ~30 mg/kg dw selenium in *Lumbriculus* worms fed selenium-enriched yeast) in preparation for a repeated attempt to stimulate spawning in the spring of 2019.

In parallel with the repeated attempt to stimulate spawning in laboratory-held fish, Teck undertook the 2019 field study to reduce uncertainty in the sensitivity of RSC to selenium. Minnow was responsible for field study components and Nautilus was responsible for laboratory study components and supported the field program by fertilizing field-collected eggs. Golder was responsible for leading development of the study design, project management, data interpretation, and reporting. All parties contributed to the content of this report.



2.0 STUDY DESIGN OVERVIEW

The objective of this study was to evaluate effects of selenium on early life stages of RSC across a range of maternally derived egg selenium concentrations. Two approaches were undertaken to obtain selenium-exposed eggs: a laboratory spawning study and field collection of eggs from various locations in the Elk Valley. Main elements of the study design were as follows:

- The laboratory study described in Section 3.0 was conducted to attempt to generate a range of egg selenium concentrations in laboratory-reared RSC fed a range of dietary selenium concentrations.
- The field study described in Sections 4.0 and 5.0 was conducted by collecting adult RSC from surface waters with a range of aqueous and dietary (invertebrate) selenium concentrations. Eggs and milt were manually expressed and fertilized on-site, then incubated under controlled conditions at the Nautilus laboratory. Test endpoints included larval deformity, larval growth, and survival to complete yolk-sac absorption and onset of exogenous feeding. An aliquot of eggs from each clutch were collected for analysis of egg selenium concentrations. Toxicological and tissue chemistry data were used to evaluate whether adverse effects were observed that could be attributed to selenium in a dose-dependent fashion.

3.0 LABORATORY SPAWNING STUDY

To the best of our knowledge, culturing of RSC had not been conducted by a laboratory prior to the 2018 pilot study, and there are no standard protocols for spawning and rearing this species. Methods for laboratory spawning were based on known biology of RSC and general culturing techniques for other fish species.

Adult fish collected in spring 2018 and held at SFU did not show signs of development to spawning condition following three rounds of Ovaprim injections. Spawning attempts were terminated, and fish were held and maintained over simulated winter conditions (Golder et al. 2018). Additional fish were collected in late summer 2018 to supplement the number of fish held over winter. Fish were fed a range of dietary selenium concentrations (control, ~10 mg/kg dw, ~20 mg/kg dw, and ~30 mg/kg dw selenium in *Lumbriculus* worms fed selenium-enriched yeast) over approximately 10 months.

In spring 2019, fish were transitioned to conditions expected to stimulate spawning. Temperature and photoperiod were gradually increased to simulate seasonal changes until reaching 16-hours light:8-hours dark photoperiod and 12°C and were held constant thereafter. Because neither male nor female fish ripened naturally under these conditions, four injections of Ovaprim were administered on 16 May, 21 and 27 June, and 4 July 2019 to stimulate follicular development and ovulation in females and spermeation in males.

Despite the Ovaprim injections, there was no evidence of development to spawning condition in the female fish and the laboratory spawning study was discontinued (Appendix A).

4.0 FIELD STUDY METHODS

4.1 Sampling Strategy

Mature RSC were collected in 2019 by Minnow. Candidate locations for RSC collection were identified based on previous RSC observations (including RSC presence as documented in the Fisheries Information Summary System [FISS; BC ENV 2018] for nearby reference areas), reported selenium concentrations in water, sediment, and benthic invertebrates, and accessibility of sampling areas (Appendix B, Table B-1). From these candidate areas, six mine-exposed areas were selected for RSC collection (Minnow 2018b; Table 1 and Figure 1) expected to provide a gradient in egg selenium concentrations, including where relatively high RSC ovary selenium concentrations have been documented (Minnow 2018b; 2019a). Loon Lake was selected as the primary reference



area for the 2019 field survey based on observations in 2018 of large numbers of RSC and low egg selenium concentrations (Golder et al. 2018). Grave Lake was considered for inclusion as a second reference area if ripe fish could not be captured at Loon Lake.

The strategy for the program was to collect adult RSC upon initiation of spawning, anticipated to begin in May and last for several weeks (Lindsey and Northcote 1963), so that ripe gametes could be extracted on-site and eggs fertilized before transport to the laboratory for rearing. In early May, field crews were deployed to the sampling areas listed in Table 1 to measure in situ water quality and undertake fishing three to four times a week using multiple fishing methods (standard operating procedures [SOPs] are described in Appendix C). When morphological features and/or early stages of spawning behavior were observed, Nautilus staff were mobilized for egg collection and fertilization.

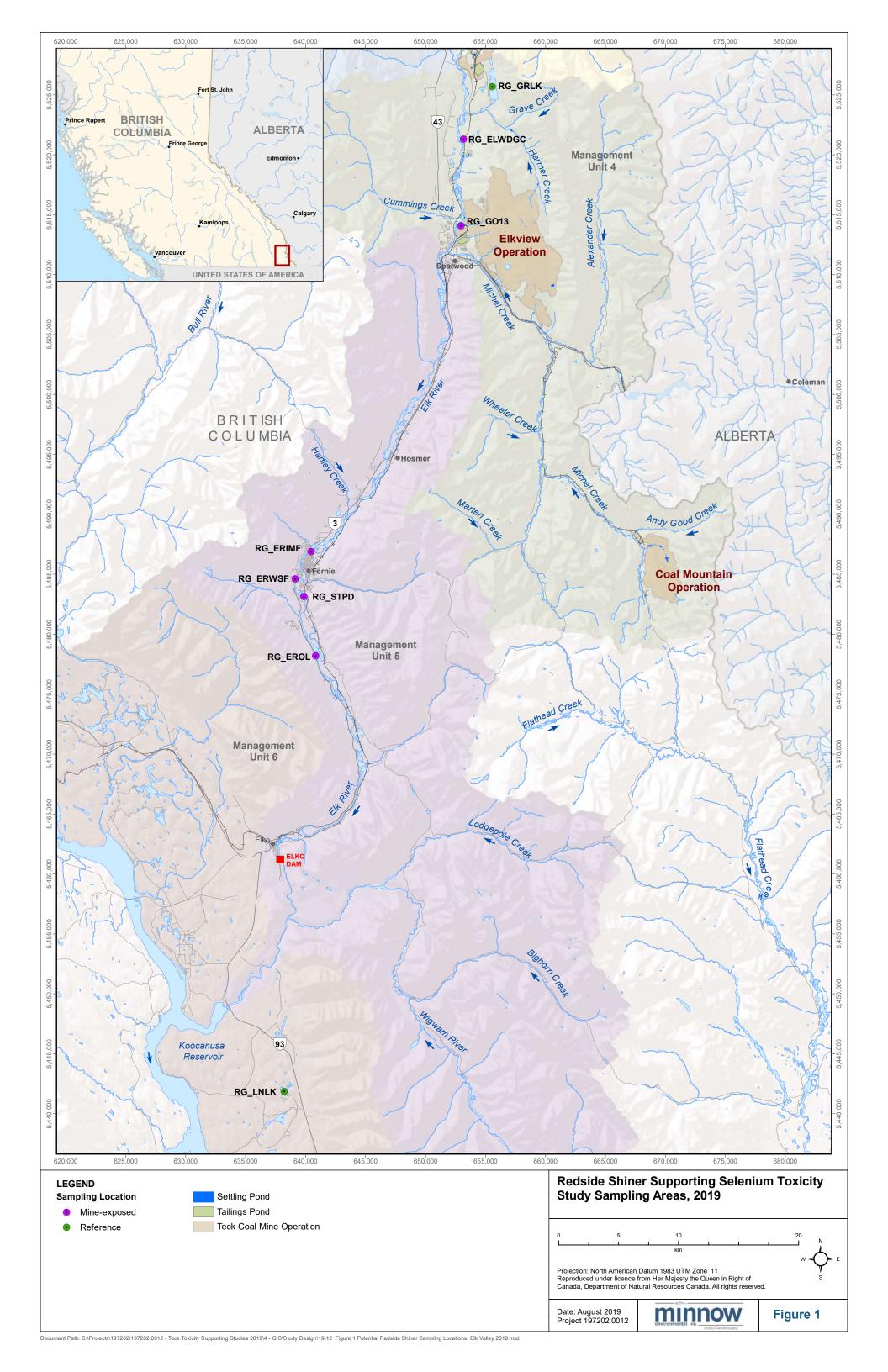
Mature RSC were collected by Minnow between 6 May and 24 June 2019. A minimum of 35 mature females (15 from high selenium areas, 10 from moderate selenium areas, and 10 from reference) and 21 mature males (7 each from 2 mine-exposed areas and 2 from a reference area) were targeted. The number of targeted males assumed that all mature, ripe female fish would be caught in a single day of fishing, and sufficient milt would be obtained to fertilize them.

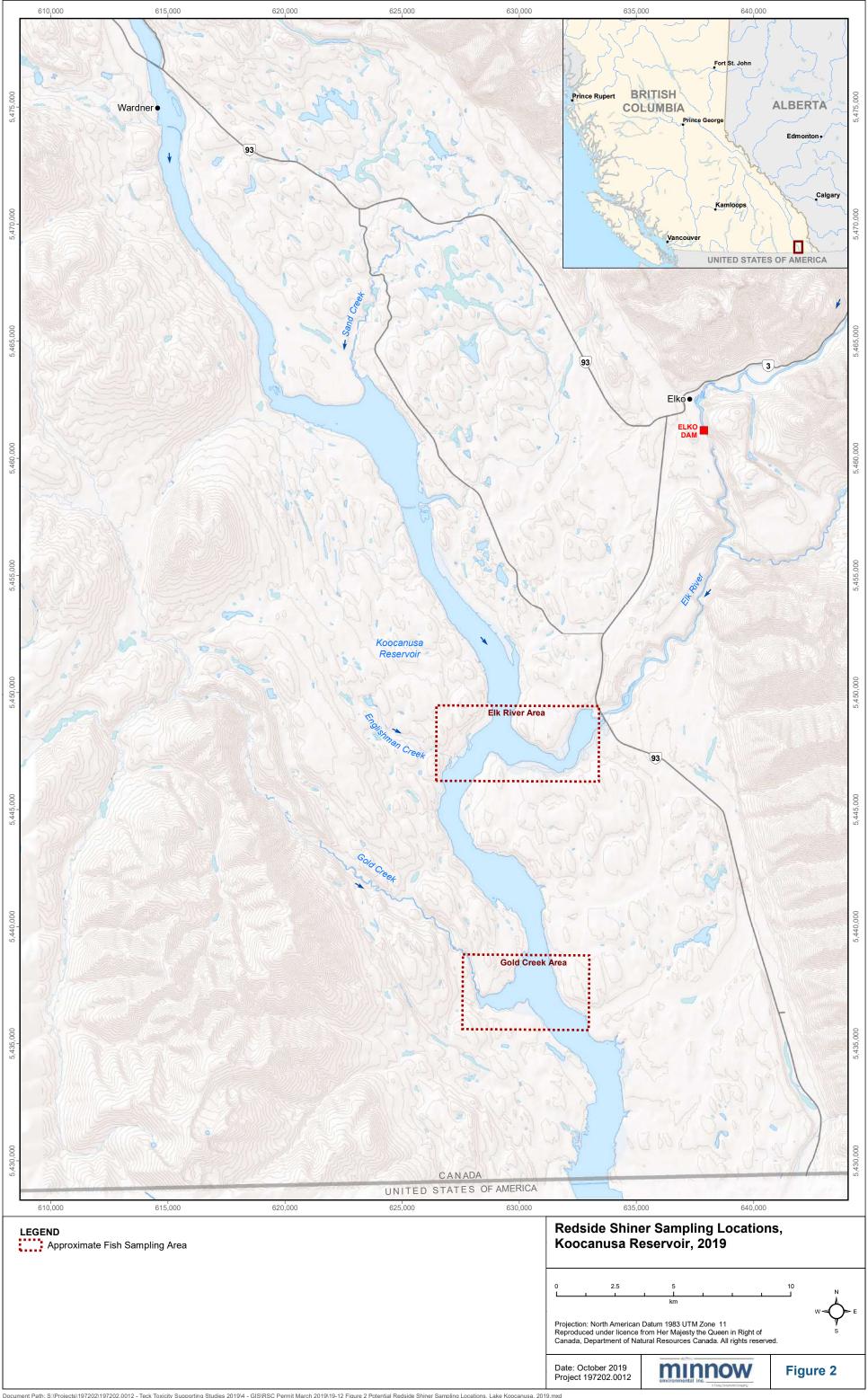
Table 1: Planned Sampling Areas for Redside Shiner, 2019

Compling Avec (Avec Code)		ordinates , NAD83)	Selenium	2018 Selenium Concentrations (see Appendix B, Table B-1 for details)			
Sampling Area (Area Code) ^a	Easting	Northing	Exposure Category	Water (µg/L)	Sediment (mg/kg dw)	Invertebrates (mg/kg) dw	
Goddard Marsh (RG_GO13)	652955	5514065	High	40-82	25	26	
Stanford Pond (RG_STPD)	639864	5483139	Moderate	4.4	10	14	
Lower Elk River Oxbow (RG_EROL)	640877	5477999	Moderate	1.3	4.4	12	
Elk River impoundment in Fernie (RG_ERIMF)	640447	5486898	Low	0.09	0.68	2.7	
Elk River Wetland d/s Grave Creek (RG_ELWDGC)	653175	5521300	Moderate	7.3	6.6	24	
Elk River Wetland South of Fernie (RG_ERWSF)	639138	5484622	Low	0.4	1.4	3.2	
Koocanusa Reservoir (mouth of Elk River; RG_ER)	627997	5447625	Low	1.2	0.67	7.7	
Koocanusa Reservoir (mouth of Gold Creek; RG_GC)	630804	5436413	Low	1.8	0.35	3.0	
Loon Lake (RG_LNLK) Reference	638220	5441850	Low	<0.05	Not collected	Not collected	
Grave Lake (RG_GRLK) Reference	655585	5525565	Low	0.32	2.9	3.7	

a) RG stands for "Regional" and is used in Teck site naming to differentiate samples collected or areas sampled under a regional program compared to a site-specific program. Hereafter, "RG" is not included in the area codes, except in Figure 1. dw = dry weight.







4.2 Sampling Methods

Because spawning RSC are known to congregate proximate to flowing water (Weisel and Newman 1951; Lindsey and Northcote 1963), an initial habitat assessment was conducted to identify potential spawning areas within targeted sampling areas. Fishing effort was focused on areas of inflow and outflow, as well as areas where congregating fish were observed. Fish collection followed protocols specified in BC Fish Collection Permits CB19-474596 and CB19-471215.

Fish were captured using very short-set, small-mesh gill nets (Koocanusa only), minnow traps, mini hoop nets, angling, and/or seine nets, as appropriate. Gill nets ranging in length from 15 to 23 m with mesh sizes of 0.5" to 1" were deployed extending from the shoreline outward and set for a maximum of 15 minutes. Minnow traps were baited with cat food that was placed in a screened (<1 mm mesh), 250-mL container to prevent fish from accessing the food. Minnow traps were set on the bottom in shallow areas near the shore. After approximately 24 hours, traps were checked and re-set, as necessary. Mini hoop nets (24" × 24" frame; 0.5" mesh size) were deployed for between 24 and 48 hours, after which nets were checked and re-set, as necessary. Angling was conducted using a 4 m telescopic fishing pole equipped with 4 m of 3.5-lb test monofilament, a small bobber, split shots, and a size 18 hook. The hook was baited with an artificial maggot and placed in the water as close as possible to the school of RSC. When a fish swallowed the bait, it was quickly pulled out of the water, de-hooked, and placed in a cooler with clean aerated site water prior to further screening or processing. Seining was conducted using a 15 m × 0.9 m net with a 0.3-cm mesh size by wading into the waterbody and attempting to corral fish into the net. Fish were identified and enumerated according to capture method, and non-target species or immature RSC were released at the point of capture. All fishing locations were recorded using a Global Positioning System.

RSC with spawning colours were placed in a cooler with site water and aerators, and fish were retained for further screening. Water temperature and dissolved oxygen levels were regularly monitored in the coolers. Individual ripe fish were anaesthetized using clove oil, measured for total length, fork length, and total body weight, and eggs and milt were expressed by application of pressure to the abdomen. Because guidance does not exist on the identification of fully ripe eggs, several attempts at gamete collection/fertilization were made prior to understanding and recognizing characteristics required of ripe fish for successful fertilization (refer to Section 7.2). Care was taken not to over-express fish to avoid collecting unripe eggs and contaminating the sample with blood. Males and females that did not easily express gametes were placed in an aerated recovery bath. Nautilus staff with experience expressing gametes were present to fertilize eggs immediately upon collection and prepare egg samples for holding and transport. Eggs were fertilized on-site by using a combination of dry and wet fertilization. The sequence of events was as follows: milt from males was expressed and pooled in a small container which was placed under a padded icepack to keep milt as cool as possible without risk of freezing. An individual female was anesthetized, and eggs expressed onto a glass slide and transferred into a Petri dish. Next, a small volume of pooled milt (approximately 1 mL) was placed on the eggs and gently mixed. After a short dry fertilization period, a small volume (enough to cover the eggs) of clean reconstituted moderately hard water (US EPA 1985) was added to the milt/egg mixture, and the eggs were allowed to fertilize under wet conditions for several minutes. Following a second rest period, eggs were transferred to a transport container with up to 1 L of laboratory water (reconstituted moderately hard). Additional details regarding timing and method development are provided in Section 7.2. Egg clutches from individual fish were kept separate and fertilized and reared as separate batches (Section 5.2). Female fish that produced ripe eggs were sacrificed, and male fish and unripe female fish were transferred to a recovery bath. All RSC that were not sacrificed were released to the sampling area from which they were collected.



Prior to the 2019 study, ovaries collected from RSC in Koocanusa Reservoir in late April or Loon Lake in early May 2018 were likely comprised of unripe eggs because of the timing of sampling, the size and colour of eggs, and the difficulty in extracting eggs, and therefore likely do not represent the selenium concentrations of ripened eggs that undergo fertilization. To address this uncertainty, paired selenium concentrations were measured in the ripe eggs that were fertilized and the residual ovaries within individual fish (Section 5.1). Prior to fertilization, subsamples of expressed, ripe eggs were collected and placed into pre-labelled, metal-free, 15-mL tubes. Residual ovaries were excised from each fish from which ripe eggs were collected (for fish dissection SOP, refer to Minnow 2019b in Appendix C). Total residual ovary weights were recorded using a digital balance (±0.001 g), and each ovary was packaged into a pre-labelled Whirl-Pak® bag and frozen prior to analysis. In addition, two skinless, dorsal muscle samples were collected from each fish. All tissue samples were stored frozen at -20°C prior to being shipped to the analytical laboratory for analysis. Frozen ripe egg samples were shipped to the Nautilus laboratory for storage (Section 5.1).

Mature female RSC retained for sampling were weighed using a digital balance (±0.001 g) and measured for total and fork length using a measuring board (± 1 mm). Total body weights were measured before and after ripe eggs were expressed and collected, and liver weights were measured after dissection. Obvious external deformities, erosions (fin and gill), lesions, tumours, and parasites observed during processing were recorded on field sheets. Ageing structures (otoliths) were collected by excising and freezing the head and sending it to the analytical laboratory (AAE; refer to laboratory report in Appendix D for a description of the ageing protocol).

Fertilized eggs were transported by Nautilus staff via vehicle and air under Permit 119127 to the laboratory in Burnaby, BC. Care was taken to minimize mechanical disturbance from handling and to limit temperature fluctuations, and a visual inspection was requested at airport security so that X-ray of the shipment was not needed. If eggs were being held prior to transport, efforts were made to maintain holding temperature at 14±3°C, within the range measured at the collection areas. Transportation of eggs occurred between 1 hour and 2 days post fertilization. Temperature was measured upon arrival at the laboratory.

All field notes and measurements were recorded on standardized field data collection forms. Field water quality measures (temperature, dissolved oxygen concentration and percent saturation, specific conductance, and pH) were collected during each visit to the waterbody. Weekly water samples for chemical analysis were collected at areas that were being actively fished, and were analyzed for total and dissolved metals, nutrients, major ions, and other conventional parameters (e.g., total suspended and dissolved solids, and total and dissolved organic carbon).

Field quality assurance/quality control (QA/QC) measures included use of staff trained in the various field sampling techniques and fish identification. General protocols for field QA/QC outlined in the regional aquatic effects monitoring (RAEMP) study design were followed (Minnow 2018c).

5.0 LABORATORY METHODS

5.1 Analytical Chemistry

Subsamples of dorsal muscle tissue and residual ovaries (i.e., following collection of ripe eggs) were collected by dissection and submitted for chemical analysis at the Saskatchewan Research Council (SRC; Saskatoon, SK). Total selenium was measured by high resolution inductively coupled plasma mass spectrometry (HR ICP-MS). Moisture content was measured by freeze drying.



Measurement of selenium in each clutch of ripe eggs is required to characterize the concentration-response relationship. If clutch sizes are small, this restricts the number of eggs available for analysis, complicating the analysis, and use in the toxicity study. The subsamples of ripe eggs were stored frozen at -20°C at the Nautilus laboratory and results of a separate method validation study were used to inform selection of the analytical method for the smaller volumes of ripe eggs.

As an alternative to standard HR ICP-MS methods, use of laser ablation ICP-MS at TrichAnalytics (Saanichton, BC) was investigated because analysis of a smaller sample size is possible using this method (i.e., <5 mg dw). This alternative method required method validation to confirm that measurements are comparable to those using HR ICP-MS. To support method validation, samples of dorsal muscle and residual ovaries from field-collected fish were split and analyzed by SRC and TrichAnalytics. A comparison of the dorsal muscle and ovary tissue results between analytical methods is provided in Appendix E. Results from a separate, more detailed, method validation study of selenium analysis in different tissues are reported under separate cover (Golder 2020 in draft). Composite samples of ripe eggs were analyzed by TrichAnalytics using laser ablation ICP-MS because of the small sample volumes.

Analytical laboratory QA/QC measures included use of laboratory duplicates, certified reference material, and reporting of method detection limits. Initial wet weight of all samples was also reported by the laboratory.

5.2 Egg Incubation

Upon arrival at the Nautilus laboratory, water temperature was recorded, and eggs placed in an environmental control testing chamber held at $14 \pm 2^{\circ}$ C. To minimize stress following transport and allow equilibration to laboratory conditions, eggs were not transferred to rearing containers until at least 12 hours after arrival. Water renewals (approximately 80%) occurred daily and water quality parameters (temperature, dissolved oxygen, and pH) were measured pre- and post- water renewal. Rearing water consisted of reconstituted moderately hard water. When eggs from a female were observed to be in the gastrula period (using a dissection microscope), which generally occurred three or four days following arrival at the laboratory, an assessment of fertilized eggs was conducted; eggs that had not developed to the gastrula stage were assumed to be unfertilized. Fertilized eggs were counted and divided into replicate containers labeled with the identity of the female fish and replicate name, targeting four replicates, each with 50 fertilized eggs. Due to the varying number of collected and fertilized eggs, the number of replicates and eggs per replicate varied across females. Containers were randomly distributed within the environmental chamber and provided continuous gentle aeration.

Eggs were monitored daily for mortality and hatch. When observed, hatched fish were transferred to a secondary, 2-L rearing container that corresponded to the same replicate. Except for water volume, rearing conditions remained the same and loading density was consistent with Environment Canada guidance for similar fish (Environment Canada 2011). Observations regarding hatch mortality were also recorded daily.

Laboratory QA/QC measures implemented during the rearing period were:

- Control water was measured for chlorine weekly and total metals and metalloids by ICP scan approximately monthly throughout the rearing period to confirm that the water supply was of suitable quality. Water in the development chambers was monitored daily for temperature and dissolved oxygen (e.g., target 80-100% saturation). Dissolved oxygen, conductivity, and pH were measured before and after water renewals.
- Appropriate test conditions were maintained at all times (e.g., temperature, lighting, aeration). Daily monitoring was documented; deviations were documented and their implications on data quality considered.
- Test personnel had hands-on experience with early life stage testing with fish.



Embryo survival for fish collected from reference areas was not an appropriate QA/QC criterion. However, significant embryo mortality during the test would be a signal to examine test conditions and procedures. Embryo mortality is discussed in Section 7.4 with respect to implications on the utility of other toxicological endpoints.

Standard laboratory and good house-keeping practices were utilized on all laboratory instrumentation and materials to reduce the risk of cross-contamination between batches of eggs and exposure containers.

5.3 Test Termination

When yolk sac absorption was completed (20 to 21 days post fertilization), fish were euthanized using Tricaine mesylate (CAS 886-86-2). All fish were assessed for deformities using a Graduated Severity Index (GSI; Table 2) as described and used by Holm et al. (2003) and Rudolph et al. (2008). The maximum possible total GSI score is 12 based on a score of up to three in each of four categories. Twenty fish from each replicate were randomly selected and measured for individual fish length. When the number of fish per replicate was less than 20, all fish were measured for length. Following length and deformity assessments, fish were pooled and dried at 60°C for a minimum of 24 hours after which dry weight was measured.

Table 2: Graduated Severity Index (GSI) for Evaluating Larval Fish Deformity

GSI		Category									
GSI	Skeletal	Craniofacial	Finfold	Edema							
0	Normal backbone. (≤15°)	Normal jaw, face and head.	All fins present and normal.	No fluid accumulation in head or pericardial cavity.							
1	Slight (15-44°) lordosis, scoliosis or kyphosis. Unlikely to impair fish movement.	Slightly reduced (<20%) or malformed eye or jaw. Unlikely to impair feeding ability or sight.	One or two fins slightly (<50%) reduced in size or slightly malformed. Unlikely to impair fish movement.	Slight (<20% of volume of normal) fluid accumulation, but unlikely to impair sight, movement or feeding.							
2	Moderate (45-89°) lordosis, scoliosis or kyphosis. Likely to impair fish movement.	Moderately (20-49%) reduced or malformed eye or jaw. Likely to impair feeding ability or sight.	More than two fins slightly reduced in size or slightly malformed, or 1 or 2 moderately (≥50%) deformed fins. Likely to impair fish movement.	Moderate (20-49% of normal volume) fluid accumulation. Likely to impair sight, movement or feeding.							
3	Severe (≥90°) lordosis, scoliosis or kyphosis. Fish movement likely to cease or be greatly impaired.	Severely (≥50% or missing) reduced or malformed eye or jaw. Feeding ability or sight severely impaired.	One or more missing fins, or two or more moderately (≥50%) deformed. Swimming ability severely impaired.	Severe (≥50% of normal volume) fluid accumulation. Greatly reduced sight, movement or feeding.							

Laboratory QA/QC measures implemented during deformity analysis were:

- Deformity analyses were conducted by technicians with training and experience in fish deformity analyses.
- Blind labelling: All test containers and preservation vials were labelled in a manner to prevent the technician from knowing the identity of any fish. Observers did not have knowledge of whether larval fish originated from a high-selenium area.
- A priori framework: An a priori framework for the GSI scoring system was prepared based on Table 2.
- Photos: Photographs from a representative selection for each type and severity of fish deformity and photographs of normal fish were used as a guide for the GSI framework.
- External observer: A minimum of 10% of the larval fish were examined by an external observer not involved in the original scoring.



6.0 DATA ANALYSIS

Data were analyzed using SystatTM version 13, which supported analysis of concentration-related toxicological data using linear and non-linear regression. The objective of this analysis was to test for concentration-response relationships relating reproductive effects endpoints to egg selenium concentrations. Concentration-response analyses for deformity endpoints were conducted with a consideration of total GSI scores 1 or more (i.e., any deformity in any category) and total GSI scores of 2 or more (i.e., significant deformity in one category or a minor or greater deformity score in two or more categories).

7.0 RESULTS

7.1 Field Collection

Spawning RSC were observed at sampling areas within the Elk Valley starting in May, and in June within Koocanusa Reservoir. In total, eggs from 56 ripe female RSC were collected (i.e., 10 from Loon Lake, 13 from ERIMF, 14 from Koocanusa, 3 from ERWSF, and 16 from STPD; Table 3). Total aqueous selenium concentrations in areas where fish were caught for the study ranged from <0.050 to 16 μ g/L (Appendix Table D.1¹).

Because no guidance exists for evaluating spawning RSC, the initial field effort focused on developing a procedure for identifying ripe fish. This effort involved identifying fish with sufficiently developed spawning colours, determining when females were gravid, and identifying females with eggs that could be successfully fertilized. RSC caught in Loon Lake were the first to clearly display spawning colours in both males and females (Appendix D Photographs). Photographs of these fish were distributed among the study team as an indication of colouring that should be observed in spawning fish. However, it was later determined that fish in Loon Lake had particularly vivid spawning colours compared to other areas where mature females were collected, and so the team refocused their screening to include fish with subtle colouration.

Given that no guidance for RSC exists on expressing viable eggs from mature females, the first attempt to fertilize eggs collected from Loon Lake and ERIMF resulted in unsuccessful fertilization. Observations made in the days following fertilization indicated that the eggs were not viable (i.e., eggs were white, perivitelline space between the plasma membrane and chorion of the fertilized egg was not visible). Moderate pressure was required to express eggs and the expressed eggs were clumped and consisted of multiple sizes. Observations and results from the first fertilization event suggested the females collected were not sufficiently ripe. During the second fertilization event, females that did not express eggs with light pressure to the abdomen were considered to be insufficiently ripe. When eggs were found to be readily expressed with light pressure, they were uniform in size and well coated in ovarian fluid. The perivitelline space was observed when assessed 15 minutes post-fertilization. Methods to identify ripe females that included visible bulge in abdominal area and application of light pressure to express eggs, were adopted thereafter. Ripe females were found at ERIMF and STPD that easily expressed eggs of a consistent size and surrounded by plenty of ovarian fluid.

Spawning populations of RSC were observed at Loon Lake a reference area and five mine-exposed areas (ERIMF, ERWSF, STPD, and the two Koocanusa Reservoir areas) (Table 3; Appendix Tables D.4 to D.8). RSC were observed in moderate to large numbers at EROL and Grave Lake, but there were no clear signs of fish preparing to spawn during the study (Table 3; Appendix Tables D.6 to D.8). RSC were not caught at ELWDGC,

A data quality review of the water quality data (Appendix D) indicated good laboratory precision and reproducibility, field reproducibility, and minimal contamination (Tables D.2 and D.3). As such, water quality data were considered reliable. Laboratory reports are included in Appendix D.



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and very few fish were caught at GO13, of which none displayed evidence of spawning (Appendix Tables D.4 to D.5). Fishing was conducted at the 10 study areas for 1 to 7 weeks (Appendix Table D.9). Fishing effort was stopped at four study areas where no spawning RSC were observed, including three mine-exposed areas (ELWDGC, EROL, and GO13), and a reference area (Grave Lake). At ELWDGC, fishing was stopped after one week of daily fishing effort at multiple locations using multiple methods (hoop net, minnow trap, seine) (Appendix Tables D.6 to D.8). No clear signs of spawning colours or gravid females were observed at EROL after 23 days and fishing was stopped (Appendix Tables D.6 to D.8) because 19 ripe female RSC with viable eggs were caught at two other areas with similar exposure (3 at ERWSF and 16 at STPD; Table 3). Fishing was stopped at GO13 after three weeks of fishing using multiple methods yielded 7 fish in total, of which only one female fish was documented (Appendix Tables D.6 to D.8). At the Grave Lake reference area, no clear signs of spawning colours or gravid females were observed after 15 days, and fishing was stopped once it was confirmed that eggs collected from the Loon Lake reference area were successfully fertilized.

Mature female RSC were between 5.6 and 12.1 cm, with total body weights prior to expressing eggs between 2.3 and 23 g (Appendix Table D.10). Gonadosomatic indices were between 5 and 26%, with median values at the six sampling areas between 14 and 18% (Appendix Table D.10). This range is consistent with previous observations of spawning RSC in the Columbia River, Washington (≥ 8%; Gray and Dauble 2001). Mature females were between 1 and 5 years old, which represents a wider age range than previously noted for sexually mature females (reaching maturity between 2 and 4 years; Lindsey and Northcote 1963; Gray and Dauble 2001). None of the fish collected for tissue analysis in the study had external anomalies or deformities (Appendix Table D.10).

Consistent with previous observations of RSC spawning populations (Weisel and Newman 1951; Lindsey and Northcote 1963; Gray and Double 2001), RSC observed in this study appeared to spawn over several weeks. At Loon Lake, RSC were spawning at the start of the field program, and the spawning school was present for 16 days of monitoring (Appendix Table D.10). Similarly, eggs were collected from mature females from STPD over a three-week period (Appendix Table D.10). Field monitoring was stopped once the required number of fish for the study were collected.

All mature females used in the present study had residual ovaries with underdeveloped eggs, following easy expression of ripe eggs, which is consistent with previous observations of RSC as fractional spawners (Weisel and Newman 1951). A small proportion of the total number of fish caught in each area were mature females with eggs that could be easily expressed and fertilized. The RSC at Loon Lake, ERIMF, ERWSF, and STPD were likely spawning upon the initiation of sampling in the first half of May, and only 0.3%, 0.4%, 4.6%, and 2.2% of the total number of fish caught had eggs that could be easily expressed and fertilized (Table 3). Thus, only a small proportion of female fish in a population appeared to be actively spawning on a given day.



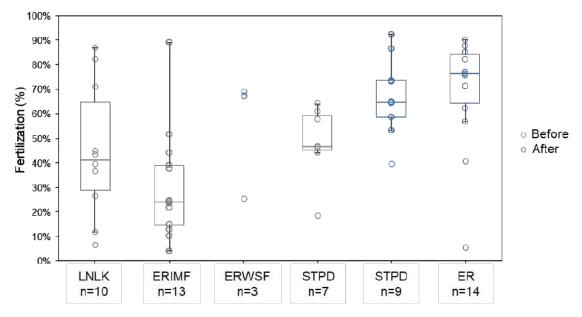
Table 3: Viable Catch Data from 2019 Redside Shiner Collection

Area Description	Area Code	Total Caught	# Females	% Females with Fertilizable Eggs ^a
Loon Lake reference	LNLK⁵	3,508	10 (10) ^c	0.3%
Grave Lake reference	GRLK	7,392	-	0%
Koocanusa (Englishman Creek)	ER	1,548	3	0.2%
Koocanusa (Gold Creek)	GC	4,185	11	0.3%
Elk River Impoundment in Fernie	ERIMF ^b	3,513	13 (3)°	0.4%
Elk River Wetland South of Fernie	ERWSF ^b	66	3	4.6%
Lower Elk River Oxbow	EROL	468	-	0%
Stanford Pond	STPD ^b	730	16	2.2%
Elk River Wetland d/s Grave Creek	ELWDGC	0	-	0%
Goddard Marsh	GO13	7	-	0%

- a) Number of females used in the study divided by the total number of fish caught over the duration of the field sampling program.
- b) Areas where RSC populations were likely spawning upon initiation of monitoring.
- c) Unsuccessful fertilization in parentheses.

7.2 Field Fertilization

To the best of our knowledge, manual expression and fertilization of RSC gametes had not been conducted prior to this study therefore some method development between fertilization events was necessary. After the first four fertilization events, the mean percent fertilization was 40%, suggesting that efforts to optimize fertilization methods should be undertaken. During the initial four rounds of fertilization, the duration of the dry fertilization period was between 5 to 10 minutes, while the wet fertilization period was between 10 to 15 minutes. It was hypothesized that higher fertilization percentages might be observed when eggs underwent shorter, dry fertilization periods since the small size of the eggs made them potentially subject to drying. To test this hypothesis, eggs from one newly expressed female (ERWSF-02) were separated into two groups; one group was dry fertilized for approximately 2 minutes while the second group for approximately 15 minutes. The short, dry fertilization period resulted in 68% fertilization while the longer period resulted in a 25% fertilization. Based on these results, fertilization methods were revised to include a short, dry fertilization of 2 minutes. The mean fertilization percentage of eggs increased to 69% following implementation of this method development (Figure 3).



Note: Boxplots and individual data points for percent fertilization before (grey) and after (blue) method refinement. Boxplots demonstrate interquartile range (25th and 75th) and median value (horizontal line within box). Whiskers represent minimum and maximum values unless outliers were present, in which case whiskers were only extended to the next value, when present within 1.5-times the inter-quartile range. One batch of eggs, ERWSF-02, was split and fertilized following two methods for comparison; both values are shown in the figure, but the reported n value does not double count this split. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

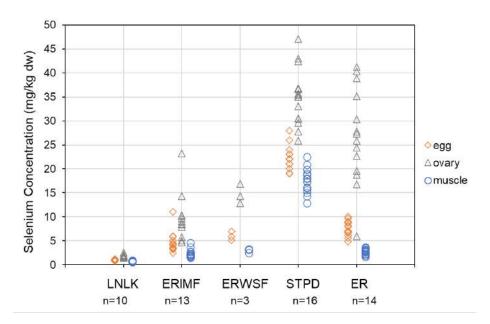
Figure 3: Percent Fertilization of redside shiner eggs before and after change to short, dry fertilization period.

7.3 Tissue Chemistry

Tissue chemistry laboratory reports are provided in Appendix E. Selenium data reported by TrichAnalytics were relied upon for the interpretation of results and the concentration-response relationships (Section 7.5) because this allowed comparison across all tissue types. A comparison of dorsal muscle and ovary selenium results from SRC and TrichAnalytics is provided in Appendix E and showed good agreement of results for both tissue types between analytical methods.

Ten adult female fish were collected from Loon Lake reference area for tissue chemistry analysis. Selenium concentrations for RSC from Loon Lake ranged from 0.71 to 1.2 mg/kg dw in eggs, 1.5 to 2.6 mg/kg dw in ovary and from 0.6 to 0.9 mg/kg dw in dorsal muscle. RSC from mine-exposed areas had a range of selenium concentrations from 2.5 to 28 mg/kg dw in eggs, 5.0 to 47 mg/kg dw in ovary, and 1.4 to 23 mg/kg dw in dorsal muscle (Figure 4). RSC from STPD had higher selenium concentrations in eggs, ovary, and muscle compared to other sampling areas (Figure 4; Figure 5). Selenium concentrations in ovary were higher than in eggs, particularly for RSC from Koocanusa Reservoir (ER; Figure 5; Figure 6). Similar differences between ovary and egg selenium concentrations were observed in the Elk Valley mountain whitefish study (Nautilus 2017). On average, RSC ovary selenium concentrations were 2 times higher than egg selenium. Ovary results should be interpreted with caution for RSC because they overestimate the exposure concentrations of developing embryos. Because of this, only ripe egg data were used for the evaluation of concentration-response relationships (Section 7.5).

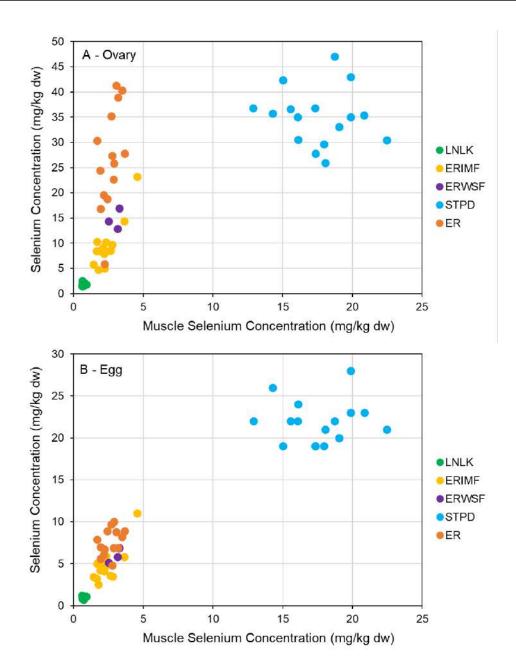




Note: Selenium data reported by TrichAnalytics. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

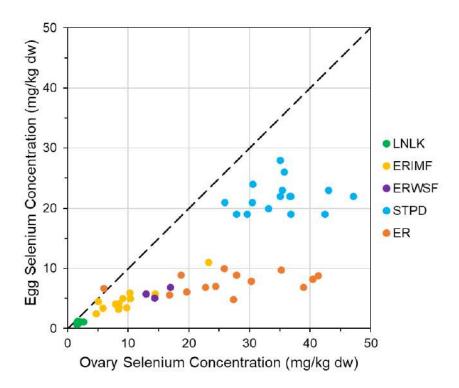
Figure 4: Egg, ovary, and dorsal muscle selenium concentrations of redside shiner from Elk Valley sampling areas, 2019.





Note: Selenium data reported by TrichAnalytics. Note different y-axis scales. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

Figure 5: A) ovary and B) egg versus dorsal muscle selenium concentrations of redside shiner from Elk Valley sampling areas, 2019.



Note: Selenium data reported by TrichAnalytics. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir. Dashed line is 1:1 relationship.

Figure 6: Egg versus ovary selenium concentrations of redside shiner from Elk Valley sampling areas, 2019.

7.4 Laboratory Rearing

A laboratory report prepared by Nautilus with raw data is provided in Appendix F. Water quality remained acceptable throughout rearing. Eggs were successfully transported to the laboratory by a combination of vehicle and plane between 3 hours and 2 days post-fertilization. Upon arrival, egg health was assessed and there was no evidence of damage or mortalities (white eggs). During egg rearing, there was no evidence of fungal growth and, therefore, prophylactic treatment of eggs was not required.

Larval RSC were terminated once yolk sac absorption was observed. This corresponded to 20 to 21 days post-fertilization and was consistent across females and collection areas. A small number of extra fish from the first successful fertilization event were reared in the presence of food and used to assess whether feeding of hatched fish was necessary. Once these additional fish were active, they were provided newly hatched *Artemia* nauplii, however they showed no signs of feeding (i.e., chasing or consumption of *Artemia*) prior to complete yolk sac absorption therefore larval RSC were not fed prior to test termination (yolk sac absorption).

Mean cumulative survival and standard deviation from fertilized egg to termination following yolk sac absorption was $84 \pm 24\%$ for the Loon Lake reference area. Survival ranged from 81% to 100% for embryos from 9 of 10 females and was 18% for embryos from the remaining female. The batch of eggs with low survival also had a 12% fertilization rate and yielded only 38 fertilized (viable) eggs. There were egg batches from other females from Loon Lake and other sampling areas that also exhibited low fertilization rates, but had high embryo survival; the reason for the low survival in that one batch from Loon Lake is unknown. The overall high survival of RSC from the Loon Lake indicates that it is reasonable to use the Loon Lake reference area to compare performance



observed in RSC originating from mine-exposed areas. Cumulative survival was high across all study areas, with a calculated mean and standard deviation of $85 \pm 17\%$ (Figure 7). The high survival results indicate that methods used in this study were suitable for successful rearing of early life stage RSC.

7.5 Concentration-Response Analysis

Concentration-response relationships were evaluated between the different RSC endpoints and ripe egg selenium concentrations. Statistical results for regression analyses are provided in Appendix G.

There was no apparent effect of egg selenium concentration on RSC survival (Figure 7) and ordinary least squares [OLS] regression indicated no significant relationship between survival and egg selenium concentration (p > 0.05). Relatively low survival was observed in one batch of eggs from Loon Lake with 18% survival (discussed in Section 7.4) and one batch of eggs from Koocanusa Reservoir (ER) with 23% survival. Due to personnel constraints in the field, that ER female had been held overnight in a minnow trap before being manually expressed. Upon collection, eggs from that female were observed as sticky and clumped and that batch of eggs had a low fertilization rate of 5.7%. None of the other females were held overnight prior to gamete collection. Removal of these two batches did not change the outcome of the regression analysis (p > 0.05).

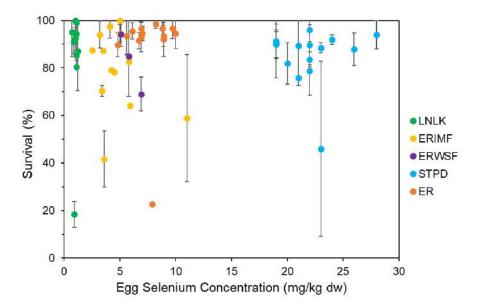
Mean percent fertilization of eggs was significantly higher (two-sample t-test, p < 0.0001) following refinement of field-fertilization methods (see Section 7.2). Concentration-response relationships evaluated separately for batches of eggs before and after method refinement showed no significant relationships between fertilization and egg selenium concentration (OLS regression; p > 0.05). Percent fertilization was typically less than 50% at egg selenium concentrations less than about 5 mg/g dw (Figure 8) because fish were first collected from reference and low selenium areas, and eggs from these fish had lower egg fertilization rates prior to refinement of the field-fertilization methods. Percent fertilization was not affected by selenium concentration.

Fish growth (length and dry weight) was consistent across batches of embryos (Figure 9) and showed no statistical difference between batches of eggs before and after refinement of field-fertilization method (two-sample t-test, p > 0.05). Mean fish length (\pm standard deviation) was 7.2 ± 0.4 mm and ranged from 6.5 to 7.9 mm. Mean fish dry weight was 0.35 ± 0.05 mg and ranged from 0.22 to 0.46 mg. Fish length was not affected by egg selenium concentration (OLS regression; p > 0.05). A statistically significant negative slope was observed for larval fish weight (OLS regression; p = 0.01), but the slope was shallow (slope = -0.002) and explained a small proportion of variation in the data ($r^2 = 0.12$). This relationship was driven by the Loon Lake fish weights that were slightly higher and less variable than other areas and was not statistically significant when these Loon Lake data were excluded (OLS regression; p > 0.05). Because the remaining areas captured a range of egg selenium from 2.5 to 28 mg/kg dw without showing a significant relationship, the shallow trend was interpreted to reflect ecological conditions in Loon Lake that affect fish growth, and not an effect of selenium.

Similar to other endpoints, no significant relationship was observed between incidence of deformity and egg selenium concentration (OLS regression; p > 0.05; Figure 10). When considering fish with any deformity (total GSI scores 1 or more), the mean (\pm standard deviation) incidence of deformity was $10 \pm 18\%$ and ranged between 0% and 100%. The batch of eggs that yielded 100% incidence of deformity was the batch from Loon Lake that had 18% survival and 12% fertilization (Section 7.4). Of the 38 fertilized eggs reared in that batch, only 7 survived until test termination, and all exhibited a mild deformity. When only those fish with a significant deformity or multiple minor deformities were considered (total GSI score of 2 or more), the mean (\pm standard deviation) percent of deformed fish for all areas was $7.0 \pm 11\%$ and ranged between 0 and 47%. Several batches of eggs collected from ERIMF with lower egg selenium concentrations were observed with an incidence of deformity greater than 10% (Figure 10), suggesting that the higher incidence of deformity relative to other areas

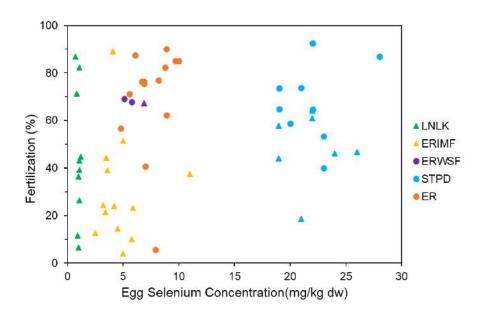


may be related to site characteristics independent of selenium concentrations. Apart from this observation for some ERIMF samples, differences in incidence of deformity were not apparent between sampling areas (Figure 10).



Note: Data are mean response and error bars are standard deviation. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

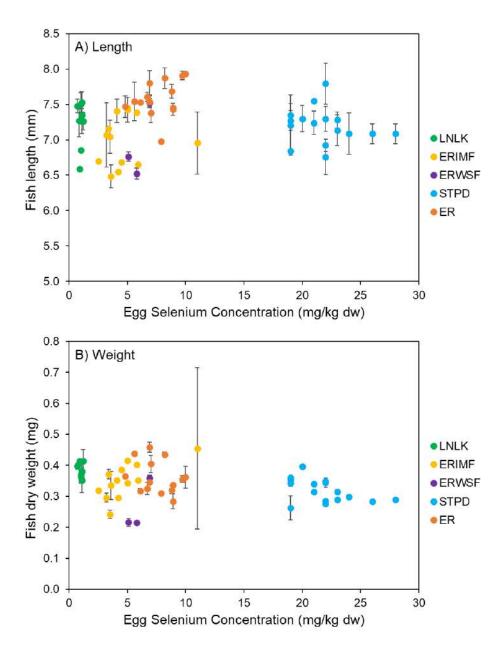
Figure 7: Survival of redside shiner larvae versus egg selenium concentration.



Note: Data indicate before (triangle) and after (circle) change to short, dry fertilization period. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

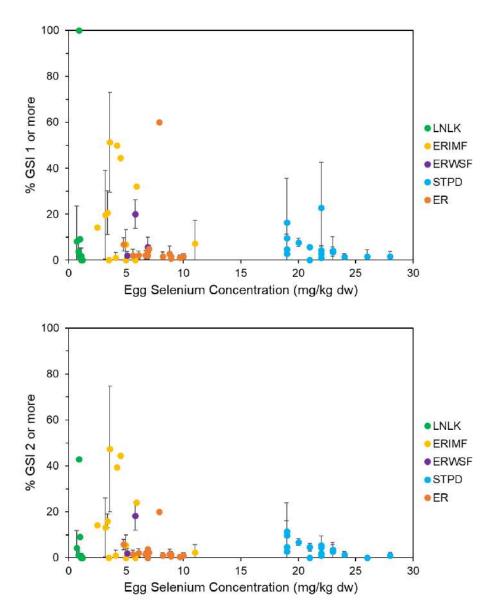
Figure 8: Percent fertilization of redside shiner eggs versus egg selenium concentration.





Note: Data are mean response and error bars are standard deviation. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

Figure 9: Growth measured as length (A) and dry weight (B) of redside shiner larvae versus egg selenium concentration.



Note: Data are mean response and error bars are standard deviation. GSI = Graduated Severity Index, see Table 2 for description of GSI categories. LNLK = Loon Lake reference area, ERIMF = Elk River impoundment in Fernie, ERWSF = Elk River Wetland South of Fernie, STPD = Stanford Pond, ER = Koocanusa Reservoir.

Figure 10: Deformity of redside shiner larvae by severity level versus egg selenium concentration.

8.0 SUMMARY AND CONCLUSIONS

The 2019 field study observed spawning RSC at areas throughout the Elk Valley and in Koocanusa Reservoir. Procedures were developed to identify ripe females, such that viable eggs could be collected and fertilized in the field. It was observed that RSC spawn over several weeks as fractional spawners, with only a small proportion of fish caught that appeared to be actively spawning on a given day. With adaptations made during the field program, field-collection and fertilization were successful in obtaining batches of fertilized eggs. Transport to and rearing of eggs in the laboratory was successful with high survival rates overall. These results indicate that the field and laboratory methods used in this study were successful for obtaining and rearing early life stage RSC, which to the best of our knowledge is the first study of this kind with RSC.

Targeted collection of adult RSC from surface waters with a range of selenium exposure resulted in a field-derived range of selenium concentrations from 0.71 to 28 mg/kg dw in eggs and 1.5 to 47 mg/g dw in ovary. Ovary selenium concentrations were higher than in eggs and ovary data should be interpreted with caution because they overestimate the exposure concentrations of developing embryos. Ripe egg data should be used for the evaluation of selenium toxicity. There was no evidence of selenium effects on survival, growth, or deformity of RSC up to the maximum egg concentration of 28 mg/kg dw obtained in the study. Thus, the results of this study indicate that the threshold for reproductive selenium toxicity to RSC is >28 mg/kg dw.



9.0 CLOSURE

We trust that this report provides sufficient information for your present needs. Should you have any questions, please do not hesitate to contact the undersigned at 604-296-4200.

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APPENDIX A

Laboratory Spawning Study

Date: 344 9/2018

Injections

		S	ex				
				Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
3A	P-1	?	?	1.95		N	
LoonLakeza LoonLakeza LoonLakeza	1		X	14.57	13.0		Hemorraging around pectoral fine? (pre-injection); red sto
ASSALANOSA	7	X		10.06	9.4		Hemorraging " "?
oonspake 1B	3		X	1296	10,2		Healthy
4 11	4	×	X	19.90	11.7		
Le 11	5		X	13.79	10.4		Moved myo HIB
L 1B	6	X		78	8,4		Manually expelled some Milt (Vimnor) - p Mared into \$5
418	7	X		8.56	5,9		
L 18	8		X	9,86	8.9		
-L 1B	9	X		11,12	9.7		
1 8B	61		X	14,08	11.6		
LL IB	1(X	10.745			
LLIB	12	X?		9.6	9,7		
LLIB	13		X	10,04	9,2		
LLIB	14		×	15.48	il.Z		Largest distended Body
LLIB	15		X	15,12	11,0		
LhiB	160		×	11,64	8.9		
EROL IA	17		X	2.52	6.2		M35sy Some Stales
-ROL IA	18	X		3,72	31		
PLOLIK	19	•	χ	7.3(6.		
EROLIA	20		X	5.03	7.4		
EROL 1A	21		X	4.68	8.2		

Lo Female or unknows

202/2010

Date: 349/18

Injections

			Y N			
			Body Weight		Used in fertilizations	
					(Y/N)	Comments
		漫	4.3			Missoy Some Scales
	3	X	33.84	7.2		Missing Some Scales Missing Some Scales
		X		6.7		
25		X?	2.71	6.6		Looking a little silk- yellow tinge
26		X	3.78	71		0
27		X		6.7		
28		X		7.0		
	X					
30		X2				
		X				
	X			68		
		X				
		X		6.7		
	X		3.79			
			7 99			
		X	300	67		
38		X		8.6		
00		/~	Tayor	0.4		
	72 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	22 X 23	22 X	22 X	22 X 3384 7.2 24 X 3.28 6.7 25 X 2.71 6.6 26 X 3.78 7.1 27 X 3.12 6.7 28 X 3.15 7.0 29 X 2.44 6.1 30 X 2.24 6.4 31 X 2.24 6.5 31 X 2.44 6.5 31 X 3.06 6.7 31 X 3.06 6.7 31 X 3.00 6.7 31 X 3.00 6.7	22

Lo Female or unknown

BELLOS

Date:

JULY 11/18

Injections

		S	ex				
				Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
LL ZA	39	X		4.78	7,7		
LL ZA	40		X?	3.06	6.7		
EL ZA	41		× ?.	3.21	6.6		
LL 214			X	4.46	718		
ELZA	43		X	5.35	7.8		
LL ZA	44		×	504	7.7		
LL ZA	45		X	11,52	8.8		
HZR	46		X	10,94	9,5		
1-2A	47		X	12.21	9.9		
1 2A	48	X	五	3,93	7.4		Redness Surranding And Pore - Swaller
LZA	49		X	331	75		
id 28	50		X	6,40	8.(
304 28	51		X	6.88	88		
G02 28	52		X;	3.64	7.(
God 28	53		X	4.39	7.2		
Gird 2B	54	X		6.57	8.6		
God 28	55		X	4.31	72		
hod 28	56		X	5.54	8.2		
rod 28	57	X(3)		5,54	8.7		
hod 28	58		X	4.62	77		
and 28	58	X		6.45	8.7		
God 2B	60		X	762	9.7		

Date: July 11 19

Injections

		S	ex				
				Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	U(Y/N)	Comments
ASBOR	61		X	692	8.5		
God ZA	62		X	4,12			Forgated Snow, V. Stream and - Old Looking
GODZA	63		X	9.41	93		
GodZA	64		X	2.36	84		
GodZA	65		X	7.82	7.8		
GodZA	66		X	3.40	8.1		
TOTAL SA	The state of the s						
200-21	63						
L 38	67		×	8,07	8.7		
L 3B	68		X	3.87	71		
LL 38	69		X	11.45	8.7		
438	70		X	5.83	8.2		
LL38	21		×	8.75	9,2		
438	22		X	9.21	9.2		
438	73		X	7.94	84		
1-138	74		X	15.17	10.7		
1-3B	75		X	9,96	ao		
433	76		X	12.68	10,(
438	77		X	13.56	12.2		
LL38	78		X	8.2	8.6		
4-3B	79		×	3.16	8.8		

he Female or unknown

Deerhan

Date: 301411/18

Injections

		S	ex				
Tould	Fish ID	Male	Female	Body Weight	Length (cm)	Used in fertilizations (Y/N)	Comments
Tank ID		iviale		(g) 3, 84	Ti Length (Cili)	(1714)	Comments
EROL3A	80		×	3,87	36		
Ellor 3A	81		X	3.33			
Elo_3H	32		X		6.2		
ElloL34	83		×	2.12	0/		
Edol3A	84			3,52	6,8		
EROL3A	35	X	./	2.31	6.6		
LL 31	86		X	11.45	8.3		
L 51	87		X	717	8.3		

Lo Female or unknown.

Devistro M

Date: 30/4/7

Injections

		S	ex				T
Tank ID	Fish ID	Male	Female	Body Weight	Fork Length (cm)	Used in fertilizations (Y/N)	Comments
	FISH ID	Iviale	X	(g) (5,196		- (1/N)	Some Whitethin Contry on back
LL 1B	-				9,2		Some white this county on back
LLIB	7		×	14,99	loit		
LLIB	4		X	11,17			
LLIB			X	8,74	9.7		
LL1B	5		X	9.95	9,3		Appears the Most developed - Firm stoman
LLIB	7		X	25,44	12.1		Witches for the state of the state of
LLIB	3		$\hat{\chi}$	13,23	116		
LLIB	9		X	15,24	11.0		
LL 18	lo	9	X	12,07	10.0		
LLB	U		X	4.54	9.5		
154 Tank	12		X	9.86	9.5		
LSH Tank	13	X	X	13.53	10.4		
1557ank	14			13.0	11.0		
LSS Touk	15	X		7.39	8.4		
-1.55 Tank	16		X	19.14	147		
EROZ IA	17		X	4.9	7.8		
EROLIA	18		X	4,45	7.1		
EROLIA	19		X	4.8	7.5		
CONTR.	14 20						
COL TO	454						

LD Female or unknown

Decel 100

Date: 50417/1

Injection 5

		S	ex				
)				Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
LZA	20		X	5.23	78		
L 212	21	×2		4.93	74		
L 2H	22		X	10,95	9.8		
124	23	X2.		5,65	7.7		
-L 2A	24	Χ		12.29	10.1		
had 28	25		X	4.28	7.1		
92 804	26	X		4,81			
hod 2B	27	>		6.77	8.7 7.5		
85 pac	28	×		4.32			
202 28	28 29		X	5.86	8.1		
hod 28	30		×	6.27	8.4		
विद्यु दिवर्द	31		·X	9.35	9.6		
207 SB	32 33	*		5.64	8.1		
30d 28	33	×		5.75	8.1		
God ZB	34 35		×	7.94	8.9		
6628		0	×	5.44	77		
hod 2B	36		>	5.40	7,7	-	
202 ZB	37		×	710	8,4		
GOZ 28	38		×	7.15	8.0		
20d 286 LL 38	39		×	7.12	8.4		
	40		×	0.31	9.8		
LL38	41		X	9.2	9.4		

Lo Female or unknown

Date:

July 17/18

Injections

		S	ex				
				Body Weight		Used in fertilizations	Community
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
级LL38	42		X	15.13	10.9		
LL3B	43	×		8,52	8.6		
LL3B	44		X	13.5	lol		
LL3B	45		\times	7.81	89		
LL38	46		×	8.09	8.9		
113B	47	X		7.97	8.5		
L1-3B	48		\succ	9.14	q.Z		
L-13B	49		~	5.85	9,6		
LL30	50		×	9,91	9.3		
L-33	51		×	12,64	10.4		
LLSB	52		×	13.0	(000		
ROL3A	53		×	4.95	7.8		
-							

Per-2/2010

Date: July 25/14

Injections

		S	ex				
			-	Body Weight	Laurath (am)	Used in fertilizations (Y/N)	Comments
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
1155	1	20	X	12.79	8.5		
455	2	X	-/	251			
LL 55	3		X	19.0	11.8		
LL SH	4		X	9.98	9,5		
LLSH	5	X		1786	10.3		
LLIB	(0	X		11.26	10.1		
LL 1B	7	*	X	9.67	9.2		
LLIB	8		X	8.48	8.9		
LL 13	q		X	13.07	10.7		
41-18	(0		X	15.25	10.9		
LLIB	10	X	×	50.11	9.8		Slight Expel of Milt
HIB	(7		X	8.95	9.0		
LLIB	13	X		9.48	9.5		
LLIB	14	- /	X	25.52	12.21		
LLIR	15		X	15.40	10.6		
LLIB	16		X	15.20	10.7		
EROL 1A	17		X	3.85	7.0		
EROLIA	18		×	4,3	7.3		
	19		X	47	7.5		
LL ZA	20		X	3.7	7.7		Some Red on Anus - Redside
			X	4.27	7.6		
LLZA	21		×	17.33	10.3		
LLZA	22		1	1(1)	1000		

LA Female or sakrown

Injections

Date: 501425/18

		S	ex				
				Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Y/N)	Comments
LLZA	23		X	4.8	79		
ILZA	24	X	•	5.7	7,9		· · · · · · · · · · · · · · · · · · ·
LLZA	23		X	10.38	9,6		
LLZA	26		X	4.83	43		
GodzB	27		X	6.63	8.7		
God 28	28		X	767	8.5		
GodzB	29		X	5.28	7.8		
GodzB	30		X	6.6	8.3		
God 28	31		X	5.64	3,4		
God 28	32	X		4.22	7.3		
God 2B	33		X	8.4	6.4		
GodZB	34	X	ė.	4.77	7.6		
GodzB	35		X	5.53	3.2		
GodzB	36		X	9.18	9.5		
BodzB	37		X	5.47	8.2		
Bodzb	38		X	6.02	8,4		
8560	39		2	4.08	8.8		
85603	40		X	5.69	7.9		
LL3B	41		X	9.96	9.7.		
L1-38	42		X	7.86	8.8		
L1-38	43		X	11.7	100		
LL38	44		X	8.51	9.3		

ha female or saknown

goc 2/2010

Date: July 25

Injections

		S	ex				
		3		Body Weight		Used in fertilizations	
Tank ID	Fish ID	Male	Female	(g)	Length (cm)	(Ý/N)	Comments
138	45		X	9.31	9.7		
LL38	46		X	12.29	101		
L138	47		X	8.08	8.9		
LL36	48		X	8.35	9.2		
438	49		X	14.5	11.0	*	
LL3B	50		×	5.5	8.1		
L13B	51		X	4.7	8.9		
113B	52		X	9.12	9.0		
1-3B	53	100	×	15.23	10.0		
ENOLS14	54	X		3.3	no		
EROLSIA	55	X		3.01	6.9		
EROLSIZ	56	1	X	3.3	7.3		
ECLOSIZ	57	X		31	7.0		3
-ROLS14	58		X	2.65	6.4		*
							*
							0

LA Female or unknown

Period

Whox

				//	Redside	shiner: I	njections
Date:	May	16/19					
			Sex				
Tank ID	Fish #	Male	Female	Unknown	Body Weight	Ovaprim Injection Volume (µL)	Removed for fertilization
14	1	X			4.1	82	
83	2		X		4.6	92	
	3		X		5.5	611	
	4	X	1 Sec. 1		4.3	86	
	5		X		6.2	124	
iB	1		X		20.8	416	
	2	X			9.1	182	
	3		X		14.3	180	
	H		X		13.6	242	
	5		X		NA	236	
	6		×		9 1	138	
	7		X		9.7	184	
24			X		13.1	262	
	4	ļ.,	X		13.4	270	
	3	7	N.		10.8	ZILO	
	1-1		X		5.1	102	
	5		X		4,9	100	
00	6	1	X		5.2	104	
28		X	2/		7.	142	
	2		X		8.3	166	
	3	X	- /		0.5	130	

H Female or unknown

Decral son

COPIET.

			· · · · · · · · · · · · · · · · · · ·		Redside	shiner: li	njections
)ate:	Mary	6/2019	1				
			Sex				
Tank ID	Fish #	Male	Female	Unknown	Body Weight	Ovaprim Injection Volume (µL)	Removed for fertilization (Y/N)
78	5		X		8.2	164	
	6		X		7.4	148	
	7		X		5.6	117	
	8	\times			6.	\ZZ	
	q	1	X		5.2	107	
	10	X	1		6.7	124	
34	14		X		8.5	170	
	2		X		13.8	276	
	3		X		17'0	298	
	1		X		13.6	272	
071	5		X		10.0	200	
36	1		X		10.7	214	
	2		X		10.6	212	
	3		X		8.2	164	
	-		X		5.1	107	
	5		X		8.4	10%	
	(0		X		13.1	270	
	3	- /	X		8.1	165	
	8	X			10.6	212	

Lo Female or unknown.

married .

Red side shiner: Fertilization—

Ingedtons

Date: 522/19

	Comments																					
	Used in fertilizations																					
	Volume Length (cm)	09	110	80	1721	48	70	50	40	Hal	80	26	26	261	180	280	152	156	252	187		
	Body Weight	5.9	5.5	3,8	2.9	3.3	3.5	2.6	3.4	2,7	4.0	4,6	4,6	9,6	9,0	18.9	11.8	7.8	١٧.6	14.2		
Sex	Female	×	\times	×	×		X	×		34	X	X		×	X	×	×	\succ	×			
Š	Male					, X		_	×	×			X									
	Fish ID		-7	ч	T	r	و	14	8	5	0)	11	27	_	2	er.	5	S	و	4		
	Tank ID	A			i se									18								

Le Female or unknown

son the

Red side shiner: Fertilization

Insections

Sure21/19

Date:

		Comments																		MAR Expressed				
	Used in fertilizations	(N/A)		30												, N				4				
	Volume(pl)	Length-(cm)	208	104	754	106	258	96	134	135	(30	110	911	98	.26	780	166	196	326	102.	451	196	220	268
	eight					5.4	6.21	4.6	نی	و	\ \ \ \ \	5.3	0.0	4.3	3,6	14.3	83	9,3	16.5	(0,3	4.4	9,8	N.o	13.4
Sex		Female	X	×	×	×	×	×	×	×	×	×	×	×	×	×	×	х.	×		×	×	×	×
S	2	Male												17			5.0			×				
	<u>9</u>	FISH ID		2	2	エ	2	_	2	es	Ŧ	S	و	+	8	_	2	3	H	_	2	3	H	5
	<u>-</u>	Tank ID	2 K					28								2K				38				

Lo fermale or continourn

works and

Red side shiner: Fertilization

Injuran

Sure 21/19

Date:

_		_				_					_					
	Comments				7. V.2. V.				*							
	Used in fortilizations (Y/N)									8						
	Volume(pt)	162	150						121							
	Body Weight (g)	8.1	7.5							2						3
Sex	Female	×	×									1				
Š	Male															
	Fish ID	9	+						4							
	Tank ID	38														

ho female or unlending

					Redside	shiner: Ir	njections
nte:	Sone	27/19	A				
			Sex			-D see	se vácimo
Tank ID	Fish #	Male	Female	Unknown	Body Weight	Ovaprim Injection Volume (µL)	Removed for fertilization
14	1	4.53		✓	4,4	•	/
	2	V WJ+		,	3.3		
	3			~			
	5	V Mily		~	5.0		
	6	V		V	3.7		
	7				3, 3		
	g			i	3.3		
	91		1		5.7		
	(0			1	3.1		
iB	1			V	4.8		
	1	1			9.1		
	3 4			V	18.2		
	5				10.7		
	5	-			77		-
	7				13.7		
2A	1			1	10.3		
	2		V		12 4		
	3			1,	11.5		
	4			1	5.1		

		1			Redside	shiner: Ir	jections
Date:	Surer	7119					-
			Sex			چهد باغد	brue shaë
Tank ID	Fish #	Male	Female	Unknown	Body Weight	Ovaprim Injection Volume (µL)	Removed for fertilization
28		1		V	6.9		/
	2	V Milx			6.9 3.8		
	3			V	3.8		
	4			1	5.7		
	5				4.1		
	6				5.9.		
	7				4.6		
	8				5.6		
3 A	1				88		
	2				13.8		
	3				10,4		è
	H				140		
3B	1				10,9		
	7				10.4		
	3				7.8		
	H			1	1 73		
	5				123		
	6			1	7.9		,
		1					1.
							1
	+						
						IS-N-1040-1	

10

Redside shiner: Injections

Date:

50144/19

		5 ()	Sex	0 101 W	Ovaprim Ovaprim						
Tank ID	Fish #	Male	Female	Unknown	Body Weight (g)	Ovaprim Injection Volume (µL)	Removed for fertilization (Y/N)				
12	1	maie	remaie		(6)	/ HLI	7/11/				
11	7			1	2,7		- U				
	3				5,4 3,5 3,0						
	4				5,0						
	1				4.8						
	5			4	4.0						
	Lp_	V Mit	100		4.4						
	7 8	1		V	4.0						
	8	VM/			3.2						
	9		i i	/	3.0 8.9						
IB		1	4 1	1	8.9						
- 0	2			1	177						
	3	VM:14			9.9						
	4			1	14,0						
	5	1/		V	15'7		3.000				
	6	PSA.		1							
2A .	ľ	la.		- Y	11.0						
21	0				7.7						
- 195	2				10.1						
	3				13.1						
					12.8						
<u> </u>	5				3.5						
2B	1				6.1						
	2				4,4						
	3	,		1	6.4						
	H	VMILY			4.6						
	5	7 10101		1	50	,i	-				
				1	7 0	•					
	8 AS				61						
	8		1		56						
3k.	2				13.3						
b ()	2				4.6 5.0 7.6.5 13.0 14.0 8.8						
	3 4				9.2						
1	Н				8.8						

100 ne 100

Redside shiner: Injections

Date:

50144/19

			Sex		See idune sheet Ovaprim							
Tank ID	Fish #	Male		Unknown	Body Weight	Injection Volume	Removed fo fertilization (Y/N)					
	FISH #	iviale	Female		(g) 10.8	/(μL)	(1/N)					
38				~	10.8		NE TO SERVICE					
	2			al ac	9,5							
	3				11.2							
	4				71							
	5	+			9.8							
* ;	6		(v:		8.2	- 6						
-			10	1.1								
7.			- 2									
		1	+ 13									
						4						
			1									
			(4)									
	771				-							
	- H											
				4								
				1								
		9 0	- 4									
		10										
,•		7										
			(4)									
			1			-	<u> </u>					
				1.7								

Becor 200

Redside shiner: Bissections Lermination

Suly 25/19

+ 4													1											
	Comments												4		2.44									
	- A	/	/	,						1														
	Liver Weight	(8)	1	_ /	/ _	/	/	/	/	/	/	/	/	/										
Weights	Gonad	Weight (g)														/				/				
We	Muscle Weight	D	24.44	946.13	23.812	631.46	91.59	473 45	138.63	534.98	246.12	418.65	232.66	30'h28	481.31	431.80	205.83	735.20	275.19	2074.40	1703.22	3226.51	21.89+1	1663.70
	Body	Weight (g)	3.9	5.3	3.0	3.1	7.7	2,0		3.1	4	7.2	1,1,4	ከ' ተ	82	5.5	2.1	Ł٤	1.8	10,2	1'6	041	JA,0	8.9
	Length	(F)	8:15	75.3	650	67.5	628	04.6	59.4	9,99	6 5	600	13.7	775	9.29	62.2	85.9	69.5	58,2	2.600	83.9	115.1	100.9	88.6
	Sex		٤	الحا	· L	٤	Z	٤	Z	H	Ź	Z-X	1	1	H	٤	Ź	Ŋ	Ņ	Н	Σ	(4	×	Z
	Fish #		_	7	60	7	N	ی	4	8	0			12	12	14	15	9-	1	4	c	n	ゴ	2
	Tank ID		X												3					Tank 18				

Redside shiner: Dissections

		1																							
The second secon		Commants	CHILINGIA										the second secon					Pille Minnow?							
		Liver Weight	(8)	>			/	/	/	/	/	/	/	/		9.									
	Weignts	Gonad	Weight (g)													/	/	/	/	/	/	/	/		
	Wei	Muscle Weight	(g)	20.79.12	1258.22	191137	2010.33	1038.04	55°t201	608.39	870.33	646.49	632.97	28'8511	956.44	19.575	934.55	811495	915.73	1850.27	2055.39	H5.F211	1775.29	1070.99	1370.44
		Body	Weight (g)	19.9	5.6	11. 7	2.21	94	5.4	3.6	5.9	4.9	5.8	5,6	5.1	3.6	5.2	4,6	8,6	10.7	15.5	4.7	11.0	<u>ų</u>	4.8
		Length	高が	97.3	アベッ	1042	1023	88.2	275	69.6	1.48	870	9.78	9.48	75.4	75.9	78.4	73.5	94.8	98.7	107.7	861	100.0	883	9116
		Š	X O	1+	Σ	4	1	4	4	M	بدا	Ā	Z	W	H	I	H	Σ	+	Ţ	+	·H	X	ガ	+
		‡ 5	‡ ESL	S	7	8	~	7	7	9		. ~	ec	4	>	0	ίγ	8	_	2	2		7	3	ц
		C S	S T T	Tank 16	Tank 2A						Tan 2B								Tank34			TankisB			

Redside shiner: Dissections

Date: 501 425/19

																3				*
	Comments	34. 3. 9									4									
8	Liver Weight (g)	/	/	/	/	/	/	/	/											
ghts	Gonad Weight (g)									/	/	_	_	_	_				۰	
Weights		1519.05	1591.22	1375.79																
	Body Weight (g)	9.н	8.8	ナナ																
	Length (cm)-	91.6	1716	86.5																
	Sex	4	M	I											*					
	Fish #	5	٥	4																
	Tank ID	Fank38																		

the cappage

17 December 2020 1896296-008-R-Rev0

APPENDIX B

Fishing Summary from Previous Years

Table B.1: Summary of Recent Redside Shiner (RSC) Lentic Area Fishing and Supporting Data

													Sele	enium Concenti	rations	
Year	Season	Туре	Area	Area Code	Approxin (NAD8		Date	Fishing Condu		In situ Specific Conductance (2018) ^a	Total Water (2018) ^a	Sediment (2018) ^b	Benthic Invertebrate Tissue (2018) ^b	2019 Selection Recommendations		
					Easting	Northing						(µS/cm)	(mg/L)	(mg/kg dw)	(mg/kg dw)	
2015			Elko Reservoir	RG_ELKO-L	637546	5462281	3-May-11	Dip net	6	nc	nc	438 ^d	0.0089 °	1.2 °	10 °	Not recommended. Highly visible to public and fishing areas are heavily travelled by public. Not entirely lentic.
and earlier	Spring	Exposed	Stanford Pond	RG_STPD	639864	5483139	10-May-15 11-May-15 17-Sep-15	Minnow Trap Minnow Trap Minnow Trap Minnow Trap Minnow Trap	2 1 1 1 1	0.0038 0.0019 0.0018 0.0019 0.0018	Catch/day Catch/day Catch/day Catch/day Catch/day	307	0.0044	10	14	Recommended with caution and preference to other areas. Highly visible to public and loss is possible.
		Reference	Loon Lake	RG_LNLK	638220	5441850	3-May-18 5-May-18 3-May-18	Seine Seine Gill net	1,000 500 30	6.7 3.3 72	Catch/m ² Catch/m ² Catch/hour	251	<0.000050	-	-	Recommended
			Koocanusa - Elk River Mouth	RG_ER	627997	5447625	Late Apr	Hoop Net Gill Net	14 97	1.7 15	Catch/day Catch/hour	302	0.0012	0.67	7.7	Recommended
			Koocanusa - Gold Creek Mouth	RG_GC	630804	5436413	Late Apr	Hoop Net Gill Net	0 112	0 36	Catch/day Catch/hour	264	0.0018	0.35	3.0	Recommended
	Spring		Michel Creek Wetland	RG_MIC2	659520	5496610	5-May-18	Seine	0	0	Catch/m ²	418 ^d	0.0013 ^d	1.9 ^d	10 ^d	Not recommended. Although RSC have been found here in the past, nothing was caught in 2018.
		Exposed	Elk River Oxbow	RG_EROL	640831	5478206	4-May-18 5-May-18 6-May-18	Hoop Net Hoop Net Hoop Net	24 7 22	33 5.1 35	Catch/day Catch/day Catch/day	375	0.0013	4.4	12	Recommended
2018			Goddard Marsh	RG_GO13	652955	5514065	2-May-18 2-May-18 4-May-18 6-May-18 2-May-18	Seine Hoop Net Hoop Net Hoop Net Hoop Net Minnow Trap	1 9 4 8 1	0.0067 5.1 2.0 4.1 0.037	Catch/m ² Catch/day Catch/day Catch/day Catch/day	790	0.040	25	26	Recommended
		Reference	Grave Lake	RG_GRLK	655563	5525690	5-Aug-18 5-Aug-18	Seine Minnow Trap	22 169	nc 256	Catch/m ² Catch/day	289	0.00032	2.9 ^e	3.7	Recommended
			Elk River Impoundment in Fernie	RG_ERIMF	640447	5486898	3-Aug-18	Seine	115	nc	Catch/m ²	284	0.000091	0.68	2.7	Recommended
	Summer	- Fynanad	Elk River Wetland South of Fernie	RG_ERWSF	639138	5484622	2-Sep-18	Minnow Trap	12	1.3	Catch/day	471	0.0004	1.4	3.2	Recommended
		Exposed	Elk River Wetland d/s Grave Creek	RG_ELWDGC	653175	5521300	6-Aug-18	Seine	15	0.030	Catch/m ²	459	0.0073	6.6	24	Recommended
			Elk River Oxbow	RG_EROL	640831	5478206	31-Jul-18 31-Jul-18	Minnow Trap Hoop Net	16 40	0.94 1.4	Catch/day Catch/day	481	0.00013	4.4	12	Recommended
			Goddard Marsh	RG_GO13	652955	5514065	2-Aug-18	Seine	1	0.0020	Catch/m ²	960	0.082 ^f	25	26	Recommended

Notes: 2018 data collected during the Lentic Area Supporting Study or the Pilot Reproductive Toxicity Study for Redside Shiner; nc = not calculated; dw = dry weight

^a Spot water samples collected within 1 week of 2018 fishing date unless otherwise noted.

^b Mean 2018 concentrations unless otherwise noted.

^c Data reported for 2015 in nearby area RG_ELKO (Minnow 2018a).

^d Data reported for 2015 (Minnow 2018a).

^e Data reported for 2013 (Minnow 2018a).

^f Low concentration of spot sample (0.00041 mg/L) was considered suspect, and August 2018 sample for EV_GC2 is reported.

17 December 2020 1896296-008-R-Rev0

APPENDIX C

Standard Operating Procedure





Standard Operating Procedure

The Collection of Ripe Redside Shiner for Use in Toxicological Experiment

Prepared by:

Minnow Environmental Inc.
Georgetown, Ontario

April 2019

1 INTRODUCTION

The objective of this SOP is to outline the methods for collection of redside shiner in order to extract ripe eggs and milt for a toxicology study. Minnow will be responsible for the collection of fish, the determination of ripeness and tissue sampling. Once the fish have been collected, Nautilus will be responsible for the expression of ripe eggs and milt, fertilization, transport to the laboratory and rearing to hatch.

Prior to fishing for redside shiner, crews will map the aquatic habitat for likely spawning locations within each lentic area. Based on the available literature, we have determined that the fish require at least 10-12 °C water temperature to begin preparing to spawn. The fish also require suitable flowing water, be that from an inflow, outflow or spring. Ideal spawning habitat has been described as a moving water sections followed by a still water pool downstream. Examples of this include a riffle-pool creek system or a tributary and the lentic area it drains into. The fish will congregate in the pool, prior to spawning in smaller groups in the riffle section. Crews must target these features when setting fishing gear to maximize the efficiency of the program. The information to make this decision will be recorded on the site selection field sheet. Every lentic area to be fished also requires a water sample to be collected once a week (with accompanying quality assurance/quality control – QA/QC - samples).

The three types of gear will be used for fishing in this program, including: 1) hoop nets; 2) seine nets; and 3) minnow traps (see section 14 for representative diagrams). Hoop nets are a passive fish capture technique, relying on fish to willingly encounter and enter the net. They are a type of cylindrical fish trap with a series of funnel-shaped openings which make it easy for fish to enter the trap, but very difficult for them to escape. Hoop nets have one lead and two wings that extend from the mouth of the net to guide fish into the trap. They can be used to sample fish in a wide range of environments, including lakes, wetlands, and rivers. Nets will be set in pool or slow flowing areas, with the opening angled towards a riffle, where possible. Hoop netting is considered a non-lethal approach to collecting fish. Hoop nets will be set overnight for fish capture.

Seining is widely used as a method for collecting fish in streams, rivers, and lakes. Seining for this program will be conducted by foot in the pools of shallow water near potential spawning riffles. A seine can be variable in size, but a standard size is 15 m (50 feet) by 0.9 m (3 feet) with a mesh size of 0.3 cm. Seine nets have a lead line along the bottom of the net and a float-line along the top of the net. While in use, these lines ensure that the net stretches vertically in the water column. The lead line must remain in contact with the substrate (when seining by foot) and the float-line must be at the surface in order to prevent fish from escaping. Seining is generally most effective



at capturing small-bodied fish in shallow littoral habitat. Seines will be used whenever possible in areas without excessive large woody debris or rocks that would influence the effectiveness of the technique, or risk damage to the net itself. Seining will be the only form of active fishing for this project.

Minnow traps are portable cages that capture fish as they swim through small funnel-shaped openings at each end. Minnow traps work best to catch small-bodied fish as traps are typically 42 cm long, 25 cm deep, have 0.6 cm mesh, and have 2.5 cm diameter openings. Minnow traps will be deployed in conjunction with the other fishing methods to maximize potential to catch fish.



2 FISHING SITE SELECTION

Fishing site selection at each lentic area will be carried out as follows:

- Conduct habitat mapping of the lentic area, and identify inflows, outflows, and ideal spawning habitat. Record the GPS coordinates of these features on field sheets. Take photos of the site and unique/ distinguishing habitat features.
- 2. Indicate the following on field sheets:
 - a. Size of assessed habitat;
 - b. Average depth (in meters);
 - Amount and type of vegetation present (aquatic, riparian, and overhanging canopy);
 - d. Anthropogenic influences;
 - e. Substrate type; and
 - f. Submerged cover (i.e., large woody debris, reeds, boulders, etc.);
- 3. Complete a drawing of the site and include:
 - a. The inflowing riffle and stillwater pool sections (if present);
 - b. General flow direction;
 - c. Unique point features (large rocks, submerged trees, etc.);
 - d. Observations of fish (RSC or other species); and
 - e. Fish behavior (e.g., spawning behavior);
- 4. Measure water temperature and other supporting measures (pH, dissolved oxygen, specific conductivity) at the inflows and outflows where RSC are expected to spawn, and record on field sheets;
- Set fishing gear at locations likely to catch ripe fish (i.e., near inflows or where RSC are exhibiting spawning behavior), and indicate set locations on field maps. Follow SOPs for fishing (see below);
- 6. Record additional notes that may include pertinent information for other crews. Several crews may visit each site and information that can be shared will be helpful to the project.



3 WATER SAMPLE COLLECTION

One grab sample will be collected at each lentic area weekly during the program. Samples will not be filtered in the field. General guidelines for grab sampling are as follows:

- 1. Only use sample bottles provided by the analytical laboratory specific for each analysis. Reject any uncapped bottles.
- 2. If the sample bottle has been pre-preserved, then use a second bottle that does not contain preservative to fill the pre-preserved sample bottle.
- 3. Ensure bottles remain capped until sample collection and are stored under clean conditions (e.g., in cooler, plastic bag, etc.). Keep vehicles reasonably clean to limit potential contaminant sources.
- 4. Do not rinse bottles that are supplied clean by the laboratory.
- 5. Only leave the sample bottle uncapped while filling the bottle and/or adding preservatives. Do not touch the cap liner or the inside of the sampling bottles (even when wearing gloves). When sampling, store caps in a plastic bag or set inverted on a clean surface.
- 6. Gloves must be worn, use un-powdered latex, nitrile, or polyethylene disposable gloves and refrain from smoking or eating. An acceptable pair of gloves are included with the sample kits received from the laboratory. Do not use insect repellent, sunscreen or moisturizers if sampling by hand or be very careful that repellents, sunscreen, or moisturizers do not come into contact with the samples.
- 7. While sampling, avoid submerged vegetation and ensure sample is free of obvious foreign material not representative of the water column at time of sampling (e.g., algae, sediment, organic matter, etc.).

Collect an unfiltered grab sample as follows:

- 1. Grasp the bottle well below the neck and remove the lid, taking care not to touch the inside of the lid;
- 2. Collect water chemistry samples by wading into the water from shore and taking a grab sample from approximately mid-depth, or at arm's length below the surface. If the water is shallow, avoid disturbing the bottom substrate while wading into the water body or when submerging the bottle;
- 3. Once the bottle is full, remove the bottle from the water in one motion by forcing the opening away from you. If the sample does not require preservation, fill it to the top to



minimize air space. If preservation is required, fill only to the "fill line" indicated on the bottle, or ensure enough space remains for addition of the preservative (refer to Analytical lab instructions).

4. Return to shore, add the preservative if required and replace cap. Gently invert the bottle two or three times to mix with preservative.



4 SETTING A HOOP NET

To set up and use a hoop net, proceed as follows:

1. Nets can be placed facing any direction, but a general procedure is to set the net perpendicular to shore with the lead running to shore.

- 2. Secure one end of the lead, either by tying it to shore or by tying an anchor (e.g., weight and reusable bag) to the lead line and a float to the float line.
- 3. If using a boat to set the net, reverse the boat slowly while deploying the lead of the hoop net. If deploying without a boat, slowly wade away from the secured lead end. Once at the end of the lead, tie the float line of the lead to the top and middle of the square opening of the net and the lead-line to the bottom-middle of the square.
- 4. At the end of each wing, add a rope and float (that will reach the water surface when the net is submerged) to the float line and an anchor to the lead line. Tie a "SCIENCE EXPERIMENT" label to the float line that is visible from the surface.
- 5. Lower the wings into the water on either side of the lead ensuring that the wings are vertical and not twisted; the float line must be at the top and the lead line on the bottom.
- 6. Continue reversing or wading backwards and slowly lower the square end of the hoop net into the water followed by all the hoops of the net. Ensure that the hoop net is completely stretched out, taut, and not twisted.
- 7. To close the cod-end of the net, confirm that the line that extends from the last funnel of the hoop net exits through the cod-end of the net. The cod-end is then tied securely by using the small rope that is tied to the hoop net mesh at the cod-end. Poorly secured codends can allow fish to escape.
- 8. Secure an anchor to the rope that extends through the cod-end. Tie a float and rope to the cod-end, so that the float will reach the surface once the net is submerged.
- 9. Slowly lower the anchor into the water, and as the net sinks, hold the float line to ensure the net remains taut.
- 10. Return to the floats tied to the wings and pull the wings lightly at a 45 degree angle from the lead to ensure that each wing is stretched out. It may be necessary to return to the cod-end float and pull it taut as well, as setting the wings may have displaced the net.
- 11. Leave the net in place overnight, including both dusk and dawn periods when fish movement is greatest.

12. Check nets daily. If nets are left for longer than a day, fish may become injured trying to escape, or larger predators caught in the net may consume smaller fish.

Retrieve the hoop net as follows:

- 1. Fill a tote with water; this will be used to hold the fish caught in the net.
- 2. Grab the lead, and follow it to the opening of the net.
- 3. When the opening is reached, pull it to the surface using a slight shaking motion to ensure that any fish caught between the hoops nearest the opening are funnelled to the cod-end of the net.
- 4. Continue to pull the hoops from the water until the entire hoop net is out of the water, retrieve the anchor secured to the cod-end, until the cod-end, and empty the contents of the net into the water-filled tote.
- 5. Upon retrieval of the net, record the date and time on field sheets.
- 6. Identify and enumerate all fish. Retain all redside shiners in an aerated bucket, and otherwise release remaining fish as close to the point of capture as possible.

5 SEINE HAULING BY FOOT

A seine net is hauled by foot using two operators, as follows:

- 1. First, pull the seine net out of its storage tote and ensure that there are no twists in the net and that the float line is on top.
- 2. Fill a tote with water; this will be used later to hold the fish for processing.
- 3. Have each operator grab separate ends of the seine by the wings. The end of each wing has a handle loop at the top on the float-line and a foot loop on the lead-line. Put one foot through the lead-line loop and hold on to the float-line loop so that you can walk forward on the outside of the seine, without obstructing the pathway to the seine bag.
- 4. Seining can be conducted either by walking over a larger area along the shore, or by encompassing a relatively small area.
- 5. To use the technique of walking over a larger area, begin at the shore. Have one operator walk out perpendicular to the shore as far as possible and then walk parallel to the shoreline while the other operator walks along the edge of the waterbody. If seining in a flowing area, begin at the downstream end and move in an upstream direction.
- 6. Alternatively, sample a more localized area by having one crew member remain stationary on shore with one wing of the seine, while the other crew member walks out and back towards shore, completing a semi-circle.
- 7. Once the desired distance has been walked, return to shore. Lay the wings out flat such that the lead lines meet and the float lines are on the outside. Both operators must retrieve the net at the same pace, so that the seine bag remains at the furthest point from the operators. While pulling the net in, have the lead-lines drag together along the bottom and the float-lines remain at the surface in order to minimize gaps where fish could escape.
- 8. As the net is being pulled in, shake the wings so that all fish are pooled in the seine bag at the end of the seine.
- 9. Once the net is completely pulled onto shore, empty the fish from the seine bag into the water-filled tote.
- 10. Inspect the seine for any remaining fish.
- 11. Record the total area covered by each seine haul, as well as the maximum depth. This information is required for calculating the catch-per-unit-effort (CPUE).



12. Identify and enumerate all fish. Retain all redside shiners in an aerated bucket, and otherwise release remaining fish as close to the point of capture as possible.

Seines can be torn as they are pulled through the water, leaving holes through which fish can escape. Inspect the seine frequently, and repair as necessary.



6 SETTING A MINNOW TRAP

 Traps are typically baited to attract fish. Place bait (dry cat food or other) into a screened (no greater than 1 mm mesh) 250 mL container or in cheese cloth tied tightly with string or a cable tie. The container or cheese cloth ensures that the fish cannot eat the food, which could potentially alter their weight and skew measurements. Record the type of bait used.

- 2. Once the bait is prepared, place the bait into one of the baskets and close the large openings together so that the each pin goes through a hoop.
- 3. Close the trap with a clip by attaching it onto the aligned open hoops (on the opposite side from the matched pins and hoops).
- 4. Tie a rope and float to the ring end of the clip, and tie a "SCIENCE EXPERIMENT" label to the end. There must be enough rope for the float to reach to the surface when the trap is sitting on the substrate.
- 5. After a set amount of time (e.g., 24 hours), retrieve the trap and record the time and date on field sheets. If necessary, minnow traps can be left in the water for a few days, as they allow the fish to remain alive and in good condition.
- 6. Remove the clip to open the trap and empty the fish into a clean pail of water.
- 7. Identify and enumerate all fish. Retain redside shiners in an aerated bucket, and otherwise release remaining fish as close to the point of capture as possible.

7 IDENTIFICATION OF RIPE INDIVIDUALS

To identify a ripe male redside shiner:

- a. The pectoral fin should extend past the pelvic fins (Used to initially sex fish)
- b. The fins should be brassy in colour. Dark colouration nearest to the insertion point but continuing down the fin, almost appear opaque in portions. There should also be a brassy half-moon under the eye. Yellow between the dark back and lateral band colour. Bright, wide red stripe extending to the anal fin.
- c. Nuptial tubercle (small white ridges or bumps) may be present on the head. This is a strong indication that a male is ready to spawn.
- d. Gently squeeze the abdomen to see if a small amount of white milt is produced. If so, the male is ready for extraction. If no milt is produced, release the fish back into the water body.

To identify a ready to spawn female redside shiner:

- a. The pectoral fin will not extend past the pelvic fins.
- b. Fins are pale in comparison to the males, and remain transparent. The half-moon under the eye is gold in colour and the colouration along the body is more subtle, described as golden.
- c. Feel the abdomen of the female fish. If the body feels hard and no apparent movement beneath the skin, the fish is not ready to spawn. If the body has some give to it and you can feel movement below the skin, the fish is still preparing to spawn. When fish are in this stage or later, be very careful not to express more than one or two eggs. If you see eggs coming out of the fish while feeling the abdomen, the fish is ready to spawn and the crew from Nautilus should be contacted immediately.

Care should always be taken when handling redside shiners, as a ripe and running female can express her eggs through very light pressure on the body. All fish determined to be ready for spawning should be set aside in buckets containing water, separated by sex.

When spawning characteristics appear in fish in an area, notify Nautilus so that crews can be deployed to assist in the extraction and fertilization of eggs.



8 FISH SAMPLE COLLECTION SEQUENCE

Once ripe and ready RSC are caught, samples will be collected in the following sequence (refer to the following sections for detailed instructions for each step):

- 1. Anaesthetize or euthanize ripe fish using clove oil (See Sections 9 and 10).
- 2. A photo will be taken of each fish and meristic data will be collected:
 - a. Fork length, total length, body weight
- 3. Nautilus staff will strip ripe eggs from spawning individuals and collect them in a clean container for fertilization (Section 9). Take photos of the eggs collected for each fish.
- 4. Prior to fertilization, a sub-sample of ripe eggs (e.g., 3) will be given to Minnow staff to place into a metal-free sample container for laboratory analysis (Section 9). Take photo of this sample.
- 5. Each fish will be dissected, and any ovaries (i.e., remaining green eggs) will be removed place into a metal-free sample container for laboratory analysis. Take photo of this sample.
- 6. Liver will be excised and weighed.
- 7. Ageing structures will be collected for laboratory analysis. Take photo of this sample.
- 8. Muscle samples will be collected for laboratory analysis Take photo of this sample.



9 RIPE FISH AND EGG HANDLING/STORAGE

Once ripe and ready RSC are caught, samples of gametes will be collected as follows:

- Prior to collection of gametes, the fish will be anaesthetized with clove oil (Section 10).
 The fish will be anaesthetized individually, once the field team is prepared for fertilization,
 so that the time is minimized between effectiveness of the anaesthetic and stripping of
 gametes.
- 2. Dry the fish gently using paper towel and take care to avoid moisture contaminating the samples.
- 3. Eggs will be expressed by application of gentle pressure to the abdomen. Collect the eggs in a Petri dish, Whirl-Pak bag, or other suitable clean and dry container, taking care to minimize the contact of the eggs with the skin and fins of the fish. It is anticipated that a Petri dish may be an effective collection vessel, since the rigid side of the dish can be held against the fish, allowing the eggs to be expressed over the lip of the dish. Only collect eggs that are freely expressed from the fish.
- 4. A subsample of eggs will be collected for analytical chemistry. Inspect this subsample using a dissecting scope and record any signs that might be characteristic of ripeness, including the degree of opaqueness of the eggs, distribution of oil droplets, and other observations related to the quality of the sample, such as the presence of blood, ovarian fluid, broken eggs, etc.
- 5. Milt will be collected from males by application of gentle pressure to the abdomen. Depending on the volume of milt produced, and the readiness with which it is expressed, it may be possible to collect the milt into a Whirl-Pak bag. However, it is likely that the volume produced will be small and, consequently a Pasteur pipette may be used to collect the milt as it is being expressed. Take care to avoid contact with moisture. In the event that the quantity of milt obtained from male fish is too small to divide among the batches of eggs being fertilized, dilute the milt using a small amount of iso-osmotic salt solution. Store the milt samples cold using ice or ice-packs prior to use for fertilization, ensuring that there is no opportunity for water to contaminate the samples and that the milt is not allowed to freeze.
- 6. Once the gametes have been expressed from the fish, return the adults to the anaesthetic in order to euthanize the fish.
- 7. The eggs will be fertilized in individual glass Petri dishes by addition of a small amount of milt to the eggs. Mix the eggs and milt gently to ensure contact between the eggs and milt



and to distribute the eggs; the eggs are expected to be sticky following water hardening, and it will be advisable to attempt to separate the eggs across the Petri dish, so that they are not clumped together. After approximately five minutes, add water to the dish and leave the eggs left to water harden. After approximately 20 minutes, rinse the water in the Petri dish to remove excess milt and refill. Water used for water hardening will be the same as water that will be used for rearing the fish in the laboratory, and will be approximately 10 to 12°C.

8. If the eggs adhere to the Petri dish, transfer the dish into a hard plastic container with lid, and fill the container with water. Alternatively, if the eggs do not adhere to the dish, the eggs can be gently poured into the container and the container filled with no head space. Package the containers in coolers and ensure they are kept close to 10 to 12°C for transportation to the laboratory.



10 EUTHANIZATION

When euthanizing fish, set up the euthanasia bath prior to extensive fish handling. The equipment required is:

- one adequately sized tubs,
- fresh water,
- Clove oil,
- Eye dropper.

Set-up and use the euthanasia bath as follows:

- 1. Set up euthanasia bath, with a clove oil concentration of approximately 60ppm or .06 mL per liter of water
- 2. Place the fish in the bath.
- 3. Wait until respiration has stopped.



11 FISH MERISTICS

11.1 Length

Three types of length measurements can be taken from a fish - total, fork, and standard (Figure 1). Total length is measured from the tip of the snout to the dorso-ventrally compressed lobes of the caudal fin. Fork length is the distance between the tip of the snout and the middle of the caudal fin. Standard length is the distance between the tip of the snout of the fish and the middle of the caudal peduncle. When taking a length measurement, ensure that the fish is lying flat on the measuring board, and that its snout is at the end of the board.

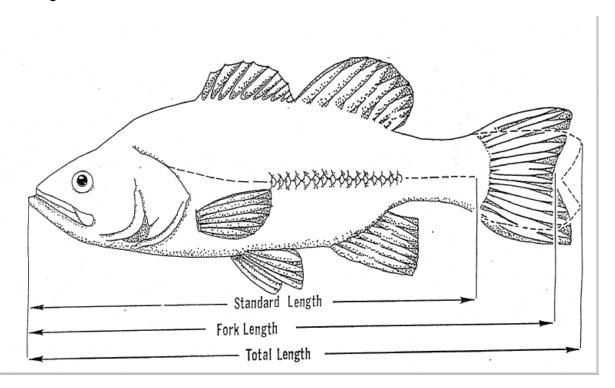


Figure 1: Measurements of Fish Length: Total, Fork, and Standard

11.2 Body Weight

Prior to stripping eggs, fresh whole body weights will be measured using an electronic balance. When measuring the whole body weight, make sure the fish is free of extra water on the surface of its body. If any eggs have spilled prior to weighing, note this on the field sheet.

Assess the scale or balance accuracy each day using standardized weights and calibrate if necessary. Tare the electronic balance prior to each measurement. Always use a scale or balance that is most accurate for the size of the fish being weighed.



11.3 Abnormalities

Fish will be assessed for abnormalities by evaluating the frequency of deformities, erosions, lesions, and tumors (DELT survey; Sanders et. al. 1999¹; see Attachment A) as well as external parasites, and scale disorientation. Record all instances of abnormalities on field sheets and document with photographs.

11.4 Liver Weight

If the fish is not already opened, create an incision (using round-nosed scissors) on the ventral surface of the body from a point immediately anterior to the anus toward a point immediately posterior to the pelvic fin. The liver is located in the anterior visceral cavity behind the heart and ahead of the stomach. It will be pink to dark red to brown in colour, and may consist of several lobes. When removing the liver, ensure that all parts are collected while being careful to exclude obvious fat deposits and the gall bladder. Weigh the liver to the nearest 0.001 g using an electronic balance.

0

¹ Sanders, R.E., R.J. Miltner, C.O. Yoder, and E.T. Rankin. 1999. The use of external deformities, erosion, lesions, and tumors (DELT anomalies) in fish assemblages for characterizing aquatic resources: A case study of seven Ohio streams. In: T.P. Simon (Ed.), pp: 225-246, Assessing the sustainability and biological integrity of water resources using fish communities. CRC Press, Boca Raton, FL.

12 AGING STRUCTURE COLLECTION

Primary (otoliths) and secondary (pectoral and pelvic fin rays) aging structures will be collected for each fish from which eggs are stripped. Otoliths will be collected by removing the entire head and placing it into a pre-labelled whirl pak bag. Put the sample in a cooler with ice packs, and freeze as soon as possible.

Pectoral and pelvic fin rays will be collected as follows:

- 1. Using a sharp knife separate the fin ray from the fin and cut around the base of the knuckle.
- 2. Remove the ray with a knife or scissors by cutting under the knuckle.
- 3. Strip the ray of as much tissue as possible and remove it cleanly (being sure to include the base/knuckle) from the fish.
- 4. Wrap the ray in wax paper and insert it into a pre-labelled envelope or sample bag. Both fins can be placed in the same sample container. If the samples are not completely free of muscle/skin tissue, store the samples in a freezer until submission to the laboratory.
- 5. Photograph sample containers/bags.



13 TISSUE SAMPLE COLLECTION

Prior to tissue sampling, and between sampling individual fish, clean all sampling tools and cutting boards. This is particularly important when collecting tissue samples for chemical analyses. If possible, conduct all dissections in a clean, laboratory environment. When not possible, make sure the dissection area can be kept as sanitary as possible.

13.1 Green Egg Samples for TrichAnalytics

If the fish is not open, then create an incision (using round-nosed scissors) on the ventral surface of the body from a point immediately anterior to the anus toward a point immediately posterior to the pelvic fins. Gonads are located dorso-laterally in the anterior end of the visceral cavity. Ovaries appear whitish to golden brown and have a granular texture. Remove green gonads from the surrounding tissue using forceps and/or round-nosed scissors, and place into a pre-labeled metal-free sample vial. Photograph the sample, place into a cooler, and freeze as soon as possible.

13.2 Muscle Tissue for SRC

A fillet of muscle tissue is collected for tissue chemistry analysis, as follows:

- 1. Begin by making a shallow cut through the skin on either side of the dorsal fin, from the top of the head to the base of the tail.
- 2. Then, make a cut behind the entire length of the gill cover cutting through the skin and flesh to the bone.
- 3. Make a shallow cut along the belly from the base of the pectoral fin to the tail. The first cut is made from behind the gill cover to the anus, and then continued down on both sides of the anal fin. Take care to avoid puncturing an internal organ while filleting the fish, which can contaminate the tissue sample.
- 4. Remove the fillet by cutting from the incision behind the gill cover, along the spine, to the tail. Include the belly flap in the fillet.
- 5. Carefully remove the skin and bones remaining in the fillet.
- 6. Weigh the fillet on an electronic balance and record the weights to the nearest 0.001g. Place the sample into a pre-labelled whirl-pak bag, and photograph it. Store muscle samples on ice (while working in the field) and then place in a freezer as soon as possible.



14 REFERENCE MATERIAL

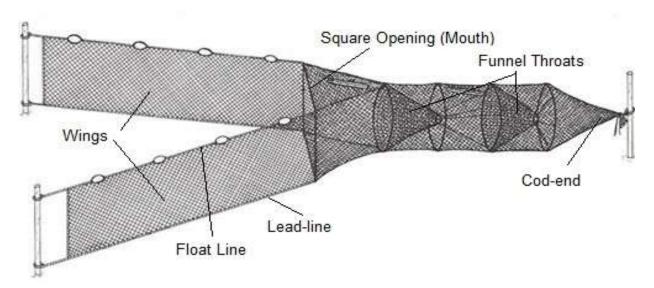


Figure A: Components of a Typical Hoop Net

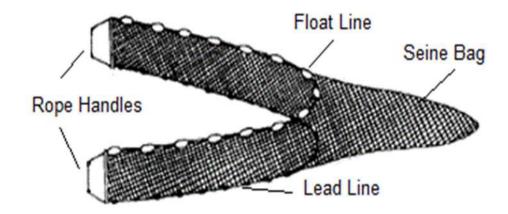


Figure B: A Common Seine Net used for Capturing Fish

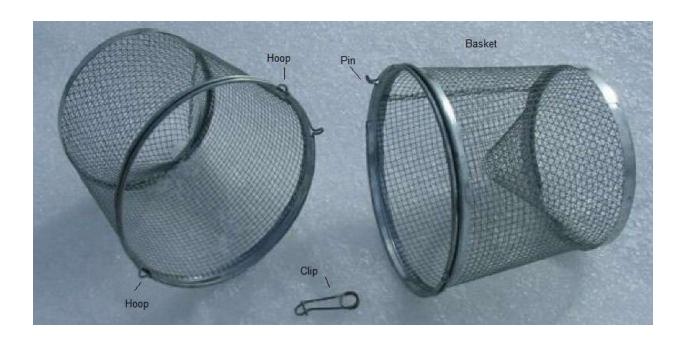


Figure C: A Common Minnow Trap used to Capture Small-bodied Fish

The Use of External Deformities, Erosion, Lesions, and Tumors (DELT Anomalies) in Fish Assemblages for Characterizing Aquatic Resources: A Case Study of Seven Ohio Streams

Randall E. Sanders, Robert J. Miltner, Chris O. Yoder, and Edward T. Rankin.

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9.1 INTRODUCTION

Since 1966, an increasing number of studies have reported the occurrence of external fish abnormalities (e.g., deformities, fin erosion, open sores, and tumors) in a variety of aquatic habitats (streams, lakes, estuaries, and marine) and discussed possible relationships between anomalies and environmental quality. Consistently, these studies have reported either a low number or percentage of anomalies at nonpolluted sites or a high number or percentage at polluted sites affected by industrial and sewage discharges, or both (Mills et al., 1966; Shotts et al., 1972; Komada, 1980; Berra and Au, 1981; Murchelano and Ziskowski, 1982; Sherwood, 1982; Cross, 1985; Bengtsson

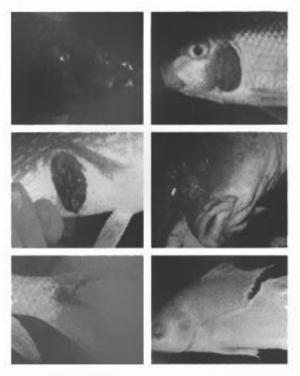


FIGURE 9.1 Five examples of external DELT anomalies and one predator-induced injury. Upper left: A common carp with a severely deformed head (knothead). Upper right: A golden redhorse with a severely eroded gill cover. Middle left: A northern pike with a large lesion/ulceration. Middle right: A common carp with large nasal tumors. Lower left: A silver redhorse with multiple DELT anomalies (severely eroded fin and tumors). Lower right: Predator injuries, such as the one a heron made on this freshwater drum, are not coded as a DELT anomaly by the Ohio EPA.

et al., 1985; Bengtsson and Larsson, 1986; Baumann et al., 1987; Malins et al., 1988; Reash and Berra, 1989; Lindesjoo and Thulin, 1990; McCain et al., 1992; Fournie and Summers, 1996). As the result of these and similar studies, the occurrence of fish anomalies has become an increasingly accepted indicator of environmental quality for water resources and fish health (Karr, 1986; Plumb, 1994; Yoder and Rankin, 1995).

9.1.1 Use of External DELT Anomalies in Bioassessments

Fish with external deformities, erosion, lesions (defined by the Ohio EPA as open sores or exposed tissue), and tumors (neoplasms) (DELT anomalies, Figure 9.1) were first observed by Ohio Environmental Protection Agency (Ohio EPA) biologists in 1979 while sampling a large urban stream, the Scioto River in downtown Columbus. The Scioto River receives a combination of pollutants from industrial and municipal effluent, combined sewer overflows, and urban runoff. Stream flows are also dominated by municipal effluent downstream from Columbus during periods of low flow (Yoder and Rankin, 1995). After a literature review showed a positive relationship between degraded water quality and anomalies (Sniezko, 1962; Mills et al., 1966; Pippy and Hare, 1969; Shotts et al., 1972; Hickey, 1972; Sniezko, 1974), DELT anomalies were incorporated into the Ohio EPA's stream monitoring program. As part of the development of biological criteria in 1987, the percentage of fish with DELT anomalies was then used as a modification of Karr's original metric for the percentage of diseased fish in the Index of Biotic Integrity (IBI; Karr, 1981; Ohio EPA, 1987a;

TABLE 9.1
Index of Biotic Integrity (IBI) Scoring Criteria for the Percentage of Fish with Deformities, Erosion, Lesions/Ulcers, and Tumors Captured at Headwater, Wading, and Boatable Sites

	Ohio EPA DELT Scoring Criteria					
,	"5"	"3"	"1"			
Headwater and wading sites	≤0.1%	>0.1 ≤ 1.3%	>1.3%			
Boat sites	<0.5%	0.5 ≤ 3.0%	>3.0%			

Note: Criteria are based on data from more than 300 reference sites throughout Ohio. If DELT is present on >1 individual at sites with ≤1000 total fish, then a score of "5" is assigned; or if 2 DELT individuals are collected at a site with ≤1000 total fish, then a score of "3" is assigned.

1987b; Table 9.1). Blackspot (Uvulifer ambloplitis and Crassiphiala bulboglossa), anchor worm (Lernaea cyprinacea), and other parasites were excluded from the metric (but are still recorded) due to the lack of a consistent, inverse relationship to environmental quality (Allison et al., 1977; Berra and Au, 1981; Whittier et al., 1987). Biocriteria were subsequently adopted into Ohio Water Quality Standards regulations in 1990 (Ohio EPA, 1992a). After realizing a high degree of variability in the severity of DELT anomalies in Ohio streams (e.g., slight fin erosion vs. severely eroded fins and skeletal and multiple anomalies), field criteria for classifying the severity of DELT anomalies were developed by Ohio EPA biologists in 1991.

In addition to IBI scores, longitudinal graphs of the percentage of DELT anomalies and photographs are frequently used in agency reports, presentations, and news releases along with other results to effectively portray the biological and chemical quality of Ohio streams (Ohio EPA, 1992b; 1995; 1996). While many audiences do not easily relate to numerical values that reflect nonattainment of Clean Water Act goals, examples of fish with DELT anomalies are clearly understood by the regulated community, resource managers, and the general public as indicators of a polluted water resource. Through the years, however, it has become obvious that not all fish species are equally susceptible, and a number of questions have arisen as to the Ohio EPA's use of these types of abnormalities. The objectives of this study were to try to answer some of these questions by determining: (1) What are the predominant types of DELT anomalies? (2) Are some fish species more susceptible to DELT anomalies? (3) Is there a statistical relationship between the percentage of DELT anomalies and the two biological indices (IBI and Modified Index of Well-Being [MIwb]) used by the Ohio EPA to assess overall stream quality? (4) Is the severity of DELT anomalies useful in assessing environmental quality?

9.1.2 STUDY AREA

Bioassessment results from seven streams sampled by the Ohio EPA between 1991 and 1995 were selected for this study to encompass a wide range of environmental quality (exceptional to very poor), stream sizes (drainage areas from 6.4 to 75,350 square miles), and land uses (woodland, agricultural, industrial, and urban). The database consisted of 360 electrofishing collections from 139 sampling locations spanning 746 river miles (1194 km). Approximately 181 hours of electrofishing was conducted over a total cumulative distance of 114 miles (184 km). Brief descriptions of the seven streams used in the present study are provided in Table 9.2.

TABLE 9.2 Descriptions of the Seven Ohio Streams Used in the DELT Study

Ottawa River: Located in northwestern Ohio, the Ottawa River is a medium-size tributary of the Auglaize River (Lake Erie basin). Land use within the 365-square-mile watershed is predominantly agricultural, with the exception of the

- urban/industrial complex within Lima. Major point source discharges to the river within and near Lima consist of the municipal sewerage system, composed of five large combined sewer overflow structures (CSOs) and a 001, an oil refinery, and a chemical complex. The stream also receives landfill leachate and chemical spills. During periods of low flow, more than 80% of the stream flow is effluent downstream from the three major wastewater discharges. Historically, the Ottawa River has been one of Ohio's most severely impacted streams downstream from Lima. A total of 23 samples from 8 locations (RM 46.1-1.2) were collected (between 27 June and 23 August 1991) and used in this study (Ohio EPA, 1992).
- 2. Mahoning River: Located in northeastern Ohio and western Pennsylvania, the Mahoning River watershed drains a total of 1140 square miles of the upper Ohio River basin. Land use within the watershed consists of a mixture of agriculture. heavy industry, and urbanization. The mainstem receives a multitude of municipal and industrial discharges, CSOs, and stormwater runoff. Historically, the Mahoning River has been severely impacted, but has shown some recovery. In 1994, the mainstern was in predominantly nonattainment of its Warmwater Habitat (WWH) aquatic life use designation throughout the lower 90 miles. Stream quality ranged from exceptional in its headwaters to very poor downstream from Youngstown (Ohio EPA, 1996). A total of 101 samples from 39 locations (RM 100.6-0.2) were collected (between 6 July and 21 September 1994) and used in this study.
- 3. Ohio River: Forming most of Ohio's eastern and southern boundaries, near-shore waters of the Ohio River now occupy Ohio due to impoundment by 10 high-lift navigational locks and dams. The mainstern receives a multitude of point source discharges from sewage treatment plants, heavy industries (e.g., steel mills, chemical plants), coal-fired power plants, and CSOs (ORSANCO, 1994). The mainstern also receives a considerable amount of barge traffic: however, a considerable amount of the watershed (drainage areas ranged from 23,450 to 75,350 square miles) is comprised of agricultural land uses and woodlands. A total of 102 fall night samples from 35 locations (RM 48.8-487.2) were collected (between 23 September 1991 and 31 October 1995) and used in this study (Sanders, 1995).
- 4. Salt Creek: Located in southcentral Ohio, Salt Creek is a medium-size tributary of the Scioto River. Land use within the 555-square-mile watershed is dominated by woodlands and agriculture. The mainstern receives effluent from one small municipal sewage plant in the upper half of the watershed and a second moderate size plant in the headwaters of a major tributary. A total of 23 samples from 13 locations (RM 41.2-0.3) were collected (between 29 June and 22 October 1992) and used in this study; 75% of the mainstern sites were in FULL attainment of Exceptional Warmwater Habitat (EWH) in 1992 (Ohio EPA, unpublished data).
- 5. Little Miami River: Located in southwestern Ohio, the Little Miami River flows in a southwesterly direction to its confluence with the Ohio River. Land use within the 1757-square-mile watershed is predominantly agricultural, followed by forests and suburbanization. The mainstem and tributaries received a cumulative total of approximately 50 million gallons per day (MGD) of municipal and county sewage treatment plant effluent in 1993. Portions of the watershed are developing rapidly, however, and the quantity of effluent is expected to increase. With the exception of elevated total phosphorus and fecal bacteria concentrations, water quality was generally good throughout the mainstem in 1993. Mainstem sediment quality was also good, with few elevated metals or organic compounds: 41% of the mainstem was in FULL attainment of EWH in 1993 (Ohio EPA, 1995). A total of 87 samples from 32 locations (RM 102.1-0.2) were collected (between 29 July and 14 October 1993) and used in this study (Ohio EPA, 1995).
- 6. East Fork Little Miami River: Located in southwestern Ohio, the East Fork is the largest tributary of the Little Miami River, Land use within its 499-square-mile watershed is largely agricultural, but is becoming increasing suburbanized in the lower third, which receives effluent from four WWTPs. Approximately 50% of the lower 15 miles of the mainstern was in FULL attainment of EWH in 1993 (Ohio EPA, 1995). A total of 16 sample: from eight locations (RM 15.5-1.4) were collected (between 20 July and 8 September 1993) and used in this study.
- Little Beaver Creek: Located on the east side of Dayton, Ohio, Little Beaver Creek is a small tributary (26.4-squaremile drainage area) of Beaver Creek, which drains into the Little Miami River near Xenia. The stream contains one of the most developed watersheds of the seven streams selected, and receives more than 8 MGD of effluent (the largest discharge in the LMR watershed). Approximately 93% of the lower 4.7 miles of the tributary was in nonattainment of WWH in 1993 (Ohio EPA, 1995). A total of eight samples from four locations (RM 4.7-0.1) were collected (between 7 July and 18 August 1993) and used in this study.

9.2 METHODS

Standardized field, laboratory, and data processing methods and procedures were used in this study (Ohio EPA, 1987a,b; 1989a,b,c). All fish sampling in this study was conducted with two principal types of gasoline-powered, pulsed DC electrofishing gear: (1) 1750-watt pulsator/generator combination (T&J Manufacturers) designed for smaller wadeable streams, and (2) boat-mounted, 3500-watt generator and pulsator combinations (Smith-Root Type 3.5 or 5.0 GPP units) with a straight electrode configuration for wider and deeper boatable streams. Sampling was conducted during the day except in the Ohio River, where night electrofishing was used for improved catches of most species (Sanders, 1992). Each sampling site consisted of a fixed distance ranging from approximately 150 to 200 meters for wading methods and 500 meters fo. boat-sampled sites. The time required to sample and process the catch at each site ranged from 1 to 3 hours.

Gross external anomalies are defined by the Ohio EPA (Ohio EPA, 1989c) as external skin, fin, or subcutaneous disorders visible to the naked eye during normal sampling procedures (i.e., when the fish are captured, identified, sorted, weighed, and counted). Deformities, erosion (of fins, barbels, and gill covers), skin lesions (i.e., open sores, ulcerations, exposed tissue), and tumors are 4 of the 15 types of anomalies (other types include common parasites and other abnormalities) recorded by Ohio EPA biologists during a fish survey. The DELT anomalies include many of the most obvious external clinical signs of infectious diseases and parasites (Plumb, 1994), and the use of such a "super group" reduces the significance of a misidentification. While every effort is made to correctly identify anomalies, the interchangeability of terms such as eroded and lesion by pathologists makes it less critical what to call an abnormality than whether the anomaly is present or absent. Ohio EPA staff have learned that with minimal training and established criteria, the field identification of DELT anomalies is relatively easy. General definitions and characteristics of the 15 different anomalies recorded are described by the Ohio EPA (1989c). Field biologists are urged to refer to textbooks on fish health for further information and pictures of specific anomalies (e.g., Post, 1987; Plumb, 1994). Questionable specimens were preserved for lab verification.

9.2.1 Examination of Fish for External DELT Anomalies

Although all fish captured are identified and counted during Ohio EPA stream surveys, only fish that are weighed (individually, in aggregate, or by subsample) are examined for external anomalies at most sites (i.e., sites with drainage areas greater than 20 square miles). Typically, this represents most of the fish captured; however, subsampling is recommended when large catches of certain species (e.g., gizzard shad) occur in order to save time on processing in the field. Subsamples by species typically included at least 15 individuals for larger species such as common carp, suckers, and sunfishes, and at least 50 individuals for smaller species such as minnows and darters. A conscious effort was made at all sites to "randomly" select fish for weighing and not skew the results by looking for fish with or without DELTs for weighing. At headwater sites (drainage areas less than or equal to 20 square miles) where fish are not weighed (because the MIwb is not applicable), all fish counted were examined for external DELT anomalies. Once detected, the severity of all DELT anomalies was determined as mild or severe using the standardized criteria (Table 9.3). The time used for examining specimens in the field typically consisted of less than 10 seconds (i.e., long enough to determine the presence or absence of anomalies on one side and classify the severity). For most species, this consisted of looking at one side of the fish, including all visible fins. Ictalurids (catfish) were also examined ventrally for barbel anomalies and parasites.

Anomaly data from each sampling location was then entered into the Ohio EPA fish community database (Ohio ECOS) along with numbers and weight(s) by species. Since the Ohio EPA does not currently calculate the percentage of DELT anomalies for each species (in report form), the percentage by species in this study was based only on fish that were examined for DELTs. The

TABLE 9.3

Ohio EPA's Field Criteria for Determining the Severity (Mild or Severe) of External Deformities, Erosion, Lesions, and Tumors (DELT Anomalies)

Type of DELT Anomaly (FINS Code)

Severity Criteria

Deformed fin, head, vertebrae, barbel, and other body parts

Mild One deformed fin or branched barbel.

Severe Two or more deformed fins or barbels; or any body (head, vertebrae,

abdomen, or other body part) deformity.

Eroded fin, gill cover, or barbel

Mild One or two barbels eroded less than half the barbel length, or a fin

ray not eroded past ray fork.

Severe Three or more eroded barbels; or a barbel eroded more than half

its total length; >2 fins eroded or fin eroded past a single ray fork

or if gill cover is eroded showing exposed gill(s).

Lesion (open sore, exposed tissue, or ulceration)

Mild <2 lesions < the size of the largest scale.

Severe >3 lesions or a lesion > the size of the largest scale or raw tissue.

Tumor Mild

<2 tumors < the diameter of the eye (count patches of Lymphocystis</p>

as one tumor).

Severe > 3 tumors or one tumor larger than the diameter of the eye.

total percentage of all species was calculated for each site, however, by Ohio ECOS, which computes (and sums) each type of anomaly for each species in each sample as a weighted number based on percent occurrence among weighed fish times the total number of that fish species in the sample. A fish with two or more different types of DELT anomalies is coded as an M (for multiple DELT anomalies) to avoid inflating the true percentage. Obvious injuries (e.g., fish-eating-bird or hooking injuries) are not included.

9.2.2 STATISTICAL ANALYSES OF STREAM QUALITY

The two fish indices incorporated into Ohio's biological criteria, the IBI and MIwb, were used to determine if a statistically significant relationship existed between stream quality and the percentage of DELT anomalies. The IBI, first introduced by Karr (1981), consists of 12 metrics that assess fish assemblages based on species richness and composition, trophic composition, abundance, and health. Ohio EPA's modified versions for headwater, wading, and boatable streams were used. The MIwb, a modified version of the Index of Well-Being (Gammon, 1976), is a measure of the fish community based on a calculation using relative number, biomass, and the Shannon Diversity Index (based on numbers and weight) from which highly tolerant and exotic fishes are removed from the numbers and biomass calculations. Higher scores for both indices typically reflect improving quality of fish assemblages or stream quality in general.

The percentage of DELT anomalies from the electrofishing samples collected from the seven streams used in this study were regressed against the MIwb and IBI (n = 346 and 360, respectively) scores computed for those samples. Before computing regression functions, percentage of DELTs were transformed to fit model assumptions with a Ln (y + 1) transformation (Neter et al., 1990). For the regression of Ln(DELT + 1) on IBI, plots of residuals against estimated values demonstrated nonconstancy of error variance over the range of IBI scores \geq 35; therefore, only data for IBI scores <35 were considered using the logarithmic transformation (Table 9.4). Percentage of DELTs for IBI scores \geq 35 were subsequently transformed using 1/Y + 1 (Neter et al., 1990), resulting in a normal distribution and constancy of error variance as demonstrated by a whisker plot of the

TABLE 9.4

Parameters and Significance Tests for Regressions of Percentage DELT Anomalies Against MIwb, IBI ≥ 35, and IBI < 35

Variable	Coefficient	Standard Error	Student's t	P
Constant	3.9735	0.1771	22.433	< 0.0001
Miwb	-0.3149	0.0205	15.344	<0.0001
Constant	-0.0863	0.1620	-0.53	0.5947
IBI ≥35	0.0132	0.0036	3.66	<0.0001
· Constant	4.8979	0.2732	17.93	<0.0001
IBI <35	-0.1185	0.1063	-115	< 0.0001

Note: The coefficient for IBI ≥ 35 is positive due to an inverse transformation.

transformed variable and a plot of residuals against estimated values. Residual and normal probability plots constructed for the regression of Ln(DELT + 1) on MIwb did not indicate a strong departure from normality or equality of error variance over the range of observed values.

9.3 RESULTS AND DISCUSSION

Of the 102,164 fish examined for external anomalies, one or more DELT anomalies was observed on 2,657 fish (2.6%). Of the 109 total species and 8 hybrids examined, one or more DELT anomalies was observed on 62 of the species (56.9%) and 5 hybrids (Table 9.5). By stream, Salt Creek (one of Ohio's highest quality rural streams) had the lowest overall percentage of DELT anomalies for both the total number of individuals examined (0.4%) and number of species afflicted (23.1%, Table 9.6). Conversely, the highest percentages of total individuals and species with anomalies occurred in two of Ohio's most biologically and chemically impacted streams, the Ottawa (8.1 and 56.5%, respectively) and Mahoning (7.1 and 60.0%, respectively) rivers. Similarly, the maximum and median values of DELT anomalies by stream were also lowest in Salt Creek (3.0 and 0.3%, respectively) and highest in the Ottawa (57.5 and 13.1%, respectively) and Mahoning (37.9 and 8.2%) rivers (Table 9.6). All but one of the streams had at least one site with no observed DELT anomalies. The exception, Little Beaver Creek, also had a relatively low minimum value of 0.3%.

9.3.1 PREDOMINANT TYPES OF DELT ANOMALIES

Of the 2657 fish with DELT anomalies (all data pooled), the predominant type of anomaly was erosion (56.0%), followed by deformities (30.1%), lesions (7.0%), and tumors (1.2%). Fish with multiple DELT anomalies accounted for 5.6% of all fish with anomalies. Similar patterns in frequency by type were exhibited in six of the streams (Table 9.6). Little Beaver Creek, however, had more deformities than erosion. The overall percentage of DELT anomalies represented by deformities ranged from a minimum of 13.6 in the Ottawa River to a maximum of 44.4 in Little Beaver Creek. The total percentage of deformities was also high and only slightly less than erosion in the Mahoning River, which has multiple complex toxic problems. The overall percentage of erosion was between 40.0 and 60.7 in six of the streams, but reached a maximum of 77.9 in the Ottawa River. Skin lesions were between 0.7 and 12.7%, and tumors between 0.0 and 11.9%. The highest overall percentage of tumors occurred in Salt Creek where all five fish were observed with tumor-like growths apparently caused by the lymphocystis virus. The high rate of tumors in Salt

TABLE 9.5 Summary of the Fishes Collected in Seven Ohio Streams and the Incidence of DELT Anomalies by Taxa

FAMILY Common Name (Scientific Name)	No. of Streams Collected in	Total No. of Fish Examined	No. of Streams with a DELT	Total No. with DELT Anomalies	% with DELT Anomalies
ESOCIDAE (pikes)					
muskellunge x northern pike hybrid	2	5	1	2	40.0
muskellunge (Esox masquinongy)	1	15	1	2	13.3
grass pickerel (Esox americanus	3	22	1	2	9.1
vermiculatus)					
ICTALURIDAE (catfishes)					
black bullhead (Ameiurur melas)	3	15	1	5	33.3
channel catfish (Ictalurus punctatus)	6	1643	6	236	14.4
yellow bullhead (Ameiurur natalis)	6	231	5	30	13.0
brown bullhead (Ameiurur nebulosus)	1	55	1	6	10.9
flathead catfish (Pylodictis olivaris)	4	326	2	14	4.3
stonecat (Noturus flavus)	4	97	3	4	4.1
mountain madtom (Noturus eleutherus)	2	50	0	0	0.0
brindled madtom (Noturus miurus)	1	20	0	0	0.0
tadpole madtom (Noturus gyrinus)	1	1	0	0	0.0
CYPRINIDAE (carps and minnows)					
common carp x goldfish hybrid	6	235	6	71	30.2
common carp (Cyprinus carpio)	7	2624	7	749	28.5
goldfish (Carassius auratus)	4	324	3	77	23.8
golden shiner (Notemigonus	4	350	2	11	3.1
crysoleucas)					
river chub (Nocomis micropogon)	4	768	2	19	2.5
creek chub (Semotilus atromaculatus)	6	2545	5	32	1.3
redfin shiner (Lythrurus umbratilis)	1	93	1	1	1.1
rosyface shiner (Notropis rubellus)	4	215	2	2	0.9
steelcolor shiner (Cyprinella whipplei)	3	287	1	1	0.3
spotfin shiner (Cyprinella spiloptera)	7	3083	4	9	0.3
central stoneroller (Campostoma	7	5615	4	6	0.1
anomalum)	_		_		
emerald shiner (Notropis atherinoides)	5	5330	3	4	<0.1
striped shiner (Luxilus chrysocephalus)	7	1407	1	1	<0.1
fathead minnow (Pimephales	4	1073	1	1	<0.1
promelas) bluntnose minnow (Pimephales notatus)	7	5769	2	4	<0.1
sand shiner (Notropis stramineus)	6	1190	1	1	<0.1
silver chub (Macrhybopsis storeriana)	3	1245	0	0	0.0
gravel chub (Erimystax x-punctatus)	3	20	0	0	0.0
blacknose dace (Rhinichthys atratulus)	5	854	o	0	0.0
tonguetied minnow (Exoglossum	1	1	ő	0	0.0
laurae)	•			0	0.0
suckermouth minnow (Phenacobius	6	159	0	0	0.0
mirabilis)	•	1.55	Ü		0.0
southern redbelly dace (Phoxinus	1	2	0	0	0.0
erythrogaster)		•	Ü		0.0
silver shiner (Notropis photogenis)	5	431	0	0	0.0

TABLE 9.5 (continued)
Summary of the Fishes Collected in Seven Ohio Streams and the Incidence of DELT Anomalies by Taxa

FAMILY Common Name (Scientific Name)	No. of Streams Collected in	Total No. of Fish Examined	No. of Streams with a DELT	Total No. with DELT Anomalies	% with DELT Anomalies
comment reality (see comment reality)	Conceine in	LAMINITO		74101141165	
rosefin shiner (Lythrurus ardens)	3	44	0	0	0.0
river shiner (Notropis blennius)	2	89	0	0	0.0
spottail shiner (Notropis hudsonius)	1	74	0	0	0.0
whitetail shiner (Cyprinella galactura)	1	1	0	0	0.0
mimic shiner (Notropis volucellus)	2	129	0	0	0.0
channel shiner (Notropis wickliffi)	1	321	0	0	0.0
silverjaw minnow (Notropis buccatus)	5	291	0	0	0.0
bullhead minnow (Pimephales vigilax)	4	138	0	0	0.0
other minnow hybrids	2	2	0	0	0.0
CATOSTOMIDAE (suckers)					
bigmouth buffalo (Ictiobus cyprinellus)	4	23	2	5	21.7
black buffalo (Ictiobus niger)	3	142	3	24	16.9
blue sucker (Cycleptus elongatus)	1	7	1	1	14.3
river redhorse (Moxostoma carinatum)	4	80	3	10	12.5
spotted sucker (Minytrema melanops)	4	147	2	14	9.5
silver redhorse (Moxostoma anisurum)	6	641	6	57	8.9
white sucker (Catostomus commersoni)	5	2459	4	193	7.8
quillback (Carpiodes cyprinus)	5	582	5	44	7.6
highfin carpsucker (Carpiodes velifer)	4	64	2	4	6.2
river carpsucker (Carpiodes carpio)	4	299	3	13	4.3
golden redhorse (Moxostoma	6	2890	6	107	3.7
erythrurum)					
smallmouth buffalo (Ictiobus bubalus)	4	1054	3	38	3.6
black redhorse (Moxostoma duquesnei)	6	1080	6	38	3.5
shorthead redhorse (Moxostoma	4	1319	3	41	3.1
macrolepidotum)					
northern hog sucker (Hypentelium	7	2381	4	62	2.6
nigricans)					
creek chubsucker (Erimyzon oblongus)	1	14	0	0	0.0
river carpsucker x quillback hybrid	2	3	0	0	0.0
UMBRIDAE (mudminnows)					
central mudminnow (Umbra limi)	1	8	1	1	12.5
PERCIDAE (perches)					
walleye (Stizostedion vitreum)	3	202	2	17	8.4
sauger x walleye (S. canadense x	5	61	2	2	3.3
S.vitreum)					
yellow perch (Perca flavescens)	2	415	1	12	2.9
sauger (Stizostedion canadense)	4	3100	3	22	0.7
johnny darter (Etheostoma nigrum)	5	225	1	1	0.4
Logperch (Percina caprodes)	5	757	1	1	0.1
greenside darter (Etheostoma	7	1371	1	1	0.1
blennioides)					
dusky darter (Percina sciera)	2	48	0	0	0.0
blackside darter (Percina maculata)	3	19	0	0	0.0
slenderhead darter (Percina	4	60	0	0	0.0
phoxocephala)					

TABLE 9.5 (continued) Summary of the Fishes Collected in Seven Ohio Streams and the Incidence of DELT Anomalies by Taxa

Anomanes by Taxa	No. of	Total No.	No. of	Total No.	% with
FAMILY	Streams	of Fish	Streams with	with DELT	DELT
Common Name (Scientific Name)	Collected in	Examined	a DELT	Anomalies	Anomalies
river darter (Percina shumardi)	1	127	0	0	0.0
channel darter (Percina copelandi)	1	62	0	0	0.0
eastern sand darter (Ammocrypta	2	24	0	0	0.0
pellucida)					
banded darter (Etheostoma zonale)	5	552	0	0	0.0
variegate darter (Etheostoma variatum)	2	159	0	0	0.0
bluebreast darter (Etheostoma	2	2	0	0	0.0
camurum)					
rainbow darter (Etheostoma	6	808	0	0	0.0
caeruleum)					
orangethroat darter (Etheostoma	4	60	0	0	0.0
spectabile)					
rainbow x orangethroat darter hybrid	1	1	0	0	0.0
fantail darter (Etheostoma flabellare)	6	982	0	0	0.0
CENTRARCHIDAE (sunfishes)					
pumpkinseed (Lepomis gibbosus)	4	340	2	22	6.5
green sunfish (Lepomis cyanellus)	7	2734	4	182	6.7
largemouth bass (Micropterus	7	1239	7	79	6.4
salmoides)					
hybrid sunfish	7	169	2	6	3.6
rock bass (Ambloplites rupestris)	6	1040	4	30	2.9
warmouth (Lepomis gulosus)	4	37	1	1	2.7
spotted bass (Micropterus punctulatus)	5	1576	4	39	2.5
white crappie (Pomoxis annularis)	6	632	3	13	2.1
smallmouth bass (Micropterus	6	2222	4	30	1.4
dolomieu)					
bluegill (Lepomis macrochirus)	7	4429	5	42	0.9
black crappie (Pomoxis	6	342	2	2	0.6
nigromaculatus)					
longear sunfish (Lepomis megalotis)	7	2091	3	11	0.5
orangespotted sunfish (Lepomis	4	10	0	0	0.0
humilis)					
redear sunfish (Lepomis microlophus)	3	7	0	0	0.0
PERCICHTHYIDAE (temperate basses)					
striped bass (Morone saxatilis)	1	116	1	2	1.7
white bass (Morone chrysops)	5	1188	2	6	0.5
white x striped bass hybrid	2	231	1	1	0.4
white perch (Morone americanus)	2	5	0	0	0.0
LEPISOSTEIDAE (gars)					
longnose gar (Lepisosteus osseus)	3	169	2	3	1.8
shortnose gar (Lepisosteus	1	2	0	0	0.0
platostomus)					
HIODONTIDAE (mooneyes)					
mooneye (Hiodon tergisus)	2	84	1	1	1.2
CLUPEIDAE (herrings)					
gizzard shad (Dorosoma cepedianum)	7	16,497	5	171	1.0

TABLE 9.5 (continued)
Summary of the Fishes Collected in Seven Ohio Streams and the Incidence of DELT
Anomalies by Taxa

FAMILY Common Name (Scientific Name)	No. of Streams Collected in	Total No. of Fish Examined	No. of Streams with a DELT	Total No. with DELT Anomalies	% with DELT Anomalies
skipjack herring (Alosa chrysochloris)	2	368	0	0	0.0
threadfin shad (Dorosoma petenense)	1	5	0	0	0.0
SCIAENIDAE (drums)					
freshwater drum (Aplodinotus grunniens)	5	6864	4	18	0.3
PETROMYZONTIDAE (lampreys)					
silver lamprey (Ichthyomyzon unicuspis)	1	19	0	0	0.0
ohio lamprey (Ichthyomyzon bdellium)	1	2	0	0	0.0
least brook lamprey (Lampetra aepyptera)	1	6	0	0	0.0
american brook Lamprey (Lampetra appendix)	1	1	0	0	0.0
POLYODONTIDAE (paddlefish)					
paddlefish (Polyodon spathula)	1	1	0	0	0.0
ANGUILLIDAE (freshwater eels)					
american eel (Anguilla rostrata)	1	1	0	0	0.0
AMIIDAE (bowfins)					
bowfin (Amia calva)	1	6	0	0	0.0
CYPINODONTIDAE (killifishes)					
blackstripe topminnow (Fundulus notatus)	3	43	0	0	0.0
ATHERINIDAE (silversides)					
brook silverside (Labidesthes sicculus)	5	107	0	0	0.0
COTTIDAE (sculpins)					
mottled sculpin (Cottus bairdi)	4	164	0	0	0.0
TOTALS		102,164	_	2657	_

Note: The percentage of DELT anomalies is listed in descending order by family (based on the species with the highest value) and taxa. No species were deleted due to low numbers. Nomenclature follow Robins et al. (1991).

Creek is surprising, however, because it was the only stream that did not have a fish with two or more (multiple) DELT anomalies. In the other six streams, fish with multiple anomalies represented 3.4 to 7.5% of the total anomalies.

In contrast to the present study results, two similar Ohio studies reported deformities as the predominant anomaly type in three streams surveyed near Mansfield, Ohio. Berra and Au (1981) found spinal curvature followed by deformed fins the most common types of anomalies in Cedar Fork (a small headwater tributary), while Reash and Berra (1989) also reported that deformities were also the most common type of anomalies observed on fishes in the Clear Fork and Rocky Fork (two larger streams within the same watershed). Fournie and Summers (1996) reported skin lesions (mostly fin erosion) as the most common type of anomaly in the Virginian and Louisianian provinces. Gill erosion, however, was apparently included in a category of branchial and gill abnormalities.

Many previous studies have focused on single types of external anomalies (e.g., deformities or eroded fins), which makes their results difficult to compare to the present study (Sherwood, 1982;

TABLE 9.6

TABLE 9.6 Summary Statistics for the Seven Study Area Streams

	Ottawa River	Mahoning River	Ohio River	Salt Creek	Little Miami River	East Fork	Little Beaver Creek
Total no. of fish examined	7052	14,460	41,267	9571	23,456	3674	2684
Total % fish with DELT(s)	8.1	7.1	1.0	0.4	2.1	2.4	1.7
% of total species afflicted	56.5	60.0	37.2	23.1	50.0	38.2	45.8
Minimum % DELT	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Maximum % DELT	57.5	37.9	9.2	3.0	11.7	6.9	5.1
Median % DELT	13.1	8.2	0.9	0.3	1.9	2.9	1.8
Total no. of DELTs + M	574	1025	401	42	481	89	45
% Deformed (of total no. DELTs)	13.6	39.3	28.4	28.6	31.0	27.0	44.4
% Eroded fins and gill covers	77.9	46.6	56.4	50.0	50.9	60.7	40.0
% Lesions (skin)	0.7	8.0	6.7	9.5	12.7	9.0	2.2
% Tumors	0.3	0.8	2.0	11.9	1.2	0.0	6.7
% Multiple DELTs (M)	7.5	5.3	6.5	0.0	4.2	3.4	6.7
DELT severity ratio	0.87	0.75	0.84	0.45	0.46	0.37	1.81

Note: "M" denotes fish with multiple DELT anomalies. The DELT Severity Ratio (based on criteria presented in Table 9.3) is calculated by summing the number of fish with severe and multiple DELTs divided by the number of fish with mild DELTs.

Murchelano and Ziskowski, 1982; Cross, 1985; Bengtsson et al., 1985; Bengtsson and Larsson, 1986; Baumann et al., 1987; Lindesjoo and Thulin, 1990). Eroded fins are, however, a clinical sign for at least two of the most common bacterial infections (Plumb, 1994). Columnaris (Flavobacterium columnare) is one of the most common fish diseases frequently associated with fin rot. Another, motile Aeromonas septicemia (MAS) has been one of the most frequently diagnosed bacterial diseases of fish based on data compiled by the Fish Disease Committee of the Southern Division of the American Fisheries Society (Plumb, 1994). Post (1987) reports that all freshwater fishes are susceptible to both of these diseases.

9.3.2 PREDOMINANT SPECIES WITH DELT ANOMALIES

The results showed a wide range in the overall percentage of DELT anomalies by species for the 117 taxa collected from the 7 streams (Table 9.5). The taxa with the highest overall percentages of DELTs were muskellunge x northern pike (40.0), black bullhead (33.3), common carp x goldfish hybrid (30.2), carp (28.5), goldfish (23.8), and bigmouth buffalo (21.7). The species with the majority of the total DELT anomalies observed in the study (number of each species with DELTs/total number of fish with DELTs [n = 2657]), however, were common carp (28.2%), followed by channel catfish (8.9%), white sucker (7.3%), green sunfish (6.8%), and gizzard shad (6.4%). These percentages of DELTs for the first four species greatly exceeded their relative abundance based on the total catch (e.g., common carp had 28.2% of the total DELT anomalies, but represented only 2.6% of the catch). The relative abundance of gizzard shad, however, was more than double the percentage of the total number of DELTs (16.1% vs. 6.4).

The most frequently occurring species with DELT anomalies were common carp and largemouth bass, the only two species collected in all seven streams with DELT anomalies. Six other species collected in two or more streams (black buffalo, silver redhorse, quillback, golden redhorse, black redhorse, and channel catfish) and one hybrid (common carp x goldfish) had at least one individual with a DELT anomaly in all streams from which collected. By family, the highest percentages of afflicted species (with more than one species) were Esocidae (pikes, 100), Catostomidae (suckers, 88.2%), Centrachidae (sunfishes, 85.7), Percichthyidae (temperate basses, 75), Ictaluridae (catfishes, 66.7), and Cypriniuae (carps and minnows, 50%). Based on the mean percent of species within families, families with the highest occurrences were Esocidae (20.8), Ictaluridae (8.9), and Catostomidae (7.4), followed by Cyprinidae (2.9) and Centrarchidae (2.6).

Conversely, no DELT anomalies were observed on 50 taxa, 29 of which were minnows and darters. Other families of fish with more than 10 individuals collected and no observed anomalies included Petrmyzondidae (lampreys), Cyprinodontidae (killifishes), Atherinidae (silversides), and Cottidae (sculpins). In general, the data show a higher percentage of anomalies for the larger, longer-lived, pollution-tolerant taxa than for the smaller, shorter-lived, pollution-sensitive taxa. Many of the highest percentages of anomalies were detected on medium- to large-size bottomfeeding taxa (carp, suckers, and catfish). Many of the smaller benthic species (e.g., darters), however, rarely had an anomaly. Recent field observations support the present study's results that some minnow species are less susceptible to DELT-type anomalies. During the summer of 1996, extra time was used in the examination of DELT anomalies on minnows from one of the Ottawa River's most severely impacted sites (overall percentage of DELT anomalies was 29.2). Results showed four (fathead minnow, spotfin shiner, central stoneroller, and redfin shiner) of the six minnow species collected did not have any DELT anomalies, while all three of the sunfish species collected had at least one DELT anomaly. Additionally, the percentage of DELTs on creek chubs and bluntnose minnows was lower (20.0 and 21.4, respectively) than on bluegills, largemouth bass, and green sunfish (100, 100, and 41.2, respectively). Age may also contribute to the presence of DELT anomalies on various species (e.g., younger fish may have less anomalies because of a shorter exposure time to various stressors). However, observations in the Ottawa River have revealed high percentages of eroded fins on juvenile bluegills.

A previous Ohio study of anomalies on stream fishes reported that white suckers in Cedar Fork had the highest percentage (0.9) of the six species afflicted by anomalies (Berra and Au, 1981). That study also supports the results shown in this study, that even the most susceptible species do not have high percentages everywhere. Also in Ohio, Berra and Au (1981) reported that two abundant species, rainbow darter and creek chub, had no deformities. Elsewhere, Plumb (1994) reports that common carp, channel catfish, and goldfish are particularly susceptible to columnaris disease. Carp and goldfish are also commonly afflicted by Aeromonas salmonicida achromogens (also referred to as "atypical nonmotile Aeromonas"), which can result in DELT-type anomalies (Plumb, 1994). Fournie and Summers (1996) reported higher rates of abnormalities in demersal fish species (bottom dwelling) than in pelagic or piscivorous fishes.

9.3.3 DELT Anomalies vs. Stream Quality

Regressions of the percentage of DELT anomalies against both the IBI and MIwb showed significant inverse relationships. High percentages of DELTs were associated with poor or very poor quality fish assemblages, while consistently low levels of the anomalies were correlated with very good to exceptional assemblages (Figure 9.2). Measured against the IBI, the percentage of DELT anomalies increased linearly with decreasing fish community performance across a range of scores indicating normal to exceptionally good fish assemblages. However, the number of DELTs increased exponentially at degraded sites (i.e., sites with IBI scores <35). Although the percentage of DELT anomalies is used in the calculation of IBI scores, the percentage can only influence scores by a total of four units. Elevated percentages of DELTs often occur in conjunction with less than full attainment of aquatic life use designations, which requires multiple IBI metrics to deviate from the reference condition and results in deductions of more than 12 units. An IBI analysis (by metric) of an impaired segment of the upper Little Miami River shows impacted fish assemblages scored poorly due to a shift from top carnivores to omnivorous and lower than expected

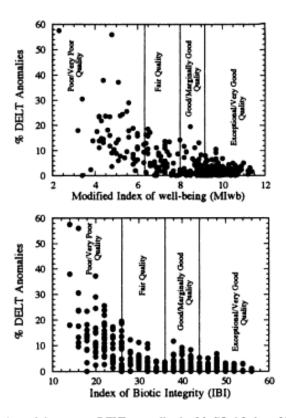


FIGURE 9.2 Scatter plots of the percent DELT anomalies by Modified Index of Well-Being (MIwb, top graph) and Index of Biotic Integrity (IBI, bottom graph) showing the narrative evaluations for stream quality based on Ohio EPA biological criteria.

numbers of intolerant species along with elevated DELT percentages (Figure 9.3). Measured against the MIwb, which is not influenced by anomalies, the percentage of DELTs tended to increase exponentially across the full range scores. The differing nature of regression functions between the IBI and MIwb could be due to the narrow interval of scores representing normal to exceptional communities for the MIwb compared to that for the IBI, and not to differing sensitivities to environmental perturbations.

Previous Ohio EPA reports on study area streams (Ohio EPA, 1992b; 1995; 1996) have shown longitudinal trends in the percentage of DELT anomalies and the IBI and MIwb that also support an inverse relationship. Similar longitudinal trends of low to no DELT anomalies at upstream control or background sites, but increased percentages of DELTs downstream from point source discharges and other pollution sources, are also shown by individual species in different streams (Figure 9.4) and multiple species in a single stream (Figure 9.5). Box plots of the percentages of DELT anomalies from the seven study area streams and 13 other Ohio streams are shown in Figure 9.6. These plots show the percentage of DELT fish is predominantly less than 3.0 in least-impacted streams (and upstream control sites in impacted streams) and greater than 3.0 in streams with multiple point-source discharges and low flows dominated by effluent.

At least one other Ohio study and two coastal studies have reported similar trends between point source discharges and the prevalence of DELT-type anomalies. Reash and Berra (1989) found that unpolluted sites (Clear Fork and Rocky Fork) had a lower percentage of the total catch afflicted by fin erosion and deformities (0.9 and 0.7, respectively) than polluted Rocky Fork sites (10.4) within and downstream from Mansfield. Reash and Berra (1989) also found similar anomaly

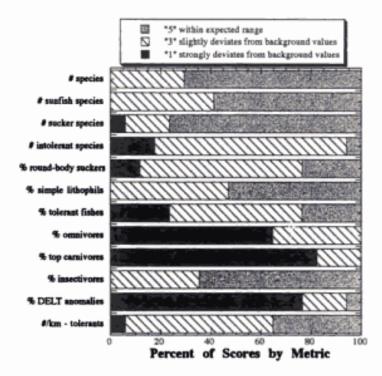


FIGURE 9.3 Metric analysis for Index of Biotic Integrity scores from an impaired segment of the Little Miami River downstream from Xenia, Ohio. Percent of metric values (by metric) scoring a "1", "3", and "5" are shown. Values that score a "1" strongly deviate from the expected are shown in solid black. A predominance of solid black indicates a rather severely degraded component of a fish assemblage. Values that score a "3" slightly deviate from the expected, and a "5" value is within the expected range for the biotic integrity of water resources.

trends for individual species. The percentage of individuals with erosion and deformities for three species markedly increased at the polluted sites within and downstream from Mansfield (creek chub from 0.8 to 7.5, white sucker from 7.9 to 41.1, and green sunfish from 3.6 to 28.3). Lindesjoo and Thulin (1990) also found a clear correlation between an industrial Swedish bleach pulp mill effluent and fin erosion on perch and ruffe with decreasing frequencies at increasing distance from the discharge point. Cross (1985) also reported the highest percentage of fin erosion close to a southern California municipal wastewater outfall and declining rate, with increasing distance from the point source.

Compared to upstream background sites, the percent of species afflicted with DELT anomalies also markedly increased downstream from multiple point source discharges in the study area streams. In the Ottawa River, only 13.1% of species had anomalies upstream from Lima (River Mile 46.1) compared to 61.1% downstream from Lima (River Mile 34.7). Table 9.6 shows similar values in the percentage of species afflicted in a rural stream (23.1 in Salt Creek) and a markedly higher level in a highly urbanized industrial stream (60.0% in the Mahoning River). Similar to Salt Creek, Berra and Au (1981) also reported a low percent of total species afflicted (17.6) and overall rate of anomalies (0.26%) in Cedar Fork, a small rural tributary of Clear Fork with a predominantly agricultural watershed.

9.3.4 SEVERITY OF DELT ANOMALIES (SEVERE VS. MILD)

The severity of DELT anomalies also appeared positively related to the degree of impact. Box plots of common carp in four of the streams show markedly lower percentages of severe DELT

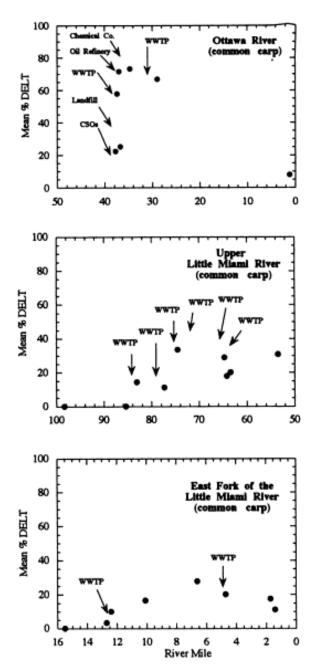


FIGURE 9.4 Longitudinal scatter plots (upstream to downstream) of the mean percentages of common carp with DELT anomalies in the Ottawa River (top), upper Little Miami River (middle), and lower East Fork of the Little Miami River (bottom). Only point source discharges (effluent) of more than 0.75 million gallons per day (MGD) are shown.

anomalies in two streams predominated by municipal WWTP discharges (Little Miami River and its East Fork) than two streams that receive (and historically received) heavy industrial effluent, municipal effluent, and larger quantities of untreated sewage overflows (Mahoning and Ottawa

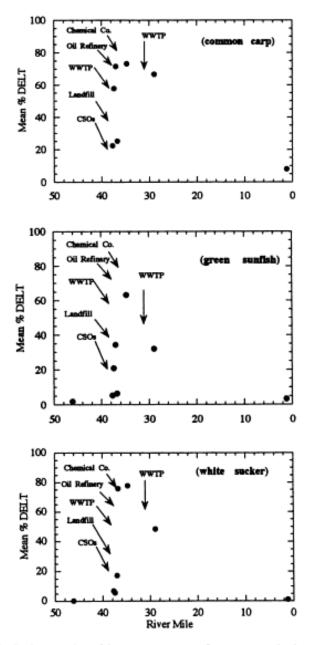


FIGURE 9.5 Longitudinal scatter plots of the mean percentage of common carp (top), green sunfish (middle), and white sucker (bottom) with DELT anomalies in the Ottawa River. Point source dischargers shown had volumes of more than 0.75 million gallons per day (MGD).

Rivers; Figure 9.7). The 75th percentile values in both nonindustrial streams were equal to or less than the 25th percentile values for the two industrial streams. The ratio of fish with severe plus multiple DELT anomalies to mild DELT anomalies also differs (Table 9.6). The least impacted streams primarily influenced by agricultural runoff and municipal wastewater had values < 0.5, while the more severely impacted streams with complex, multiple causes and sources of pollutant-related stresses (e.g., municipal and industrial discharges, combined sewer overflows, urban and



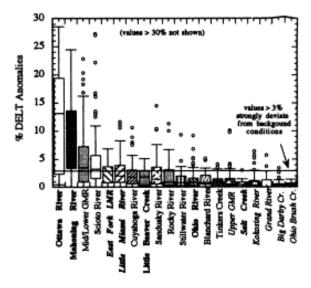


FIGURE 9.6 Box plots (upper, middle, and lower horizontal lines show 75th, 50th, and 25th percentile values, respectively) of the percentages of DELT anomalies in 20 Ohio streams ranked by median values. The seven study area streams are shown in bold. Streams with Exceptional Warmwater Habitat aquatic life use designations are shown in italics.

agricultural runoff, contaminated sediments, and toxics) contained values > 0.5. Yoder and Rankin (1995) developed patterns of response between the IBI, MIwb, and DELT anomalies, termed "biological response signatures," which are combinations of fish community attributes that consistently indicate a general type of environmental or pollution stress. High occurrences of DELT

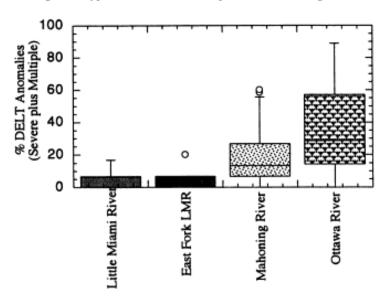


FIGURE 9.7 Box plot (upper, middle, and lower horizontal lines show 75th, 50th, and 25th percentile values, respectively) comparisons of the percentages of fish with severe and multiple DELT anomalies in two nonindustrial streams (Little Miami River and East Fork of the Little Miami River) with multiple sewage plant discharges and two streams with large industrial discharges (Mahoning and Ottawa Rivers).

anomalies (>10-15%) in combination with low IBI and MIwb scores reflecting poor to very poor community condition consistently occurred in stream segments stressed by complex combinations of municipal and industrial sources that frequently exhibited toxicity to bioassay test organisms or exceedences of known chemical toxicity thresholds both in the water column and bottom sediments. A direct relationship between common carp with "knothead" and the severity of pollution in the Illinois River was first reported in 1928 (Thompson, 1928; Mills et al., 1966). In Ohio, common carp with severe knothead (Figure 9.1) have been consistently captured downstream from large industrial effluents (e.g., Mahoning and Ottawa rivers), but have rarely been observed in streams receiving only municipal sewage effluent (e.g., Little Miami River and East Fork of the Little Miami River). The total percent of fish with anomalies in the Ohio River and Beaver Creek was relatively low; however, the severity ratio was high and indicative of impacts from complex industrial and municipal effluents.

Reash and Berra (1989) also found that the severity of fin erosion (based on number of fins afflicted) and the prevalence of fin erosion and deformities were greater at polluted sites than at nonpolluted sites. Additionally, the most common type of anomaly at nonpolluted sites in Clear Fork were fin deformities (usually considered a mild deformity by the Ohio EPA if afflicting only one fin) compared to spinal curvatures (always considered a heavy deformity by the Ohio EPA) at the polluted sites in Rocky Fork. In addition to the severity of individual anomaly types, the presence of multiple types of DELT anomalies on individual fish also appears to be indicative of more severe impacts. Salt Creek was the only stream in the present study with no multiple DELTs recorded. Similarly, Berra and Au (1981) found no individual fish in Cedar Fork to have more than one type of anomaly.

9.4 CONCLUSION

Overall, these results from seven Ohio streams support the findings of previous studies, which have shown or suggested an inverse relationship between the prevalence or percentage of DELT-type anomalies and environmental quality. As used by the Ohio EPA, the percentage of external DELT anomalies in fish assemblages has proven to be an effective IBI metric and accurate indicator of chemical water and sediment quality in streams over a wide range of drainage areas and geographically different basins throughout Ohio. When compared with background levels, elevated occurrences of DELT anomalies in Ohio have been most often found in association with point source discharges, particularly those associated with industrial and municipal wastewater effluents. The incidents of DELTs in wild Ohio fish assemblages has also been useful because conclusions can be made based on both elevated and nonelevated levels. Increased or elevated rates are typically indicative of fish assemblages stressed by chemical pollutants. High bacterial levels (e.g., motile members of the genus Aeromonas) may also play an important role in association with sewagerelated effluent and combined sewer overflow releases. Low or no anomalies in Ohio typically suggest good chemical water and sediment quality. Biological impairment has been detected in Ohio streams in conjunction with low or no anomalies; however, the cause of impairment was typically due to physical factors (e.g., physical habitat) as opposed to chemical factors. This also corresponds to the findings of Yoder and Rankin (1995).

Two factors that contribute to the usefulness of DELT anomalies as a reliable and accurate indicator of stream quality include the susceptibility of many fish species and a consistently low natural rate at background or reference sites. The results of this study, based on similar longitudinal trends, also suggest that the detection of anomalies could be limited to the more susceptible species (e.g., common carp, white suckers, redhorse species) to reduce the amount of time spent on processing fish and eliminate the possibility of potentially skewing the results by capturing large numbers of species that are not as susceptible (e.g., most minnow species). This would only be recommended, however, if one or more of the selected species were present at all sampling locations. The selection should also include several species from each family to account for different assem-

blages due to changes in stream size (i.e., headwaters to large rivers). Based on the results of this study, good indicator taxa include the common carp, goldfish, common carp x goldfish hybrid, channel catfish, bullheads, white sucker, redhorses and most other sucker species, green sunfish, largemouth bass, and pike species. Methods may also be improved by not including juvenile fish (e.g., set a minimum length limit) in the DELT rate. The severity of DELT anomalies based on the Ohio EPA's criteria for severe and mild cases also appears important in assessing the complexity and severity of impacted fish assemblages.

After more than 10 years of use in the Ohio EPA's surface water program, the percentage of DELT anomalies has proven to be a reliable indicator of fish community condition. This indicator has responded in an intuitively correct and predictable manner and has been informative across a wide gradient of environmental conditions and stresses. It has been most helpful in identifying sites degraded by multiple and cumulative stresses. Preserved specimens or photographs of fish with DELT anomalies have also proven to be an effective communicator of degraded stream quality to resource managers, the regulated community, and the general public. It is important to realize, however, that elevated occurrences of DELT anomalies may be part of the recovery process for many of the most historically impaired streams. As pollution levels have been reduced in many of Ohio's larger streams, pollution-sensitive fish species have returned; however, many have locally elevated levels of anomalies. The return of these species (even with a DELT anomaly) should be construed as a positive sign of recovery, as well as an indication of continued toxicity or other pollution-related stress(es) and the need for additional pollution abatement measures. With millions of dollars being spent to monitor and restore stream quality throughout the United States, accurate environmental indicators such as DELT anomalies may also prove useful in other states, so that future abatement measures are well directed and result in measurable improvements. Biologists interested in duplicating the fish sampling methods used in this study are encouraged to contact the Ohio EPA.

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APPENDIX D

Field Data



Photograph D-1: Loon Lake ripe male



Photograph D-2: Loon Lake 1 ripe female





Photograph D-3: Loon Lake 8 ripe female



Photograph D-4: ERIMF male





Photograph D-5: ERIMF ripe female



Photograph D-6: ERIMF unripe female





Photograph D-7: Koocanusa Elk River ripe female



Photograph D-8: STPD ripe female





Photograph D-9: GO13 unripe male



Photograph D-10: Grave Lake unripe male



APPENDIX D.1 DATA QUALITY REVIEW

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D1 INTRODUCTION

D1.1 Background

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

D1.2 Quality Control Samples

A Data Quality Review (DQR) was conducted on water quality laboratory data collected as part of the 2019 Redside Shiner (RSC) Selenium Toxicity Supporting Study. The objective of DQR is to define the overall quality of the data presented in the report, and, by extension, the confidence with which the data can be used to derive conclusions.

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



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

D2 WATER CHEMISTRY

D2.1 Laboratory Reporting Limits

The analytical ALS Laboratory Reports (L2269908, L2270399, L2271140, L2271157, L2272864, L2273883, L2277038, L2278104, L2279040, L2280498, L2284959) were examined to provide an inventory of analytes for which the sample results were less than the LRL, and the maximum LRL for these analytes were assed relative to existing British Columbia water quality guidelines (BCMOE 2018, 2019). Except for dissolved copper and total silver, the analytes that were less than the LRL all had maximum LRLs which were lower than the respective guidelines, indicating that the achieved LRLs were appropriate for this study (Appendix Tables D.1 and D.2). For dissolved copper, seven out of 36 samples were reported as less than the LRL, and the LRL (<0.0005 mg/L) was above the recently revised lowest chronic copper guideline that was released after the collection of this data (0.0002 mg/L; BCMOE 2019) (Appendix Table D.1). However, all dissolved copper data were reported as <0.0005 mg/L, and so

D2.2 Laboratory and Field Blanks

A total of 274 method blank samples were analyzed in the ALS Laboratory Reports (L2269908, L2270399, L2271140, L2271157, L2272864, L2273883, L2277038, L2278104, L2279040, L2280498, L2284959). Of the 994 reported method blank results, two (one dissolved aluminum [L2284959] and one dissolved copper [L2277038) exceeded the laboratory DQO and had detectable concentrations. For dissolved aluminum, sample data was considered reliable if it was reported as below the LRL, or greater than five times the blank level; since this was observed for the samples in Report L2284959, these data were considered reliable. For dissolved copper, the MB (0.0148 mg/L) was 74-times higher than the DQO (<0.0002 mg/L). However, all results in Report L2277038 were <0.0005 mg/L, indicating there was no inadvertent laboratory contamination for these samples. Overall, this indicates that laboratory contamination of the collected water samples did not occur.

A total of four trip blank and four field blank samples were analyzed (Reports L2270399, L2272864, L2277038, L2280498). All results were below LRLs, and so no inadvertent contamination occurred during sample collection or during transit.

D2.3 Data Precision

A total of 19 laboratory duplicate samples were used to evaluate laboratory precision (L2269908, L2270399, L2271140, L2271157, L2272864, L2273883, L2277038, L2278104, L2279040, L2280498, L2284959) totaling 187 individual results. All measurements were

within the laboratory DQO. This indicates that the laboratory analytical precision can be considered excellent.

Five sets of field duplicate samples were collected to assess the field sampling precision (Appendix Table D.2). Thirty comparisons (out of 455) had relative percent differences (RPD) that exceeded the DQO of 30% (6.7% of all pairs; Appendix Table D.2). Of these, 10 comparisons had data that were less than 5-times the LRL, and so failure to meet the DQO was likely the result of low measured concentrations. Failure to meet the DQO for a small portion of the QC results was not unexpected for multi-element scans, and is within the DQO (i.e., <20%; refer to section C1.1). As such, data were considered to have acceptable field precision and reproducibility.

D2.4 Data Accuracy

Data accuracy was evaluated based on results of Certified Reference Materials (CRM), Laboratory Control Samples (LCS), and Matrix Spikes (MS). All LCS (1,005 results) and CRM (12 results) analyses met the laboratory DQO. MS results for two of four RG_GO13 samples (Report L2272864, Lot 1090445; and L2270399, Lot 1087194), one RG_GC sample (report L2277038; Lot 1095183), and one RG_RGLK sample (L2270399, Lot 1087194) did not meet laboratory DQOs due to high analyte background. This included eight analytes for RG_GO13 (Al, Ba, Ca, Mg, Mn, Se, Na, Sr), and four analytes for RG_GC and RG_LNLK (Ba, Ca, Mg and Sr). Regardless, MS results met the laboratory DQO for all other samples collected for which concentrations of these analytes were not high relative to the MS, and so laboratory accuracy was considered acceptable.

D2.5 Hold Times

Recommended hold time for pH and ORP analysis was exceeded for all samples (15 minute hold time). Since *in situ* pH and ORP will be used for data interpretation, these exceedances have no impact on data interpretability. Additionally, one sample for total suspended solids (TSS), and one sample for turbidity also exceeded holding times (7 days for TSS, and 4 days for turbidity). However, excluding pH and ORP analyses, all samples were received by the laboratory more than one day before they exceeded their hold time. These exceedances will be considered when interpreting results.

D2.6 Data Quality Statement

Water chemistry data collected for the 2019 RSC Supporting Selenium Toxicity Study were of acceptable quality as characterized by good detectability, negligible analyte concentrations in blanks, as well as good precision and accuracy in both laboratory and field QC samples.

Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.



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Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units	Guidelines ^{1,2}			RG_EL	WDGC				RG	_ER	
	•		min max	6-May-19	13-May-19		SD	Min	Max	7-May-19		21-May-19	
	Conductivity, Field	μS/cm	-	465	388	427	54 31	388	465	207	198	193	161
	Specific Conductivity, Field Conductivity, Lab	μS/cm μS/cm	-	537 531	493 531	515 524	10.6	493 516	537 531	282 293	249 242	282 304	217 234
	Hardness (as CaCO3)	mg/L	-	270	284	277	9.90	270	284	138	124	128	116
	pH, Field ³	pН	< 6.5 or > 9	7.6	7.5	7.6	0.028	7.5	7.6	7.9	8.2	8.3	8.1
	pH, Lab	рН	< 6.5 or > 9	8.4	8.2	8.28	0.141	8.18	8.38	8.3	8.1	8.2	8.1
Physical Characteristics	ORP, Lab Total Suspended Solids, Lab	mV mg/L	-	398 2.0	422 2.5	410 2.25	17.0 0.354	398 2.00	422 2.50	474 11	415 13	442 23	371 7.7
	Total Dissolved Solids ²	mg/L	1,000	323	317	320	4.24	317	323	175	148	165	132
	Turbidity, Lab	NTU	-	1.5	0.64	1.08	0.629	0.640	1.53	11	7.9	17	7.0
	Dissolved Oxygen-Field ⁴	mg/L	< 8	6.9	10	8.5	2.2	6.9	10	9.8	9.2	9.9	9.9
	Dissolved Oxygen-Field	% °C	-	79 18	98 14	88 16	13 2.8	79 14	98 18	90	98 14	85 8.5	91 12
	Temperature-Field Acidity (as CaCO3)	mg/L	-	<1.0	3.9	2.45	- 2.0	<1.00	3.90	<1.0	2.3	<1.0	2.1
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	185	165	175	14.1	165	185	109	98	142	104
Acidity and Alkalinity	Alkalinity, Carbonate (as CaCO3) Alkalinity, Hydroxide (as CaCO3)	mg/L	-	4.4 <1.0	<1.0 <1.0	2.70 <1.00	-	<1.00 <1.00	4.40 <1.00	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0
	Alkalinity, Total (as CaCO3)	mg/L mg/L	-	190	165	178	17.7	165	190	109	98	142	104
	Ammonia as N ⁵	mg/L	0.10 2.1	0.035	<0.0050	0.0200	-	<0.00500	0.0351	<0.0050	<0.0050	<0.0050	0.009
	Bromide (Br) Chloride (CI)	mg/L mg/L	- 150	<0.050 4.2	<0.050 2.8	<0.0500 3.49	0.940	<0.0500 2.82	<0.0500 4.15	<0.050 4.2	<0.050 3.2	<0.050 3.2	<0.05 2.2
	Fluoride (F) ⁷	mg/L	1.2 1.9	0.21	0.21	0.207	0.00283	0.205	0.209	0.087	0.079	0.091	0.071
Anions and Nutrients	Nitrate (as N) ²	mg/L	3	1.1	3.2	2.15	1.46	1.11	3.18	0.18	0.15	0.27	0.22
Allions and Numerus	Nitrite (as N) ⁶	mg/L	0.20 0.20	0.0058	0.0034	0.00460	0.00170	0.00340	0.00580	<0.0010	0.0012	<0.0010	<0.001
	Total Kjeldahl Nitrogen Orthophosphate-Dissolved (as P)	mg/L mg/L	-	0.29 <0.0010	0.42 <0.0010	0.358 <0.00100	0.0912	0.294 <0.00100	0.423 <0.00100	0.11 <0.0010	0.10 <0.0010	0.12 0.0070	0.087
	Phosphorus (P)-Total	mg/L	-	0.0056	0.016	0.00100	0.00764	0.00560	0.0164	0.016	0.0090	0.0070	0.007
	Sulphate (SO ₄) ^{2,7}	mg/L	308-429	84	99	91.6	11.0	83.8	99.3	33	26	17	21
Organic Carbon (Soil)	Dissolved Organic Carbon	mg/L	-	1.1	<0.50	0.785	-	<0.500	1.07	2.1	1.3	2.0	1.4
· ,	Total Organic Carbon Aluminum (Al)	mg/L mg/L	-	1.4 0.0075	<0.50 0.071	0.945 0.0392	0.0448	<0.500 0.00750	1.39 0.0708	2.7 0.19	1.5 0.098	2.3 0.27	1.6 0.089
	Antimony (Sb)	mg/L	0.009	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.00010	<0.000
	Arsenic (As)	mg/L	0.005	0.00020	0.00016	0.000180	0.0000283	0.000160	0.000200	0.00050	0.00044	0.00055	0.0004
	Barium (Ba) Beryllium (Be)	mg/L μg/L	1.0 0.13	0.079 <0.020	0.069 <0.020	0.0736 <0.0200	0.00700	0.0686 <0.0200	0.0785 <0.0200	0.043 <0.020	0.035 <0.020	0.054 <0.020	0.034 <0.02
	Bismuth (Bi)	mg/L	-	<0.000050	<0.000050	<0.0000500		<0.0000500		<0.000050	<0.000050	<0.000050	
	Boron (B)	mg/L	1.2	0.014	<0.010	0.0120	- 0.00750	<0.0100	0.0140	<0.010	<0.010	<0.010	<0.01
	Cadmium (Cd) Calcium (Ca)	μg/L mg/L	-	0.0089 74	0.020 72	0.0142 72.6	0.00750 1.20	0.00890 71.8	0.0195 73.5	0.014 39	0.0091 32	0.013 35	0.009
	Chromium (Cr) ⁸	mg/L	0.001	0.00014	0.00039	0.000265	0.000177	0.000140	0.000390	0.00036	0.00022	0.00042	0.0003
	Cobalt (Co)	μg/L	4	0.12	<0.10	0.110	-	<0.100	0.120	0.18	0.10	0.20	<0.10
	Copper (Cu) Iron (Fe)	mg/L mg/L	1	<0.00050 0.20	<0.00050 0.11	<0.000500 0.152	0.0629	<0.000500 0.107	<0.000500 0.196	0.00062 0.29	<0.00050 0.12	0.00097 0.31	<0.000
	Lead (Pb) ⁷	mg/L	0.01 0.02	<0.000050		0.0000760	-	<0.0000500		0.00035	0.00023	0.00038	0.0001
	Lithium (Li)	mg/L	-	0.011	0.0096	0.0102	0.000778	0.00960	0.0107	0.0021	0.0017	0.0024	0.001
Total Metals	Magnesium (Mg) ⁷ Manganese (Mn)	mg/L mg/L	0.96 2.59	21 0.040	25 0.0060	23.4 0.0228	2.83 0.0239	21.4 0.00596	25.4 0.0397	12 0.019	9.9 0.013	13 0.015	9.5 0.010
	Mercury (Hg) ⁹	μg/L	0.00125	<0.00050	0.0011	0.000780	-	<0.000500	0.00106	0.0010	0.00095	0.0010	0.0007
	Molybdenum (Mo)	mg/L	1	0.0013	0.0013	0.00127	-	0.00127	0.00127	0.00060	0.00059	0.00057	0.0005
	Nickel (Ni) ⁷ Potassium (K)	mg/L mg/L	0.080 0.15	0.00066 0.74	<0.00050 0.75	0.000580 0.745	0.00707	<0.000500 0.740	0.000660 0.750	<0.00050 0.62	<0.00050 0.62	<0.00050 0.89	<0.000 0.52
	Selenium (Se)	μg/L	19	8.3	16	12.0	5.32	8.27	15.8	0.63	0.35	0.96	0.54
	Silicon (Si)-Total	mg/L	-	2.3	2.1	2.20	0.106	2.13	2.28	2.6	2.4	3.5	2.5
	Silver (Ag) ³ Sodium (Na)	mg/L mg/L	0.00005 0.0015	<0.000010 3.7	<0.000010 2.8	<0.0000100 3.22	0.651	<0.0000100 2.76	<0.0000100 3.68	<0.000010 5.0	<0.000010 4.0	<0.000010 4.0	<0.0000
	Strontium (Sr)	mg/L	-	0.33	0.26	0.296	0.0495	0.261	0.331	0.15	0.12	0.12	0.13
	Thallium (TI)	mg/L	0.0008	<0.000010 <0.00010	<0.000010 <0.00010	<0.000100 <0.000100		<0.0000100		<0.000010 <0.00010	<0.000010 <0.00010	<0.00010 <0.00010	<0.0000
	Tin (Sn) Titanium (Ti)	mg/L mg/L	-	<0.00010	<0.00010	<0.000100	-	<0.000100 <0.0100	<0.000100	<0.00010	<0.00010	<0.00010	<0.000
	Uranium (U)	mg/L	0.0085	0.00098	0.0014	0.00116	0.000262	0.000979	0.00135	0.00071	0.00062	0.0010	0.0006
	Vanadium (V) Zinc (Zn) ⁷	mg/L	0.0075 0.19	<0.00050 <0.0030	<0.00050 <0.0030	<0.000500 <0.00300	-	<0.000500 <0.00300	<0.000500 <0.00300	<0.00050 0.012	<0.00050 <0.0030	0.00071 0.0045	<0.000
	Aluminum (Al)	mg/L mg/L	0.0075 0.19	<0.0030	<0.0030	<0.00300	-	<0.00300	<0.00300	0.012	0.0052	0.0045	0.003
	Antimony (Sb)	mg/L	-	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.00010	<0.000
	Arsenic (As) Barium (Ba)	mg/L mg/L	-	0.00016 0.076	<0.00010 0.073	0.000130 0.0744	0.00191	<0.000100 0.0730	0.000160 0.0757	0.00040 0.041	0.00037 0.038	0.00040 0.054	0.0003
	Beryllium (Be)	μg/L	-	<0.020	<0.020	<0.0200	-	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.02
	Bismuth (Bi)	mg/L	-	<0.000050	<0.000050				<0.0000500		<0.000050	<0.000050	
	Boron (B) Cadmium (Cd) ^{2,7}	mg/L μg/L	0.11 0.32	0.014 0.0052	<0.010 0.0056	0.0120 0.00540	0.000283	<0.0100 0.00520	0.0140 0.00560	<0.010 <0.0050	<0.010 <0.0050	<0.010 <0.0050	<0.01 <0.00
	Calcium (Ca)	mg/L		74	71	72.6	1.91	71.2	73.9	37	33	32	31
	Chromium (Cr)	mg/L	-	<0.00010	0.00016 <0.10	0.000130	-	<0.000100	0.000160	0.00010	<0.00010	<0.00010 <0.10	<0.000
	Cobalt (Co) Copper (Cu)	μg/L mg/L	0.0002 0.012	<0.10 <0.00050	<0.10	<0.100 <0.000500	-	<0.100 <0.000500	<0.100 <0.000500	<0.10 <0.00050	<0.10 <0.00050	<0.10 <0.00050	<0.10
	Iron (Fe)	mg/L	0.35	0.015	<0.010	0.0125	-	<0.0100	0.0150	<0.010	<0.010	<0.010	<0.01
	Lead (Pb) Lithium (Li)	mg/L mg/L	-	<0.000050 0.011	<0.000050 0.0090	<0.0000500 0.00985	0.00120	<0.0000500 0.00900	<0.0000500 0.0107	<0.000050 0.0019	<0.000050 0.0015	<0.000050 0.0017	<0.0000
Dissolved Metals	Magnesium (Mg)	mg/L	-	21	26	23.3	3.54	20.8	25.8	11	10	12	9.4
ספות INIERAIS	Manganese (Mn)	mg/L	-	0.0075	0.00023	0.00384	0.00511	0.000230	0.00745	0.00019	0.00037	0.0029	0.003
	Mercury (Hg) Molybdenum (Mo)	μg/L mg/L	-	<0.0000050 0.0013	<0.0000050 0.0011	<0.00000500 0.00122	0.000120	<0.00000500 0.00113	<0.00000500 0.00130	<0.0000050 0.00062	<0.0000050 0.00054	<0.000050 0.00055	<0.0000
	Nickel (Ni)	mg/L	-	0.00052	<0.00050	0.000510	-	<0.000500	0.000520	<0.00050	<0.00050	<0.00050	<0.000
	Potassium (K)	mg/L	-	0.74 10	0.70 18	0.718 14.2	0.0283 5.94	0.698 10.0	0.738 18.4	0.56 0.71	0.60 0.43	0.75 1.0	0.50 0.42
	Selenium (Se) Silicon (Si)	μg/L mg/L	-	2.2	2.1	2.13	0.106	2.06	2.21	2.3	2.2	2.9	2.4
	Silver (Ag)	mg/L	-	<0.000010	<0.000010	<0.0000100	-	<0.0000100	<0.0000100	<0.000010	<0.000010	<0.000010	<0.000
	Sodium (Na) Strontium (Sr)	mg/L	-	3.5 0.33	2.8 0.25	3.16 0.291	0.467 0.0566	2.83 0.251	3.49 0.331	4.6 0.14	4.1 0.12	3.7 0.11	3.1 0.13
	Thallium (TI)	mg/L mg/L	-	<0.000010		<0.000100			<0.000100		<0.000010		
	Tin (Sn)	mg/L	-	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.00010	<0.000
	Titanium (Ti) Uranium (U)	mg/L mg/L	-	<0.010 0.00095	<0.010 0.0014	<0.0100 0.00117	0.000321	<0.0100 0.000946	<0.0100 0.00140	<0.010 0.00072	<0.010 0.00066	<0.010 0.00088	<0.01 0.0006
	Vanadium (V)	mg/L	-	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.000
	Zinc (Zn)	mg/L		<0.0010	<0.0010	<0.00100		<0.00100	<0.00100		<0.0010	0.0013	< 0.001

Value > GL Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g.,

hardness), guidelines were screened using concurrent values. ² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness.

⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9\,}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L)$ was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest

day. ¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

Controlled Part P		Analyte	Units				_ER					RG_ERIMF		
Seedic Conditions Fisch 186		Io. 1 11 11 11 11 11 11 11 11 11 11 11 11	0/										Mean	SI
Careactively, late			•											42 30
Paccesse for Co-COST May 107 108 117 118 108 108 107 109														27
Fig.			-			ļ								21.
Miles Description Property		,												0.1
Total Sugargeous Side Lab						1							8.26	0.05
Treat Description Stores	ysical Characteristics	ORP, Lab	mV	362					474	449				19
Turtlethy, Lish NTU 15 5-3 10.6 4.75 5.32 17.2 5.9 13 2.8 13.5														2.4
Discovered Dospon-Freider mg/L 7.77 6.8 9.2 0.50 7.7 9.9 0.55 0.7 7.0 9.9						ļ								26
Description (Propriet 1														2.
Testing-entaine Field To 19														0.4
Acade your according to the common of the co		, 5												3
Assamble, September (accided and accided as a property of the control of the co														3
Makelinky, Jesopous (accessed as Sacos) mgb, 4-10 4-			_										178	10
Materiary (1964) Cap	cidity and Alkalinity	Alkalinity, Carbonate (as CaCO3)				<1.00		<1.00	<1.00	2.0	<1.0		1.33	
American is N													<1.00	4
Remain (Fig.)														11
Clascine (Cr)														
The Name of Primary of		Chloride (CI)											11.9	1.
Notate (san N "													0.0893	0.00
Note Leg Rs I)** mg J. 40,001 0,001	aiama amal Nivitsiamta	Nitrate (as N) ²				1							<0.00500	
Total Experient Noticegen mgst 0.21 0.010 0.128 0.0470 0.0270 0.20170 0.0210 0.0210 0.001	nions and inutrients	Nitrite (as N) ⁶			0.0014	1	0.000105	<0.00100	0.00140		<0.0010	<0.0010	<0.00100	
Principhonic (PyTotal mgs 0.0056 0.0061 0.0108 0.00590 0.0109 0.021 0.017 0.013 0.017		Total Kjeldahl Nitrogen	mg/L	0.21	0	0.126	0.0470	0.0870	0.207	0.23	0.26	0.16	0.217	0.0
Suphinale (SQL) 3*7													<0.00100	0.0
Dissolved Organic Carbon mg/L 1.1 1.2 5.51 0.393 1.11 2.05 3.5 1.7 2.7 2.05		Phosphorus (P)-Total												0.00
Total Organic Carbon mg/L 1.5 1.1 1.77 0.571 1.99 2.5 3.1 1.8 2.4 2.														0.3
Aluminum (AI) Aluminum (AI) Aluminum (AI) Aluminum (AI) Ariminum (AII) Brainum (AIII) Brainum (AIIII) Brainum (AIIIII) Brainum (AIIII) Brainum (AIIIII) Brainum (AIIII) Brainum (AIIIII) Brainum (AIIIII) Brainum (AIIIIII) Brainum (AIIIII) Brainum (AIIIII) Brainum (AIIIII) Brai	ganic Carbon (Soil)	~				ļ								0.8
Ardimony (9b)	. ,													0.0
Arsenic (As)							0.114						0.0391	0.00
Barlum (Ba)					0.00038		0.0000602						0.000393	0.000
Blambutt (8)		Barium (Ba)	mg/L	0.026	0.032	0.0372	0.0101	0.0255	0.0542	0.16	0.15	0.13	0.146	0.0
Bloom (B)													<0.0200	
Cadmim (Cd)														
Cacloum (Ca)													0.00970	0.00
Cobat (Co)													55.7	7.
Copper (Cu)													0.000223	0.000
Total Metals To													0.123	0.00
Lead (Pb)														0.00
Claim Metals		Lead (Ph) 7												
Total Metals		Lithium (Li)											0.0000917	0.00
Manganese (Mn)	T-4-1 M-4-1-					1							11.2	0.
Molybdenum (Mo)	lotal Metals	Manganese (Mn)	mg/L	0.015	0.0067	0.0129			0.0187	0.040	0.023		0.0264	0.0
Nickel (Ni)													0.000523	
Potassium (K)						1								0.000
Selenium (Se)		Nickel (Ni)												0.00
Silicon (Si)-Total mg/L 2.6 2.2 2.64 0.463 2.19 3.53 1.9 1.5 0.98 1.45													0.0737	0.00
Scodium (Na)													1.45	0.4
Strontium (Sr)										<0.000010				
Thallium (TI)													9.03	0.9
Tin (Sn)														0.00
Titanium (Ti)		. ,												
Uranium (U)													<0.0100	
Zinc (Zn)		Uranium (U)		0.00058		0.000696	0.000154	0.000582		0.00036				0.000
Aluminum (Al)		Vanadium (V)	mg/L		<0.00050	1		<0.000500	0.000710				<0.000500	
Antimony (Sb)													0.00527	0.0
Arsenic (As)														0.00
Barium (Ba)													0.000183	0.000
Beryllium (Be)		Barium (Ba)			0.031	0.0362		0.0218		0.16		0.14	0.156	0.0
Boron (B)		Beryllium (Be)	μg/L										<0.0200	
Cadnium (Cd) 2.7													<0.0000500	
Calcium (Ca) mg/L 25 30 31.3 3.97 25.2 37.2 62 60 46 55.9		Codmium (Cd.) 2,7											<0.0100	
Chromium (Cr)														8.
Cobalt (Co)													0.000153	0.000
Iron (Fe)		Cobalt (Co)	μg/L	<0.10	<0.10	<0.100		<0.100	<0.100	<0.10	<0.10	<0.10	<0.100	
Lead (Pb)													<0.000500	
Lithium (Li)													<0.0100 <0.0000500	
Magnesium (Mg)													0.00447	0.000
Manganese (Mn) Mg/L 0.0045 0.00012 0.00197 0.00199 0.000120 0.00451 <0.00010 0.00011 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00014 0.00016 0.000050 <0.0000050 <0.0000050 <0.0000050 <0.0000050 <0.0000050 <0.0000050 <0.0000050 <0.0000050 <0.000050 <0.000050 <0.000050 <0.000050 <0.000050 <0.000050 <0.00050 <0.00050 <0.000500 <0.000500 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.000500 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.0	Dissolved Metals		mg/L	5.7	8.4	9.39	2.19	5.70	11.9	10	12	11	10.9	0.7
Molybdenum (Mo) mg/L 0.00051 0.00053 0.000544 0.0000418 0.000506 0.000623 0.0014 0.0013 0.0012 0.0012 Nickel (Ni) mg/L <0.00050	Sissolveu Meldis	Manganese (Mn)	mg/L										0.000117	0.000
Nickel (Ni) mg/L <0.00050 <0.000500 - <0.000500 <0.000500 0.00078 0.00074 0.0006 0.066 0.117 0.146 0.146 0.147 1.7 1.4 0.88 1.33 0.136 0.00074 0.000010 0.000010														0.00
Potassium (K) mg/L 0.43 0.44 0.545 0.118 0.434 0.746 1.4 1.4 0.79 1.17 Selenium (Se) μg/L 0.12 0.35 0.503 0.308 0.116 0.999 0.063 0.066 0.070 0.066 Silicon (Si) mg/L 2.0 2.0 2.27 0.330 1.96 2.87 1.7 1.4 0.88 1.33 Silver (Ag) mg/L <0.000010													0.00125 0.000780	0.00
Selenium (Se)													1.17	0.000
Silicon (Si) mg/L 2.0 2.0 2.27 0.330 1.96 2.87 1.7 1.4 0.88 1.33 Silver (Ag) mg/L <0.000010													0.0663	0.00
Silver (Ag) mg/L < 0.000010 < 0.000010 - < 0.0000100 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.0010 < 0.0010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 <td></td> <td>Silicon (Si)</td> <td></td> <td>2.0</td> <td>2.0</td> <td>2.27</td> <td>0.330</td> <td>1.96</td> <td>2.87</td> <td>1.7</td> <td>1.4</td> <td>0.88</td> <td>1.33</td> <td>0.4</td>		Silicon (Si)		2.0	2.0	2.27	0.330	1.96	2.87	1.7	1.4	0.88	1.33	0.4
Strontium (Sr) mg/L 0.10 0.11 0.120 0.0129 0.104 0.141 0.17 0.17 0.16 0.162 Thallium (Tl) mg/L <0.000010		Silver (Ag)	mg/L		<0.000010	<0.000100	-	<0.0000100	< 0.0000100		<0.000010			
Thallium (TI) mg/L < 0.000010 < 0.000010 - < 0.0000100 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.0010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 <td></td> <td>8.75</td> <td>0.7</td>													8.75	0.7
Tin (Sn) mg/L < 0.00010 < 0.00010 < 0.000100 - < 0.000100 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.0001 < 0.0001 < 0.0001 < 0.0001 < 0.0010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 <														0.00
Titanium (Ti) mg/L <0.010 <0.010 <0.0100 - <0.0100 <0.0100 <0.010 <0.010 <0.010 <0.010 <0.010													<0.0000100	
													<0.000100	
		Uranium (U)	mg/L	0.00055	0.00058	0.000676	0.000119	0.000549	0.000883	0.00036	0.00040	0.00034	0.000365	0.000
Vanadium (V) mg/L <0.00050 <0.00050 <0.00050 - <0.000500 <0.000500 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050 <0.00050		Vanadium (V)	mg/L	<0.00050	<0.00050	<0.000500	-				<0.00050	<0.00050	<0.000500 0.00223	0.00

Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness),

guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable

hardness, then guidelines were determined using the maximum applicable hardness. ⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L$) was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units	RG_E	RIMF				RG_E	EROL				RG_ERW
	-		Min	Max	7-May-19			27-May-19	Mean	SD	Min	Max	21-May-1
	Conductivity, Field Specific Conductivity, Field	μS/cm μS/cm	254 350	337 408	313 429	320 420	292 420	286 389	303 415	16 18	286 389	320 429	420 608
	Conductivity, Lab	μS/cm	358	412	424	420	412	384	410	18.0	384	424	594
	Hardness (as CaCO3)	mg/L	160	198	223	234	220	213	222	8.74	213	234	272
	pH, Field ³	pН	7.8	8.1	7.7	7.6	7.8	7.7	7.7	0.098	7.6	7.8	7.5
Neurinal Objection	pH, Lab	pН	8.21	8.32	8.3	8.2	8.3	8.3	8.28	0.0790	8.16	8.34	8.3
Physical Characteristics	ORP, Lab Total Suspended Solids, Lab	mV mg/L	413 2.10	449 6.60	476 <1.0	432 1.1	365 <1.0	396 <1.0	417 1.02	47.8	365 <1.00	476 1.10	447 2.5
	Total Dissolved Solids ²	mg/L	177	228	245	230	221	213	227	13.7	213	245	321
	Turbidity, Lab	NTU	1.92	5.90	0.54	0.44	0.29	0.31	0.395	0.117	0.290	0.540	3.1
	Dissolved Oxygen-Field ⁴	mg/L	7.8	8.7	7.8	7.3	7.3	9.7	8.0	1.1	7.3	9.7	13
	Dissolved Oxygen-Field	°C	70	91	79	68	63	88	75	11	63	88	103
	Temperature-Field Acidity (as CaCO3)	mg/L	11 <1.00	17 4.00	11 <1.0	13 4.6	9.2 <1.0	11 2.2	11 2.20	1.4 1.47	9.2 <1.00	13 4.60	8.8 <1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	166	185	194	196	198	191	195	2.99	191	198	257
Acidity and Alkalinity	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.00	2.00	3.2	<1.0	<1.0	<1.0	1.55	-	<1.00	3.20	<1.0
	Alkalinity, Hydroxide (as CaCO3) Alkalinity, Total (as CaCO3)	mg/L mg/L	<1.00 166	<1.00 185	<1.0 198	<1.0 196	<1.0 198	<1.0 191	<1.00 196	3.30	<1.00 191	<1.00 198	<1.0 257
	Ammonia as N ⁵	mg/L	<0.00500	<0.00500	<0.0050	<0.0050	0.0099	0.090	0.0276	0.0492	<0.00500	0.0903	0.0092
	Bromide (Br)	mg/L	<0.0500	<0.0500	< 0.050	<0.050	<0.050	<0.050	<0.0500	-	<0.0500	<0.0500	<0.050
	Chloride (CI)	mg/L	9.82	13.6	4.5	4.3	3.5	2.7	3.74	0.795	2.74	4.48	33
	Fluoride (F) ⁷ Nitrate (as N) ²	mg/L mg/L	0.0810 <0.00500	0.0960 <0.00500	0.13 0.27	0.13 0.29	0.13 0.34	0.10 0.20	0.121 0.275	0.0144 0.0585	0.100 0.200	0.131 0.341	0.095 0.41
Anions and Nutrients	Nitrite (as N) ⁶	mg/L	<0.00300	<0.00300	0.0010	0.0016	0.0016	0.0012	0.00135	0.000300	0.00100	0.00160	0.0013
	Total Kjeldahl Nitrogen	mg/L	0.156	0.260	0.13	0.093	0.087	0.15	0.113	0.0281	0.0870	0.146	0.28
	Orthophosphate-Dissolved (as P)	mg/L	<0.00100 0.0129	<0.00100 0.0214	0.0010	<0.0010 0.0034	<0.0010 0.0023	<0.0010 0.0078	0.00100 0.00390	0.00266	<0.00100 0.00210	0.00100 0.00780	0.001
	Phosphorus (P)-Total Sulphate (SO ₄) ^{2,7}	mg/L mg/L	0.0129 6.41	7.11	0.0021 27	28	30	18	25.8	5.61	17.6	30.3	0.021 12
	Dissolved Organic Carbon	mg/L	1.66	3.45	1.6	0.81	1.2	0.56	1.03	0.441	0.560	1.57	2.5
Organic Carbon (Soil)	Total Organic Carbon	mg/L	1.84	3.10	1.7	0.77	1.4	0.69	1.14	0.479	0.690	1.66	2.8
	Aluminum (AI)	mg/L	0.0178	0.0689	0.0036	0.011	0.0035	0.0081	0.00655	0.00366	0.00350	0.0110	0.11
	Antimony (Sb) Arsenic (As)	mg/L mg/L	0.000180 0.000380	0.000220 0.000420	<0.00010 0.00016	<0.00010 0.00014	<0.00010 0.00020	<0.00010 0.00014	<0.000100 0.000160	0.0000283	<0.000100 0.000140	<0.000100 0.000200	0.0001 0.0004
	Barium (Ba)	mg/L	0.000380	0.164	0.00016	0.00014	0.11	0.00014	0.110	0.0000283	0.000140	0.116	0.0004
	Beryllium (Be)	μg/L	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	-	<0.0200	<0.0200	<0.020
	Bismuth (Bi) Boron (B)	mg/L	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.0000500 <0.0100	-	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.0000
	Cadmium (Cd)	mg/L μg/L	0.00790	0.0122	0.0086	0.010	0.0061	0.0091	0.00875	0.00210	0.00610	0.0112	0.010
	Calcium (Ca)	mg/L	47.2	62.1	65	63	63	62	63.2	0.911	62.4	64.5	85
	Chromium (Cr) 8	mg/L	0.000150	0.000300	0.00017	0.00017	0.00053	0.00028	0.000288	0.000170	0.000170	0.000530	0.0004
	Cobalt (Co) Copper (Cu)	μg/L mg/L	<0.100 <0.000500	0.140 0.000920	<0.10 <0.00050	<0.10 <0.00050	<0.10 <0.00050	<0.10 <0.00050	<0.100 <0.000500	-	<0.100 <0.000500	<0.100 <0.000500	0.14 0.0005
	Iron (Fe)	mg/L	0.0670	0.138	0.017	0.040	0.017	0.025	0.0248	0.0108	0.0170	0.0400	0.46
	Lead (Pb) 7	mg/L	0.0000520		<0.000050		<0.000050		<0.0000500			<0.0000500	
	Lithium (Li) Magnesium (Mg) 7	mg/L mg/L	0.00440 10.7	0.00520 11.8	0.0049 16	0.0051 16	0.0050 16	0.0039 15	0.00472 15.7	0.000556 0.395	0.00390 15.2	0.00510 16.0	0.002
Total Metals	Manganese (Mn)	mg/L	0.0161	0.0404	0.0039	0.0052	0.0036	0.0044	0.00428	0.000692	0.00364	0.00521	0.011
	Mercury (Hg) 9	μg/L	<0.000500	0.000570	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	<0.000
	Molybdenum (Mo)	mg/L	0.00123	0.00137	0.00076	0.00074	0.00070	0.00061	0.000702	0.0000637	0.000614	0.000758	0.0005
	Nickel (Ni) ⁷ Potassium (K)	mg/L mg/L	0.000730 0.809	0.00105 1.40	<0.00050 0.55	<0.00050 0.61	<0.00050 0.52	<0.00050 0.53	<0.000500 0.554	0.0383	<0.000500 0.523	<0.000500 0.609	0.0007 1.5
	Selenium (Se)	μg/L	0.0630	0.0820	2.8	2.9	3.0	2.5	2.79	0.205	2.52	2.99	0.75
	Silicon (Si)-Total	mg/L	0.980	1.90	2.1	2.2	2.1	2.2	2.16	0.0614	2.11	2.24	3.2
	Silver (Ag) ³ Sodium (Na)	mg/L mg/L	<0.0000100 8.00	<0.0000100 9.98	<0.000010 3.7	<0.000010 3.6	<0.000010	<0.000010 3.2	<0.0000100 3.45	0.256	<0.0000100 3.20	<0.0000100 3.70	<0.0000 18
	Strontium (Sr)	mg/L	0.155	0.174	0.18	0.17	0.17	0.13	0.163	0.0207	0.133	0.179	0.16
	Thallium (TI)	mg/L		<0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000100			<0.0000100	<0.0000
	Tin (Sn) Titanium (Ti)	mg/L mg/L	<0.000100 <0.0100	<0.000100 <0.0100	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.000100 <0.0100	-	<0.000100 <0.0100	<0.000100 <0.0100	<0.000° <0.010
	Uranium (U)	mg/L	0.000356	0.000374	0.00067	0.00065	0.00063	0.00051	0.000617	0.0000701	0.000514	0.000669	0.0005
	Vanadium (V)	mg/L	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	0.0006
	Zinc (Zn) ⁷ Aluminum (Al)	mg/L mg/L	<0.00300 <0.00300	0.00870 0.00360	<0.0030 <0.0030	<0.0030 <0.0030	<0.0030 <0.0030	0.0059 <0.0030	0.00372 <0.00300	-	<0.00300 <0.00300	0.00590 <0.00300	<0.003
	Antimony (Sb)	mg/L	0.000170	0.00360	<0.0030	<0.0030	<0.0030	<0.0030	<0.00300	-	<0.00300	<0.00300	0.0001
	Arsenic (As)	mg/L	0.000310	0.000380	0.00016	0.00014	0.00011	0.00015	0.000140	0.0000216	0.000110	0.000160	0.0003
	Barium (Ba) Beryllium (Be)	mg/L	0.140 <0.0200	0.172 <0.0200	0.12 <0.020	0.11 <0.020	0.11 <0.020	0.10 <0.020	0.110 <0.0200	0.00730	0.102 <0.0200	0.118 <0.0200	0.097 <0.02
	Bismuth (Bi)	μg/L mg/L		<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200		<0.0200		<0.000
	Boron (B)	mg/L	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	-	<0.0100	<0.0100	0.014
	Cadmium (Cd) ^{2,7}	μg/L	<0.00500	<0.00500	0.0078	0.011	0.0078	0.0071	0.00840	0.00170	0.00710	0.0109	0.007
	Calcium (Ca) Chromium (Cr)	mg/L mg/L	45.7 0.000120	62.4 0.000220	64 0.00013	67 0.00011	63 0.00011	61 0.00024	63.8 0.000148	2.41 0.0000624	61.0 0.000110	66.8 0.000240	85 0.0002
	Cobalt (Co)	μg/L	<0.100	<0.100	<0.10	<0.10	<0.10	<0.10	<0.100	-	<0.100	<0.100	<0.10
	Copper (Cu)	mg/L	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	<0.000
	Iron (Fe) Lead (Pb)	mg/L mg/L	<0.0100 <0.000500	<0.0100 <0.0000500	<0.010 <0.000050	<0.010 <0.000050	<0.010 <0.00050	<0.010 <0.00050	<0.0100 <0.0000500	-	<0.0100 <0.000500	<0.0100 <0.0000500	0.092
	Lithium (Li)	mg/L	0.00440	0.00450	0.0051	0.0048	0.0051	0.0038	0.00470	0.000616	0.00380	0.00510	0.002
Dissolved Metals	Magnesium (Mg)	mg/L	10.1	11.6	15	16	15	15	15.4	0.733	14.7	16.4	14
	Manganese (Mn) Mercury (Hg)	mg/L μg/L	<0.000100 <0.00000500	0.000140 <0.00000500	0.0015 <0.0000050	0.0030 <0.0000050	0.0017 <0.000050	0.0032 <0.000050	0.00235 <0.00000500	0.000867	0.00151 <0.00000500	0.00318 <0.0000050	0.002
	Molybdenum (Mo)	mg/L	0.00115	0.00135	0.00074	0.00066	0.00072	0.00058	0.000673	0.0000686	0.000583	0.000735	0.0006
	Nickel (Ni)	mg/L	0.000740	0.000820	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	0.0006
	Potassium (K) Selenium (Se)	mg/L μg/L	0.791 0.0630	1.36 0.0700	0.54 3.6	0.60 3.4	0.53 3.4	0.51 2.3	0.545 3.14	0.0412 0.598	0.509 2.25	0.604 3.55	1.5 0.84
	Silicon (Si)	μg/L mg/L	0.881	1.74	2.1	2.3	2.3	2.3	2.23	0.0812	2.11	2.28	2.7
	Silver (Ag)	mg/L	<0.0000100	<0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000100	-	< 0.0000100	< 0.0000100	<0.000
	Sodium (Na) Strontium (Sr)	mg/L	7.90 0.155	9.41 0.167	3.5 0.18	3.8 0.17	3.7 0.19	3.0 0.13	3.50 0.167	0.329 0.0245	3.03 0.132	3.76 0.188	18 0.16
	Strontium (Sr) Thallium (TI)	mg/L mg/L		0.167 <0.0000100			<0.00010		0.167 <0.0000100			0.188 <0.0000100	<0.000
	Tin (Sn)	mg/L	<0.000100	<0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.000
	Titanium (Ti)	mg/L	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	-	<0.0100	<0.0100	<0.01
	Uranium (U) Vanadium (V)	mg/L mg/L	0.000336 <0.000500	0.000397 <0.000500	0.00068 <0.00050	0.00070 <0.00050	0.00066 <0.00050	0.00050 <0.00050	0.000634 <0.000500	0.0000882	0.000504 <0.000500	0.000695 <0.000500	0.0005
													~U.UUU

Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness),

guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

⁵ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable

hardness, then guidelines were determined using the maximum applicable hardness. ⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

⁹ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 μg/L) was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units			RG_ERWSF	•				RG _.	_GC		
	•		27-May-19	Mean	SD	Min	Max	7-May-19		21-May-19		Mean	SD
	Conductivity, Field Specific Conductivity, Field	μS/cm μS/cm	396 529	408 568	17 56	396 529	420 608	117 154	151 225	119 178	134 179	130 184	16 29
	Conductivity, Lab	μS/cm	491	542	72.8	491	594	160	250	177	196	196	39.0
	Hardness (as CaCO3)	mg/L	233	252	27.6	233	272	80	128	85	95	97.0	21.6
	pH, Field ³ pH, Lab	pH pH	7.4 8.2	7.4 8.20	0.021 0.0778	7.4 8.15	7.5 8.26	8.0 8.1	7.8 8.1	8.4 8.1	8.0 7.9	8.0 8.04	0.27 0.116
Physical Characteristics		mV	442	444	3.54	442	447	407	404	399	406	404	3.56
•	Total Suspended Solids, Lab	mg/L	9.8	6.15	5.16	2.50	9.80	11	6.8	3.4	4.3	6.38	3.40
	Total Dissolved Solids 2	mg/L	280	300	29.0	280	321	109	148	101	116	118	20.6
	Turbidity, Lab Dissolved Oxygen-Field ⁴	NTU mg/L	5.1 8.9	4.12 11	1.41 2.6	3.12 8.9	5.12 13	11 9.2	3.5 8.2	4.4 9.9	3.9 9.6	5.60 9.2	3.35 0.75
	Dissolved Oxygen-Field Dissolved Oxygen-Field	%	83	93	14	83	103	87	76	83	90	84	6.2
	Temperature-Field	°C	12	10	2.2	8.8	12	13	8.0	7.7	12	10	2.6
	Acidity (as CaCO3) Alkalinity, Bicarbonate (as CaCO3)	mg/L mg/L	2.6 205	1.80 231	36.8	<1.00 205	2.60 257	3.3 82	<1.0 110	1.5 86	2.3 85	2.02 91.0	0.906 12.8
Acidity and Alkalinity	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.00	-	<1.00	<1.00	<1.0	<1.0	<1.0	<1.0	<1.00	-
	Alkalinity, Hydroxide (as CaCO3) Alkalinity, Total (as CaCO3)	mg/L mg/L	<1.0 205	<1.00 231	36.8	<1.00 205	<1.00 257	<1.0 82	<1.0 110	<1.0 86	<1.0 85	<1.00 91.0	- 12.8
	Ammonia as N ⁵	mg/L	<0.0050	0.00710	-	<0.00500	0.00920	<0.0050	0.015	<0.0050	<0.0050	0.00748	-
	Bromide (Br)	mg/L	<0.050	< 0.0500	-	<0.0500	<0.0500	<0.050	<0.050	<0.050	<0.050	<0.0500	-
	Chloride (CI) Fluoride (F) ⁷	mg/L mg/L	31 0.087	31.8 0.0910	1.63 0.00566	30.6 0.0870	32.9 0.0950	<0.50 0.041	2.5 0.074	0.76 0.055	1.3 0.057	1.24 0.0568	0.846 0.0135
Aniana and Nutrianta	Nitrate (as N) ²	mg/L	0.059	0.0310	0.248	0.0570	0.410	<0.0050	0.14	0.19	0.19	0.130	0.0267
Anions and Nutrients	Nitrite (as N) ⁶	mg/L	0.0018	0.00155	0.000354	0.00130	0.00180	<0.0010	0.0014	<0.0010	<0.0010	0.00110	-
	Total Kjeldahl Nitrogen Orthophosphate-Dissolved (as P)	mg/L mg/L	0.27 0.0026	0.277 0.00205	0.00990 0.000778	0.270 0.00150	0.284 0.00260	0.13 <0.0010	0.13 0.0022	0.082 0.0019	0.10 <0.0010	0.111 0.00152	0.0242 0.00018
	Phosphorus (P)-Total	mg/L	0.0026	0.00205	0.000778	0.00150	0.00260	0.012	0.0022	0.0019	0.0072	0.00152	0.00018
	Sulphate (SO ₄) ^{2,7}	mg/L	10	10.8	1.06	10.1	11.6	1.3	20	6.4	13	10.2	8.20
Organic Carbon (Soil)	Dissolved Organic Carbon	mg/L	3.4	2.92	0.672	2.45	3.40	2.9	1.6	2.5	1.9	2.20	0.578
	Total Organic Carbon Aluminum (Al)	mg/L mg/L	3.4 0.037	3.08 0.0756	0.396 0.0542	2.80 0.0373	3.36 0.114	2.9 0.20	1.7 0.057	2.6 0.12	2.1 0.078	2.33 0.113	0.507 0.0636
	Antimony (Sb)	mg/L	0.00014	0.000145	0.00000707	0.000140	0.000150	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	-
	Arsenic (As) Barium (Ba)	mg/L mg/L	0.00053 0.052	0.000475 0.0707	0.0000778 0.0259	0.000420 0.0524	0.000530 0.0890	0.00022 0.055	0.00038 0.047	0.00027 0.043	0.00029 0.038	0.000290 0.0456	0.000066
	Beryllium (Be)	μg/L	<0.020	<0.0200	-	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	-
	Bismuth (Bi)	mg/L	<0.000050	<0.0000500 0.0150	0.00141	<0.0000500 0.0140	<0.0000500 0.0160	<0.000050 <0.010	<0.000050 <0.010	<0.000050	<0.000050 <0.010	<0.0000500 <0.0100	
	Boron (B) Cadmium (Cd)	mg/L μg/L	0.014 0.011	0.0150	0.00141	0.0140	0.0100	<0.010	0.0060	<0.010 0.0052	0.0067	0.00572	0.00076
	Calcium (Ca)	mg/L	73	78.7	8.34	72.8	84.6	21	33	23	25	25.6	5.45
	Chromium (Cr) ⁸ Cobalt (Co)	mg/L μg/L	0.00033 <0.10	0.000380 0.120	0.0000707	0.000330 <0.100	0.000430 0.140	0.00030 0.14	0.00017 <0.10	0.00017 <0.10	0.00017 <0.10	0.000202 0.110	0.000065
	Copper (Cu)	mg/L	<0.00050	0.000535	-	<0.000500	0.000570	0.00056	<0.00050	0.00072	<0.00050	0.000570	0.000098
	Iron (Fe)	mg/L	0.49	0.475	0.0191	0.461	0.488	0.25	0.067	0.10	0.080	0.126	0.0866
	Lead (Pb) ' Lithium (Li)	mg/L mg/L	0.00012 0.0023	0.000128	0.00000707 0.000354	0.000123	0.000133 0.00280	0.00013 <0.0010	0.000094	0.00011	0.00011 0.0012	0.000111 0.00125	0.000016
Total Metals	Magnesium (Mg) ⁷	mg/L	15	14.6	1.06	13.8	15.3	7.3	11	7.4	8.0	8.32	1.61
	Manganese (Mn)	mg/L	0.0075 <0.00050	0.00918	0.00243	0.00747	0.0109 <0.000500	0.0094 0.0017	0.0067	0.0055	0.0080	0.00741 0.00118	0.00166
	Mercury (Hg) ⁹ Molybdenum (Mo)	μg/L mg/L	0.00048	0.000500	0.0000629	<0.000500 0.000479	0.000568	0.0017	0.00083 0.00045	0.0012 0.00025	0.00097 0.00036	0.00118	0.00037
	Nickel (Ni) 7	mg/L	0.00078	0.000750	0.0000424	0.000720	0.000780	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-
	Potassium (K) Selenium (Se)	mg/L μg/L	1.4 0.61	1.44 0.681	0.0990 0.0990	1.37 0.611	1.51 0.751	0.60 <0.050	0.65 0.64	0.57 0.31	0.49 0.57	0.578 0.394	0.0670 0.182
	Silicon (Si)-Total	mg/L	2.7	2.90	0.0990	2.65	3.16	4.9	2.9	4.3	2.9	3.76	1.02
	Silver (Ag) 3	mg/L	<0.000010				<0.0000100		<0.000010			<0.0000100	
	Sodium (Na) Strontium (Sr)	mg/L mg/L	17 0.14	17.5 0.148	0.849 0.0134	16.9 0.138	18.1 0.157	1.5 0.031	3.8 0.11	1.9 0.054	1.9 0.082	2.27 0.0682	1.05 0.0327
	Thallium (TI)	mg/L	<0.000010	<0.0000100	-	< 0.0000100	< 0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000100	-
	Tin (Sn) Titanium (Ti)	mg/L mg/L	<0.00010 <0.010	<0.000100 <0.0100	-	<0.000100 <0.0100	<0.000100 <0.0100	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.000100	-
	Uranium (U)	mg/L	0.00049	0.000527	0.0000587	0.000485	0.000568	0.00031	0.00059	0.00046	0.00046	0.000455	0.00011
	Vanadium (V)	mg/L	0.00067	0.000650	0.0000283	0.000630	0.000670	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-
	Zinc (Zn) ⁷ Aluminum (Al)	mg/L mg/L	<0.0030 0.0033	<0.00300 0.00315	-	<0.00300 <0.00300	<0.00300 0.00330	<0.0030 0.012	<0.0030 0.0048	<0.0030 0.014	<0.0030 0.012	<0.00300 0.0106	0.00404
	Antimony (Sb)	mg/L	0.00015	0.000145	0.00000707	0.000140	0.000150	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	-
	Arsenic (As) Barium (Ba)	mg/L mg/L	0.00046 0.049	0.000395 0.0729	0.0000919 0.0335	0.000330 0.0492	0.000460 0.0966	0.00015 0.049	0.00034 0.047	0.00022 0.048	0.00027 0.037	0.000245 0.0452	0.000080
	Beryllium (Be)	μg/L	<0.020	<0.0200	-	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	-
	Bismuth (Bi) Boron (B)	mg/L mg/L	<0.000050 0.014	<0.0000500 0.0140	-	<0.0000500 0.0140	<0.0000500 0.0140	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.0000500 <0.0100	-
	Cadmium (Cd) ^{2,7}	µg/L	0.0053	0.0140	0.00127	0.0140	0.0140	<0.010	<0.010	<0.010	<0.010	<0.00500	-
	Calcium (Ca)	mg/L	70	77.4	10.8	69.7	85.0	21	34	23	25	25.6	5.72
	Chromium (Cr) Cobalt (Co)	mg/L μg/L	0.00021 <0.10	0.000210 <0.100	-	0.000210 <0.100	0.000210 <0.100	<0.00010 <0.10	<0.00010 <0.10	<0.00010 <0.10	<0.00010 <0.10	<0.000100 <0.100	-
	Copper (Cu)	mg/L	<0.00050	<0.000500	-	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-
	Iron (Fe) Lead (Pb)	mg/L mg/L	0.17 <0.000050	0.133 <0.0000500	0.0580	0.0920	0.174 <0.0000500	0.011 <0.00050	<0.010 <0.000050	0.010 <0.000050	<0.010 <0.00050	0.0102 <0.0000500	0.00061
	Lithium (Ĺi)	mg/L	0.0023	0.00225	0.0000707	0.00220	0.00230	<0.0010	0.0015	<0.0010	0.0011	0.00115	0.00024
	Magnesium (Mg)	mg/L	14 0.0015	14.4 0.00211	0.0707 0.000919	14.3 0.00146	14.4 0.00276	6.6 0.00053	11 0.00017	7.1 0.00048	7.9 0.0015	8.06 0.000668	1.84 0.00057
	Manganese (Mn) Mercury (Hg)	mg/L μg/L		<0.00211	-	< 0.00000500	<0.00276	<0.00053	<0.00017			<0.000068	
	Molybdenum (Mo)	mg/L	0.00051	0.000556	0.0000615	0.000512	0.000599	0.000080	0.00042	0.00023	0.00037	0.000272	0.00015
	Nickel (Ni) Potassium (K)	mg/L mg/L	0.00062 1.4	0.000640 1.43	0.0000283	0.000620 1.36	0.000660 1.50	<0.00050 0.57	<0.00050 0.61	<0.00050 0.54	<0.00050 0.50	<0.000500 0.552	0.0445
	Selenium (Se)	μg/L	0.55	0.694	0.206	0.548	0.840	<0.050	0.75	0.30	0.57	0.418	0.232
	Silicon (Si)	mg/L	2.5	2.61 <0.0000100	0.191	2.47	2.74 <0.0000100	4.5 <0.000010	2.8	3.8	2.9 <0.000010	3.48	0.798
	Silver (Ag) Sodium (Na)	mg/L mg/L	<0.000010 17	<0.0000100 17.5	1.20	16.7	18.4	<0.000010 1.5	3.7	1.8	2.0	<0.0000100 2.24	0.979
	Strontium (Sr)	mg/L	0.15	0.155	0.00849	0.149	0.161	0.028	0.11	0.052	0.080	0.0671	0.0344
	Thallium (TI) Tin (Sn)	mg/L mg/L	<0.000010 <0.00010	<0.0000100 <0.000100	-	<0.000100	<0.0000100 <0.000100	<0.000010 <0.00010	<0.00010	<0.00010	<0.00010 <0.00010	<0.000100 <0.000100	-
	Titanium (Ti)	mg/L	<0.010	<0.0100	-	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	-
	Uranium (U)	mg/L	0.00047	0.000493	0.0000311	0.000471	0.000515	0.00033	0.00066	0.00042	0.00048	0.000472	0.00013
	Vanadium (V)	mg/L	< 0.00050	< 0.000500	-	~0 000F00	<0.000500	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.000500	-

Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness),

guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness.

⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9\,}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L)$ was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

Anions and Nutrients Anions Arseni Barium Beryllii Bismul Boron Cadoni Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Molybo Nickel Potass Seleni Silicon Cadmi Calciu Chrom Arseni Barium Beryllii Bismul Barium Antionc Arseni Barium Antionc Arseni Barium Beryllii Bismul Barium Antionc Arseni Barium Antionc Arseni Barium Antionc Arseni Barium Antionc Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Nagne Marga	Analyte	Units	RG _.	_GC				RG_0	GO13 ¹⁰			
Acidity and Alkalinity Acidity and Alkalinity Acidity and Alkalinity Anions and Nutrients Anions Anions and Nutrients Anions Arseni Bariun Boron Cadmi Calciun Chrom Cobalti Coppe Iron (F Lead (Lithiun Magne Manga Mercul Molybe Nickel Potass Sodiur Stronti Thalliu Tin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseniun Bariuni Antimo Calciu Chrom Cobalti Coppe Iron (F Lead (Lithiun Magne Magn	•		Min	Max	7-May-19		23-May-19		Mean	SD	Min	Max
Acidity and Alkalinity Acidity and Alkalinity Acidity and Alkalinity Anions and Nutrients Anions and Nutrients Anions and Nutrients Anions and Nutrients Anions Anions and Nutrients Anions Alumir Antimo Arseni Barium Beryllia Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybe Nickel Potass Seleni Silicon Silver or Sodiur Stronti Thalliu Tin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Barium Barium Barium Barium Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Tin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Antimo Cobalt Cob	Conductivity, Field Specific Conductivity, Field	μS/cm μS/cm	117 154	151 225	-	736 1,023	713 1,084	770 1,058	740 1,055	29 31	713 1,023	770 1,023
hysical Characteristics or Total Sorbits on Dissolved Metals Physical Characteristics or Total Coppe Iron (Flued) (Potal Solid Calciure) Coppe Iron (Flued) Calciure Cappe Iron (Flued) Calciure Chroma Cadmin Cadmin Calciure Chroma Cadmin Calciure Chroma Cadmin Calciure Chrom	Conductivity, Lab	μS/cm	160	250	1,050	1,020	1,070	1,030	1,010	78.7	856	1,070
hysical Characteristics pH, La ORP, I Total S Total I Turbid Dissolved Metals Dissolved Metals	Hardness (as CaCO3)	mg/L	79.7	128	603	592	564	574	576	42.1	500	620
Physical Characteristics Total S Total S Total Dissolved Metals Total S Total Dissolved Metals Total S Total Dissolved Metals Total Magne Manga Magne Magne Magne Manga Magne Manga Magne Manga Magne Ma	pH, Field ³	рН	7.8	8.4	-	7.9	8.0	8.2	8.0	0.17	7.9	8.2
Total S Total I Turbid Dissolv Dissolv Dissolv Dissolv Tempe Acidity Alkalin Bromic Chloric Fluoric Nitrate Nitrite Total Morthop Orthop Orthop Orthop Orthop Nicsol Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel Potass Seleni Silicon Siliver I Sodiur Stronti Thalliu Trin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bron) Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bron) Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bron) Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bron) Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bron) Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Marga	pH, Lab	pН	7.87	8.12	8.3	8.2	8.3	8.2	8.23	0.113	8.04	8.35
Acidity and Alkalinity Acidity and Alkalinity Acidity and Alkalinity Acidity and Alkalinity Alkalin Bromic Chloric Fluoric Nitrate Nitrite Total k Orthop Phosp Sulpha Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Litthiun Magne Manga Mercu Molybo Nickel Potass Selenii Silicon Silver I Sodiur Stronti Thalliu Trin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Litthiun Dissolved Metals Dissolved Metals	ORP, Lab Total Suspended Solids, Lab	mV mg/L	399 3.40	407 11.0	391 3.4	453 24	427 4.7	273 8.1	400 39.8	75.8 66.9	273 3.40	457 175
Acidity and Alkalinity Acidity and Alkalinity Acidity and Alkalinity Alkalin Bromic Chloric Fluoric Nitrate Nitrite Total K Orthop Phosp Sulpha Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Litthiun Magne Manga Mercut Molybo Nickel Potass Selenii Silicon Silver i Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu	Total Dissolved Solids ²	mg/L	101	148	754	711	694	723	696	83.4	534	761
Acidity and Alkalinity Acidity Alkalin Alkali	Turbidity, Lab	NTU	3.54	10.6	5.3	19	7.3	17	14.8	10.1	5.30	32.2
Acidity and Alkalinity Acidity Alkalin Bromic Chloric Fluoric Fluoric Fluoric Fluoric Nitrate Nitrite Total Morthop Phosp Sulphas Dissolved Metals Total Carbon (Soil) Organic Carbon (Soil) Organic Carbon (Soil) Total Carbon (Soil) Total Carbon (Soil) Total Carbon (Soil) Total Carbon (Cadmi Calcium Chrom Cobalt Coppe Iron (Fluead (Lithiun Hanga Marga Mercum Chrom Silicon Silicon Silicon Silicon Silicon Carbon Silicon Carbon Silicon Carbon Cadmi Calcium Chrom Cobalt Coppe Iron (Fluead (Lithiun Hanga Marga Margam Marga Marga Margam Marga Marga Margam Marga	Dissolved Oxygen-Field ⁴	mg/L	8.2	9.9	-	7.9	8.0	6.9	7.6	0.60	6.9	8.0
Acidity and Alkalinity Alkalin Fluoric	Dissolved Oxygen-Field	%	76	90	-	58	67	63	63	4.6	58	67
Acidity and Alkalinity Alkalin Rivitate Nitrite Total Morthop Phosp Sulpha Dissolv Total O Alumir Antimo Arseni Barium Beryllin Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybo Nickel Potass Seleni Silicon Silver u Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Uran	Temperature-Field Acidity (as CaCO3)	°C mg/L	7.7 <1.00	13 3.30	- <1.0	12 4.8	7.0 1.7	11 4.2	10 3.75	2.5 2.49	7.0 <1.00	12 8.10
Acidity and Alkalinity Alkalin Fluoric Alturin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybo Nickel Potass Seleni Silicon Silver o Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vranad Zinc (2 Alumir Antimo Arseni Barium Beryllii Bismut Silicon Silver o Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vranad Zinc (2 Alumir Antimo Arseni Barium Beryllii Bismut Beryllii Silicon Silver o Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vranad Zinc (2 Alumir Antimo Arseni Barium Beryllii Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Marga Marga Marga Marga Marga Marga Marga Marga	Alkalinity, Bicarbonate (as CaCO3)	mg/L	82.2	110	234	220	241	230	236	22.3	216	278
Alkalin Ammo Bromic Chloric Fluoric Nitrate Nitrital Nitrotal Fortal Phosp Sulpha Organic Carbon (Soil) Organic Carbon (Soil) Dissolv Total Calciu Rariun Antinc Arseni Bariun Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel Potass Seleni Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Codalt Coppe Iron (F Lead (Lithiun Chrom Codalt Coppe Iron (F Lead (Lithiun Uraniu Vanad Zinc (Z Coppe Iron (F Lead (Lithiun Dissolved Metals Dissolved Metals Magne Marga	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.00	<1.00	2.4	<1.0	<1.0	<1.0	1.70	0.738	<1.00	3.80
Anions and Nutrients Anions and Nutrients Anions and Nutrients Anions and Nutrients Orthop Phosp Sulpha Organic Carbon (Soil) Organic Carbon (Soil) Dissolo Total Alumin Antimo Arseni Barium Beryllia Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybo Nickel Potass Seleni Silicon Silver I Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumin Antimo Arseni Barium Beryllia Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Uraniu Vanad Zinc (Z Coppe Iron (F Lead (Lithiun Beryllia Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Barium Beryllia Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Marga	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.00 82.2	<1.00 110	<1.0 236	<1.0 220	<1.0 241	<1.0 230	<1.00 238	21.6	<1.00 220	<1.00 278
Anions and Nutrients Anions and Nutrients Anions and Nutrients Anions and Nutrients Orthop Phosp Sulpha Organic Carbon (Soil) Organic Carbon (Soil) Organic Carbon (Soil) Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybo Nickel Potass Selenii Silicon Silver i Sodiur Stronti Thalliu Uraniu Uraniu Vanad Zinc (Z Alumin Antimo Arseni Barium Beryllii Bismut Barium Beryllii Bismut Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Dissolved Metals Magne Marga	Alkalinity, Total (as CaCO3) Ammonia as N ⁵	mg/L mg/L	<0.00500	0.0149	0.043	0.0087	0.011	0.0098	0.0160	0.0131	0.00870	0.042
Anions and Nutrients Fluoric Nitrate Nitrite Total K Orthop Phosp Sulpha Sulpha Dissolv Total C Alumin Arseni Barium Berylli Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver I Sodiur Stronti Thalliu Uraniu Vanad Zinc (2 Alumin Antimo Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Uraniu Vanad Zinc (2 Alumin Antimo Arseni Barium Beryllii Bismul Bismul Bismul Bismul Bismul Bismul Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Marga Marga Mercui Molybo Nickel	Bromide (Br)	mg/L	<0.0500	<0.0500	<0.25	<0.25	0.27	0.22	0.157	0.0274	<0.0500	0.27
Anions and Nutrients Nitrate Nitrite Total Morthop Phosp Sulpha Dissolv Total C Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver of Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (2 Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Uraniu Vanad Zinc (2 Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Dissolved Metals	Chloride (Cl)	mg/L	<0.500	2.45	24	25	36	32	26.2	7.58	14.0	36.1
Organic Carbon (Soil) Dissolved Metals Nitrite Total Monthop Phosp Sulpha Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Silicon Silver I Sodiur Stronti Thalliu Uraniu Vanad Zinc (2 Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Uraniu Uraniu Craniu Craniu Craniu Craniu Craniu Craniu Craniu Craniu Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Marga	Fluoride (F) 7	mg/L	0.0410	0.0740	0.19	0.17	0.18	0.17	0.166	0.0258	0.116	0.19
Organic Carbon (Soil) Organic Carbon (Soil) Organic Carbon (Soil) Organic Carbon (Soil) Dissolved Metals Total Morthage And Margar	Nitrate (as N) ²	mg/L	<0.00500	0.188	1.0	0.96	1.1	0.79	0.802	0.120	<0.00500	1.05
Orthop Phosp Sulpha Sulpha Dissolv Total C Alumir Antimo Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver of Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismul Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Tin (Sr Titaniu Uraniu Vanad Zinc (Z Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Tin (Sr Titaniu Uraniu Vanad Zinc (Z Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Marga Mercuu Molybo Nickel	Nitrite (as N) 6	mg/L	<0.00100 0.0820	0.00140 0.132	<0.0050 0.25	<0.0050 0.32	<0.0050 0.094	0.0033 0.20	0.00289 0.222	0.00174 0.0832	<0.00100 0.0940	0.0066
Organic Carbon (Soil) Phosp Sulpha Dissolv Total O Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel Potass Seleni Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Chrom Cobalt Coppe Iron (F Lead (Lithiun Carseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Marga Marga Marga Marga Marga Marga Marga Marga	Total Kjeldahl Nitrogen Orthophosphate-Dissolved (as P)	mg/L mg/L	<0.00100	0.132	<0.0010	<0.0010	<0.0010	0.20	0.222	0.0832	<0.00100	0.009
Organic Carbon (Soil) Dissolved Metals Sulpha Dissolved Metals Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel Potass Seleni Silicon Silver Sodiur Stronti Thalliu Uraniu Vanad Zinc (Z Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Chrom Cobalt Calciu Chrom Cadmi Calciu Chrom Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Marga	Phosphorus (P)-Total	mg/L	0.00720	0.0124	0.0068	0.021	0.0038	0.014	0.0352	0.0529	0.00380	0.14
Total Carbon (Soli) Total Calumin Antimo Arseni Barium Beryllia Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumin Antimo Arseni Barium Beryllia Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Tin (Sr Titaniu Uraniu Uraniu Vanad Zinc (Z Calciu Chrom Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Dissolved Metals Magne Margau Morgau Molybo Nickel	Sulphate (SO ₄) ^{2,7}	mg/L	1.25	20.1	347	338	334	300	306	65.1	178	347
Total Calciured Potass Selenii Silicon Silver Sodiur Strontii Thalliu Trin (Sr Titaniu Vanad Zinc (2 Alumire Antimo Arsenii Barium Boron Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercure Molybo Nickel Potass Selenii Silicon Silver Sodiur Strontii Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (2 Alumire Antimo Arsenii Barium Beryllii Bismut Boron Cadmi Calciure Chroma Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercure Molybo Nickel Nickel Magne Manga Margare Manga Margare Molybo Nickel	Dissolved Organic Carbon	mg/L	1.59	2.85	2.4	0.91	0.74	1.6	1.84	1.36	0.740	4.31
Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver I Sodiur Stronti Thalliu Uraniu Uraniu Uvanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Uraniu	Total Organic Carbon	mg/L	1.74	2.89	2.5	1.5	0.78	1.7	2.64	1.82	0.780	5.86
Arseni Barium Berylli Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercui Molybo Nickel	Aluminum (AI) Antimony (Sb)	mg/L	0.0570 <0.000100	0.201 <0.000100	0.057 0.00036	0.26 0.00045	0.037 0.00042	0.13 0.00034	0.141 0.000403	0.120 0.000160	0.0371	0.32
Barium Beryllia Bismut Boron Cadmit Calciut Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercut Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arsenii Barium Beryllia Bismut Boron Cadmit Calciut Chrom Cobalt Coppe Iron (F Lead (Lithium Carseni) Cadmit Calciut Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercut Molybo Nickel	Antimony (Sb) Arsenic (As)	mg/L mg/L	0.000220	0.000380	0.00036	0.00045	0.00042	0.00034	0.000403	0.000160	0.000100	0.0007
Bismut Boron Cadmi Calcius Chrom Cobalts Coppe Iron (F Lead (Lithium Magne Manga Mercus Selenii Silicon Silver Sodiur Stronti Thallius Trin (Sr Titanius Vanad Zinc (Z Alumir Antimo Arsenii Barium Beryllii Bismut Boron Cadmi Calcius Chrom Cobalts Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Marcus Molybo Nickel	Barium (Ba)	mg/L	0.0378	0.0554	0.096	0.088	0.10	0.11	0.107	0.0208	0.0883	0.14
Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Total Metals Magne Manga Mercu Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Manga Mercu Molybo Nickel	Beryllium (Be)	μg/L	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	-	<0.0200	<0.02
Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Total Metals Magne Manga Mercu Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arsenii Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Manga Mercu Molybo Nickel	Bismuth (Bi)	mg/L	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.000050 0.022	<0.000050 0.023	<0.000050 0.029	<0.000050 0.025	<0.0000500 0.0270	0.00636	<0.0000500 0.0220	<0.0000
Calcium Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercum Molybo Nickel Potass Selenim Silicon Silver Sodium Stronti Thalliu Uraniu Uvanad Zinc (Z Alumin Antimo Arseni Barium Beryllim Bismum Beryllim Boron Cadmi Calcium Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercum Molybo Nickel	Cadmium (Cd)	mg/L μg/L	<0.00500	0.00670	0.022	0.023	0.029	0.025	0.0270	0.00030	0.0220	0.038
Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel	Calcium (Ca)	mg/L	20.9	33.4	126	119	121	118	119	6.43	107	126
Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercul Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Uraniu Uvanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercul Molybo Nickel	Chromium (Cr) 8	mg/L	0.000170	0.000300	0.00013	0.00039	0.00011	0.00024	0.000255	0.000145	0.000110	0.0004
Total Metals Total Metals Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver Sodiur Strontii Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercui Molybo Nickel	Cobalt (Co)	μg/L	<0.100	0.140	<0.10	0.19	<0.10	0.15	0.187	0.0753	<0.100	0.32
Total Metals Lead (Lithium Magne Manga Mercui Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Trin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Marga Mercui Molybo Nickel Nicke	Copper (Cu)	mg/L mg/L	<0.000500 0.0670	0.000720 0.254	<0.00050 0.080	0.00061 0.23	<0.00050 0.074	<0.00050 0.13	0.000592 0.434	0.000174 0.615	<0.000500 0.0740	0.0009
Total Metals Lithium Magne Manga Mercu Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arsenii Barium Beryllii Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Lithium Magne Marga Mercu Molybo Nickel Nick	Lead (Pb) ⁷		0.0070				<0.000050	0.00011	0.000129		<0.000500	
Manga Mercui Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismuf Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magna Marga Mercui Molybo Nickel	Lithium (Li)	mg/L	<0.00100	0.00170	0.028	0.028	0.029	0.030	0.0285	0.00106	0.0273	0.030
Mercui Molybo Nickel Potass Selenii Silicon Silver i Sodiur Strontii Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arsenii Barium Beryllii Bismut Boron Cadmi Calciui Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel	Magnesium (Mg) 7	mg/L	7.25	10.7	73	70	71	72	66.9	8.70	49.7	72.6
Molybo Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (2 Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Marga Mercut Molybo Nickel	Manganese (Mn)	mg/L	0.00554	0.00940	0.015	0.023	0.016	0.034	0.149	0.305	0.0149	0.77
Nickel Potass Selenii Silicon Silver Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercui Molybo Nickel	Mercury (Hg) ⁹ Molybdenum (Mo)	μg/L mg/L	0.000830 0.0000890	0.00168 0.000453	<0.00050 0.0022	0.0019 0.0023	0.00060 0.0023	0.0013 0.0021	0.00160 0.00201	0.00117 0.000597	<0.000500 0.000814	0.003
Potass Selenii Silicon Silver i Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciuu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercuu Molybc Nickel	Nickel (Ni) 7	mg/L	<0.000500		0.0022	0.0023	0.0023	0.0021	0.00201	0.000337	0.000514	0.002
Silicon Silver of Sodiur Stronti Thalliu Tin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Berylli Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel	Potassium (K)	mg/L	0.490	0.650	1.7	1.9	1.9	2.1	1.86	0.206	1.53	2.07
Silver of Sodiur Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Berylli Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magna Marga Mercul Molybo Nickel	Selenium (Se)	μg/L	<0.0500	0.643	74	69	70	62	57.0	28.0	0.427	73.7
Sodiur Stronti Thalliu Tin (Sr Titaniu Vanad Zinc (Z Alumir Antimo Arseni Barium Berylli Bismul Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel	Silicon (Si)-Total	mg/L	2.87	4.93 <0.0000100	2.6 < 0.000010	2.9 <0.000010	2.9	2.8	3.11	0.609	2.61	4.29
Stronti Thalliu Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Marga Mercut Molybo Nickel	Silver (Ag) ³ Sodium (Na)	mg/L mg/L	1.47	3.82	8.8	8.4	<0.000010 9.0	9.4	<0.0000100 9.12	0.742	<0.0000100 8.42	10.5
Tin (Sr Titaniu Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciui Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercui Molybo Nickel	Strontium (Sr)	mg/L	0.0312	0.106	0.40	0.39	0.42	0.44	0.431	0.0736	0.356	0.56
Titaniu Uraniu Vanad Zinc (2 Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciuu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel	Thallium (TI)	mg/L	<0.0000100	<0.000100	0.000013	0.000018	0.000013	0.000016	0.0000145		<0.000100	0.0000
Uraniu Vanad Zinc (Z Alumir Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercut Molybc Nickel	Tin (Sn)	mg/L	<0.000100		<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000
Vanad Zinc (Z Alumir Antimo Arseni Barium Berylli Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Dissolved Metals Magne Manga Mercu Molybc Nickel	Titanium (Ti) Uranium (U)	mg/L mg/L	<0.0100 0.000308	<0.0100 0.000590	<0.010 0.0031	<0.010 0.0033	<0.010 0.0035	<0.010 0.0031	<0.0100 0.00282	0.00116	<0.0100 0.000477	<0.01 0.003
Alumin Antimo Arseni Barium Beryllii Bismut Boron Cadmi Calciut Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercut Molybo Nickel	Vanadium (V)	mg/L	<0.000500		<0.00050	0.00079	<0.00050	0.00078	0.000727	0.000250	<0.000500	0.001
Antimo Arseni Barium Berylli Bismul Boron Cadmi Calciui Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercui Molybo Nickel	Zinc (Zn) ⁷	mg/L	<0.00300	<0.00300	0.0030	0.0050	0.0045	<0.0030	0.00388	0.00103	<0.00300	0.005
Arseni Barium Beryllii Bismut Boron Cadmi Calciui Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercui Molybc Nickel	Aluminum (Al)	mg/L	0.00480	0.0142	0.0055	0.0048	0.0049	0.0045	0.00480	0.000645	<0.00300	0.006
Barium Beryllii Bismut Boron Cadmi Calciui Chrom Cobalt Coppe Iron (F Lead (Lithium Magne Manga Mercui Molybc Nickel	Antimony (Sb) Arsenic (As)	mg/L mg/L	<0.000100 0.000150	<0.000100 0.000340	0.00036 0.00017	0.00039 0.00015	0.00044 0.00016	0.00032 0.00020	0.000395 0.000210	0.000171 0.0000746	<0.000100 0.000150	0.0007
Beryllin Bismut Bismut Boron Cadmi Calciu Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercu Molybc Nickel	Barium (Ba)	mg/L	0.0366	0.000340	0.10	0.093	0.00010	0.10	0.0998	0.0000740	0.000130	0.11
Dissolved Metals Boron Cadmi Calciur Chrom Cobalt Coppe Iron (F Lead (Lithiun Magne Manga Mercur Molybc Nickel	Beryllium (Be)	μg/L	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.0200	-	<0.0200	<0.02
Cadmi Calciur Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercur Molybo Nickel	Bismuth (Bi)	mg/L	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.000050 0.023	<0.000050 0.022	<0.000050 0.024	<0.000050 0.024	<0.0000500 0.0268		<0.0000500 0.0220	<0.0000
Calcium Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercum Molybo Nickel	Cadmium (Cd) ^{2,7}	mg/L μg/L	<0.0100	<0.0100	0.023	<0.0050	<0.0050	0.024	0.0268	0.00591 0.000791	<0.00500	0.037
Chrom Cobalt Coppe Iron (F Lead (Lithium Dissolved Metals Magne Manga Mercui Molybo Nickel	Calcium (Ca)	mg/L	21.0	33.8	129	120	119	115	121	7.06	112	129
Coppe Iron (F Lead (Lithium Magne Manga Mercui Molybo Nickel	Chromium (Cr)	mg/L	<0.000100	<0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.000100	1	<0.000100	<0.000
Dissolved Metals Dissolved Metals Magne Marga Mercui Molybc Nickel	Cobalt (Co)	μg/L	<0.100	<0.100 <0.000500	<0.10 <0.00050	<0.10 <0.00050	<0.10 <0.00050	0.12 <0.00050	0.103 <0.000500	-	<0.100 <0.000500	0.12 <0.000
Dissolved Metals Dissolved Metals Magne Manga Mercui Molybo Nickel	Copper (Cu) Iron (Fe)	mg/L mg/L	<0.000500	0.0110	<0.00050	<0.00050	<0.00050	<0.00050	0.0297	-	<0.000500	0.000
Dissolved Metals Magne Manga Mercui Molybo Nickel	Lead (Pb)	mg/L	<0.0000500	<0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.0000500	-	<0.0000500	<0.000
Manga Mercui Molybo Nickel	Lithium (Li)	mg/L	<0.00100	0.00150	0.028	0.025	0.029	0.029	0.0276	0.00157	0.0253	0.029
Mercui Molybo Nickel	Magnesium (Mg) Manganese (Mn)	mg/L mg/L	6.61 0.000170	10.7 0.00149	68 0.0090	71 0.011	65 0.011	70 0.026	66.5 0.0107	6.78 0.00790	53.6 0.00413	72.0 0.02
Molybo Nickel	Mercury (Hg)			<0.00149					<0.0000500		<0.00413	
	Molybdenum (Mo)	mg/L	0.0000800	0.000417	0.0023	0.0020	0.0023	0.0020	0.00201	0.000686	0.000712	0.002
IPotass	Nickel (Ni)	mg/L		<0.000500	0.00093	0.0010	0.0010	0.00095	0.000912	0.0000561	<0.000500	0.001
	Potassium (K) Selenium (Se)	mg/L μg/L	0.499 <0.0500	0.605 0.752	1.7 87	1.9 79	2.1 87	2.0 63	1.84 64.7	0.250 32.8	1.41 0.272	2.07 86.6
	Silicon (Si)	mg/L	2.78	4.47	2.5	2.6	2.8	2.6	2.79	0.502	2.47	3.79
Silver	Silver (Ag)	mg/L	<0.0000100	<0.000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000100	1	<0.000100	<0.000
Sodiur	Sodium (Na)	mg/L	1.46	3.67	8.5	8.1	9.6	9.8	9.34	0.905	8.11	10.6
	Strontium (Sr) Thallium (TI)	mg/L mg/L	0.0284	0.108	0.40 0.000011	0.35 0.000015	0.42 0.000011	0.45 0.000013	0.433	0.0916	0.353 <0.0000100	0.60
	Tin (Sn)	mg/L mg/L	<0.0000100		<0.00011	<0.00015	<0.000011	<0.00013	<0.000117	0.00000176	<0.0000100	<0.000
Titaniu	Titanium (Ti)	mg/L	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.0100	-	<0.0100	<0.01
Uraniu	Uranium (U)	mg/L	0.000331	0.000658	0.0033	0.0035	0.0035	0.0030	0.00284	0.00118	0.000448	0.003
Vanad Zinc (Z	D / P 00	mg/L	<0.000500	<0.000500	< 0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000

Value > GL Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness.

⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9\,}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu\text{g/L})$ was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data

collected on the nearest day. ¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units				RG_GRLK 11					RG_LNLK	
	•		7-May-19		21-May-19	Mean	SD	Min	Max	8-May-19	14-May-19	
	Conductivity, Field Specific Conductivity, Field	μS/cm μS/cm	-	237 301	-	-	-	-	-	212 251	229 255	213 268
	Conductivity, Lab	μS/cm	315	303	307	308	6.11	303	315	257	251	270
	Hardness (as CaCO3)	mg/L	162	180	166	169	9.45	162	180	132	135	136
	pH, Field ³	рH	- 0.4	8.1	- 0.2	- 0.22	- 0.0700	- 0.05	-	8.6	8.4	8.8
Physical Characteristics	pH, Lab ORP, Lab	pH mV	8.4 452	8.3 412	8.3 420	8.32 428	0.0700 21.2	8.25 412	8.39 452	8.3 476	8.2 486	8.3 428
, o.ca. Onaractoriolica	Total Suspended Solids, Lab	mg/L	15	2.9	<1.0	6.30	8.07	<1.00	15.0	3.3	1.4	<1.0
	Total Dissolved Solids ²	mg/L	178	178	171	176	4.04	171	178	146	168	141
	Turbidity, Lab Dissolved Oxygen-Field ⁴	NTU mg/l	2.5	1.3 9.4	0.31	1.35	1.08	0.310	2.46	1.9 9.8	1.2 9.5	0.33 8.9
	Dissolved Oxygen-Field Dissolved Oxygen-Field	mg/L %	-	9.4	-	-	-	-	-	9.8	9.5	8.9 86
	Temperature-Field	°C	-	14	-	-	1	1	-	17	19	14
	Acidity (as CaCO3) Alkalinity, Bicarbonate (as CaCO3)	mg/L mg/L	<1.0 146	<1.0 149	<1.0 149	<1.00 148	1.73	<1.00 146	<1.00 149	<1.0 130	<1.0 131	<1.0 139
Acidity and Alkalinity	Alkalinity, Carbonate (as CaCO3)	mg/L	3.4	<1.0	1.2	1.87	1.73	<1.00	3.40	1.8	<1.0	1.2
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0 149	<1.0 149	<1.0 150	<1.00 149	- 0.577	<1.00 149	<1.00 150	<1.0 132	<1.0 131	<1.0 140
	Alkalinity, Total (as CaCO3) Ammonia as N ⁵	mg/L mg/L	0.0068	<0.0050	<0.0050	0.00560	-	<0.00500	0.00680	0.032	0.026	0.092
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.0500	-	<0.0500	<0.0500	<0.050	<0.050	<0.050
	Chloride (CI) Fluoride (F) ⁷	mg/L mg/L	0.55 0.60	<0.50 0.59	0.52 0.62	0.523 0.601	0.0200 0.0152	<0.500 0.587	0.550 0.617	2.6 0.062	2.5 0.060	2.6 0.060
Aniono and Nethernt	Nitrate (as N) ²	mg/L	<0.0050	<0.0050	<0.0050	<0.00500	-	<0.00500	<0.00500	<0.0050	<0.0050	<0.000
Anions and Nutrients	Nitrite (as N) 6	mg/L	<0.0010	<0.0010	<0.0010	<0.00100	ı	<0.00100	<0.00100	<0.0010	<0.0010	<0.001
	Total Kjeldahl Nitrogen Orthophosphate-Dissolved (as P)	mg/L mg/L	0.24 <0.0010	0.20 0.0013	0.22 <0.0010	0.223 0.00110	0.0190	0.204 <0.00100	0.242 0.00130	0.94 <0.0010	0.93 <0.0010	0.86 <0.001
	Phosphorus (P)-Total	mg/L	0.017	0.0013	0.0060	0.00990	0.00616	0.00600	0.00130	0.012	0.0086	0.0043
	Sulphate (SO ₄) ^{2,7}	mg/L	21	21	22	21.1	0.436	20.8	21.6	3.2	3.1	3.6
Organic Carbon (Soil)	Dissolved Organic Carbon	mg/L	3.0	2.5	2.1	2.54	0.474	2.10	3.04	8.2	9.8	8.0
. ,	Total Organic Carbon Aluminum (Al)	mg/L mg/L	4.0 0.034	2.7 0.0071	2.1 0.0052	2.94 0.0153	0.961 0.0159	2.12 0.00520	4.00 0.0337	8.4 0.0049	10 0.0062	9.0
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.0001
	Arsenic (As) Barium (Ba)	mg/L mg/L	0.00043 0.056	0.00037 0.055	0.00037 0.051	0.000390 0.0541	0.0000346 0.00267	0.000370 0.0510	0.000430 0.0559	0.00046 0.20	0.00050 0.20	0.0005
	Beryllium (Be)	μg/L	<0.020	<0.020	<0.020	<0.0200	-	<0.0200	<0.0200	<0.020	<0.020	<0.020
	Bismuth (Bi)	mg/L	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.0000500 <0.0100	-	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.000050 <0.010	<0.000050 <0.010	<0.00008
	Boron (B) Cadmium (Cd)	mg/L μg/L	0.0081	<0.0050	<0.010	0.00603	-	<0.0100	0.00810	<0.010	<0.010	<0.010
	Calcium (Ca)	mg/L	38	38	36	37.3	0.929	36.2	37.9	26	27	29
	Chromium (Cr) ⁸ Cobalt (Co)	mg/L μg/L	0.00012 <0.10	<0.00010 <0.10	<0.00010 <0.10	0.000107 <0.100	-	<0.000100 <0.100	0.000120 <0.100	<0.00010 <0.10	<0.00010 <0.10	<0.0001
	Copper (Cu)	mg/L	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500	<0.000500	<0.00050	0.0018	<0.0005
	Iron (Fe)	mg/L	0.053	<0.010	<0.010	0.0243	-	<0.0100	0.0530	<0.010	<0.010	<0.010
	Lead (Pb) ' Lithium (Li)	mg/L mg/L	0.000088	0.000050	0.00050	0.0000627	0.000265	0.00300	0.0000880	0.000050	<0.000050 0.0016	0.0000
Total Metals	Magnesium (Mg) 7	mg/L	19	18	18	18.5	0.569	18.0	19.1	16	16	15
. J.ai Motalo	Manganese (Mn) Mercury (Hg) ⁹	mg/L μg/L	0.0048 <0.00050	0.0022 <0.00050	0.0026 <0.00050	0.00320 <0.000500	0.00136	0.00222	0.00475 <0.000500	0.0051 <0.00050	0.0064 <0.00050	0.0024 <0.0005
	Molybdenum (Mo)	mg/L	0.00030	0.0013	0.0012	0.00127	0.0000520	0.00124	0.000300	0.00034	0.00035	0.0003
	Nickel (Ni) 7	mg/L	<0.00050	<0.00050	<0.00050	<0.000500	- 0.0427	<0.000500	<0.000500	<0.00050	<0.00050	<0.0005
	Potassium (K) Selenium (Se)	mg/L μg/L	0.95 0.26	1.0 0.22	1.0 0.30	1.00 0.262	0.0437 0.0390	0.954 0.223	1.04 0.301	1.2 <0.050	1.3 <0.050	1.2 <0.050
	Silicon (Si)-Total	mg/L	2.5	2.4	2.8	2.54	0.193	2.37	2.75	1.2	1.2	2.3
	Silver (Ag) ³ Sodium (Na)	mg/L mg/L	<0.000010	<0.000010 1.8	<0.000010 1.9	<0.0000100 1.83	0.0361	<0.0000100 1.80	<0.0000100 1.87	<0.000010 4.0	<0.000010 4.1	<0.0000
	Strontium (Sr)	mg/L	0.13	0.13	0.13	0.130	0.00208	0.128	0.132	0.073	0.074	0.078
	Thallium (TI)	mg/L	<0.000010 <0.00010			<0.0000100 <0.000100	-		< 0.0000100			<0.0000
	Tin (Sn) Titanium (Ti)	mg/L mg/L	<0.00010	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.0001
	Uranium (U)	mg/L	0.00078	0.00080	0.00081	0.000800	0.0000157	0.000783	0.000814	0.00023	0.00024	0.00022
	Vanadium (V) Zinc (Zn) ⁷	mg/L mg/L	<0.00050 <0.0030	<0.00050 <0.0030	<0.00050 <0.0030	<0.000500 <0.00300	-	<0.000500 <0.00300	<0.000500 <0.00300	<0.00050 0.0039	<0.00050 <0.0030	<0.0005
	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	<0.00300	-	<0.00300	<0.00300	<0.0030	<0.0030	<0.0030
	Antimony (Sb) Arsenic (As)	mg/L mg/L	<0.00010 0.00042	<0.00010 0.00039	<0.00010 0.00033	<0.000100 0.000380	0.0000458	<0.000100 0.000330	<0.000100 0.000420	<0.00010 0.00052	<0.00010 0.00053	<0.0001
	Barium (Ba)	mg/L mg/L	0.00042	0.00039	0.00033	0.0609	0.000458	0.0569	0.0658	0.00052	0.00053	0.00048
	Beryllium (Be)	μg/L	<0.020	<0.020	<0.020	<0.0200	1	<0.0200	<0.0200	<0.020	<0.020	<0.020
	Bismuth (Bi) Boron (B)	mg/L mg/L	<0.000050 <0.010	<0.000050 <0.010	<0.000050 <0.010	<0.0000500 <0.0100	-	<0.0000500 <0.0100	<0.0000500 <0.0100	<0.000050 <0.010	<0.000050 <0.010	<0.00005
	Cadmium (Cd) 2,7	μg/L	<0.0050	<0.0050	<0.0050	<0.00500	1	<0.00500	<0.00500	<0.0050	<0.0050	<0.005
	Calcium (Ca) Chromium (Cr)	mg/L mg/L	36 <0.00010	40 <0.00010	36 <0.00010	36.9 <0.000100	2.25	35.6 <0.000100	39.5 <0.000100	27 <0.00010	27 <0.00010	28 <0.0001
	Cobalt (Co)	mg/L μg/L	<0.10	<0.10	<0.10	<0.100	-	<0.100	<0.100	<0.10	<0.10	<0.10
	Copper (Cu)	mg/L	<0.00050	<0.00050	<0.00050	<0.000500	-	<0.000500 <0.0100	<0.000500	<0.00050 <0.010	<0.00050	<0.0005
	Iron (Fe) Lead (Pb)	mg/L mg/L	<0.010 <0.00050	<0.010 <0.000050	<0.010 <0.00050	<0.0100 <0.0000500		<0.0100	<0.0100 <0.0000500	<0.010	<0.010 <0.00050	<0.0000
	Lithium (Ĺi)	mg/L	0.0030	0.0031	0.0029	0.00300	0.000100	0.00290	0.00310	0.0015	0.0016	0.0015
Dissolved Metals	Magnesium (Mg) Manganese (Mn)	mg/L mg/L	18 <0.00010	20 0.00021	19 <0.00010	18.7 0.000137	0.950	17.8 <0.000100	19.7 0.000210	16 0.00011	16 0.00017	16 <0.0001
	Mercury (Hg)	μg/L	<0.0000050	<0.000050	<0.0000050	<0.00000500	-	<0.00000500	<0.00000500	<0.0000050	<0.0000050	<0.00000
	Molybdenum (Mo) Nickel (Ni)	mg/L mg/L	0.0014 <0.00050	0.0013 <0.00050	0.0014 <0.00050	0.00134	0.0000666	0.00127 <0.000500	0.00140 <0.000500	0.00034 <0.00050	0.00041 <0.00050	0.0003 <0.0005
	Potassium (K)	mg/L	0.93	1.1	1.0	1.02	0.0902	0.930	1.11	1.3	1.3	1.2
	Selenium (Se)	μg/L	0.26 2.4	0.29	0.26	0.271	0.0163	0.260	0.290	<0.050 1.1	<0.050 1.2	<0.050 2.5
	Silicon (Si) Silver (Ag)	mg/L mg/L		2.2 <0.000010	2.5 <0.000010	2.38 < 0.0000100	0.133	2.23 <0.0000100	2.49 <0.0000100			
	Sodium (Na)	mg/L	1.7	1.8	1.8	1.76	0.0500	1.71	1.81	4.0	4.2	4.3
	Strontium (Sr) Thallium (TI)	mg/L mg/L	0.13 <0.000010	0.14 < 0.000010	0.13 <0.000010	0.133 <0.0000100	0.00361	0.130 <0.0000100	0.137 <0.0000100	0.071 <0.000010	0.076 <0.000010	0.084
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.000100	-	<0.000100	<0.000100	<0.00010	<0.00010	<0.0001
	Titanium (Ti)	mg/L	<0.010 0.00081	<0.010 0.00086	<0.010 0.00077	<0.0100 0.000813	0.0000460	<0.0100 0.000767	<0.0100 0.000859	<0.010 0.00026	<0.010 0.00024	<0.010 0.0002
	Uranium (U) Vanadium (V)	mg/L mg/L	<0.00081	<0.00086	<0.00077	<0.000813	0.0000460		<0.000859	<0.00026	<0.00024	< 0.00022
	Zinc (Zn)								<0.00100			

Value > GL Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014) ³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

 $^{^{\}rm 4}$ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness.

⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9\,}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L)$ was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the

nearest day.

12 Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units			LNLK					RG_STPD			
	Candinatinity Field		Mean	SD	Min	Max	7-May-19			27-May-19	3-Jun-19	Mean	SD
	Conductivity, Field Specific Conductivity, Field	μS/cm μS/cm	218 258	9.5 8.9	212 251	229 268	333 411	324 396	253 429	293 400	285 394	298 406	32 15
	Conductivity, Lab	μS/cm	259	9.71	251	270	414	387	427	407	409	409	14.5
	Hardness (as CaCO3)	mg/L	134	2.08	132	136	210	213	212	215	205	211	3.81
	pH, Field ³	pН	8.6	0.19	8.4	8.8	8.1	8.4	7.9	7.7	7.7	8.0	0.26
	pH, Lab	pH	8.28	0.0436	8.23	8.31	8.4	8.2	8.2	8.2	8.3	8.24	0.082
Physical Characteristics	Total Suspended Solids, Lab	mV mg/L	463 1.90	31.0 1.27	428 <1.00	486 3.30	453 1.8	440 1.6	402 <1.0	448 1.9	469 <1.0	442 1.46	24.9 0.15
	Total Dissolved Solids ²	mg/L	152	14.4	141	168	243	235	237	234	223	234	7.27
	Turbidity, Lab	NTU	1.14	0.791	0.330	1.91	3.4	1.1	0.88	0.75	0.90	1.42	1.13
	Dissolved Oxygen-Field 4	mg/L	9.4	0.42	8.9	9.8	13	13	6.4	9.3	7.1	9.8	3.1
	Dissolved Oxygen-Field	% °C	97 17	9.5	86	104	144	130	49	85	63	94	41 4.9
	Temperature-Field Acidity (as CaCO3)	mg/L	<1.00	2.6	14 <1.00	19 <1.00	15 <1.0	16 2.3	3.4 1.7	11 1.6	1.2	11 1.56	0.46
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	133	4.93	130	139	149	140	161	155	159	153	8.50
	Alkalinity, Carbonate (as CaCO3)	mg/L	1.33	0.400	<1.00	1.80	2.6	<1.0	<1.0	<1.0	3.2	1.76	0.33
	Alkalinity, Hydroxide (as CaCO3) Alkalinity, Total (as CaCO3)	mg/L mg/L	<1.00 134	4.93	<1.00 131	<1.00 140	<1.0 152	<1.0 140	<1.0 161	<1.0 155	<1.0 162	<1.00 154	8.86
	Ammonia as N ⁵	mg/L	0.0498	0.0364	0.0262	0.0917	0.018	<0.0050	0.014	<0.0050	0.019	0.0121	0.003
	Bromide (Br)	mg/L	<0.0500	-	<0.0500	<0.0500	<0.050	<0.050	<0.050	<0.050	<0.050	<0.0500	-
	Chloride (CI)	mg/L	2.60	0.0493	2.54	2.63	7.4	6.8	3.0	2.9	2.5	4.52	2.40
	Fluoride (F) ⁷ Nitrate (as N) ²	mg/L mg/L	0.0607 <0.00500	0.00115	0.0600 <0.00500	0.0620 <0.00500	0.13 0.30	0.13 0.13	0.17	0.16 0.60	0.17	0.152 0.508	0.018
Anions and Nutrients	Nitrite (as N) ⁶	mg/L	<0.00300	-	<0.00300	<0.00300	0.0055	0.0058	0.0041	0.0070	0.0055	0.00558	0.29
	Total Kjeldahl Nitrogen	mg/L	0.910	0.0418	0.862	0.938	0.21	0.16	0.17	0.31	0.38	0.246	0.094
	Orthophosphate-Dissolved (as P)	mg/L	<0.00100	-	<0.00100	<0.00100	<0.0010	<0.0010	0.0010	0.0015	<0.0010	0.00110	0.0002
	Phosphorus (P)-Total Sulphate (SO ₄) ^{2,7}	mg/L	0.00830	0.00386	0.00430	0.0120	0.012	0.011	0.0072	0.0082	0.0026	0.00808	0.003
	Dissolved Organic Carbon	mg/L mg/L	3.30 8.68	0.232 0.973	3.12 8.04	3.56 9.80	54 2.3	57 1.4	57 1.1	61 0.91	48 1.3	55.3 1.40	4.74 0.54
Organic Carbon (Soil)	Total Organic Carbon	mg/L	9.17	0.850	8.43	10.1	2.6	1.4	0.84	0.91	1.4	1.50	0.69
	Aluminum (Al)	mg/L	0.00573	0.000723	0.00490	0.00620	0.026	0.017	0.0035	0.013	0.0053	0.0128	0.009
	Antimony (Sb)	mg/L	<0.000100	-	<0.000100	<0.000100	0.00013	0.00015	<0.00010	0.00011	0.00010	0.000118	0.0000
	Arsenic (As) Barium (Ba)	mg/L mg/L	0.000493	0.0000306	0.000460 0.199	0.000520 0.206	0.00022 0.10	0.00020 0.087	0.00014 0.098	0.00017 0.096	0.00019	0.000184 0.0955	0.0000
	Beryllium (Be)	µg/L	<0.0200	-	<0.0200	<0.0200	<0.020	<0.020	<0.020	<0.020	<0.020	<0.0200	0.005
	Bismuth (Bi)	mg/L	<0.0000500	-	<0.0000500	<0.000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0000500	-
	Boron (B)	mg/L	<0.0100	-	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	-
	Cadmium (Cd) Calcium (Ca)	μg/L mg/L	<0.00500 27.4	1.82	<0.00500 25.9	<0.00500 29.4	0.0084 54	0.0061 52	0.0084 58	0.0074 54	0.015 57	0.00904 54.8	0.003
	Chromium (Cr) ⁸	mg/L	<0.000100	-	<0.000100		0.00025	0.00015	0.00019	0.00017	0.00030	0.000212	0.0000
	Cobalt (Co)	μg/L	<0.100	-	<0.100	<0.100	<0.10	<0.10	0.11	<0.10	<0.10	0.102	-
	Copper (Cu)	mg/L	0.000917	-	<0.000500	0.00175	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	- 0.04
	Iron (Fe) Lead (Pb) ⁷	mg/L mg/L	<0.0100 <0.0000500	-	<0.0100 <0.000500	<0.0100 <0.0000500	0.058 <0.000050	0.047 <0.000050	0.022	0.037 <0.000050	0.021	0.0370 <0.0000500	0.01
	Lithium (Li)	mg/L	0.00153	0.000115	0.00140	0.00160	0.0053	0.0057	0.0067	0.0062	0.0062	0.00602	0.000
Total Matala	Magnesium (Mg) ⁷	mg/L	15.7	0.351	15.4	16.1	18	19	18	18	15	17.7	1.44
	Manganese (Mn)	mg/L	0.00462	0.00204	0.00237	0.00636	0.0049	0.0037	0.0048	0.0047	0.0068	0.00496	0.001
	Mercury (Hg) 9	µg/L	<0.000500 0.000333	0.0000173	<0.000500	<0.000500 0.000348	<0.00050	<0.00050 0.00098	<0.00050 0.00091	<0.00050	<0.00050 0.00098	<0.000500 0.000948	0.0000
	Molybdenum (Mo) Nickel (Ni) ⁷	mg/L mg/L	<0.000500	-	0.000314 <0.000500	<0.000500	0.00088 0.00051	<0.00098	<0.00091	0.00099 <0.00050	<0.00098	0.000948	0.0000
	Potassium (K)	mg/L	1.22	0.0751	1.18	1.31	0.62	0.56	0.49	0.48	0.53	0.535	0.058
	Selenium (Se)	μg/L	<0.0500	-	<0.0500	<0.0500	5.4	5.3	7.0	6.3	5.7	5.93	0.70
	Silicon (Si)-Total	mg/L	1.56	0.648	1.15	2.31	0.54	0.29	1.9	1.1 <0.00010	1.9	1.14	0.74
	Silver (Ag) ³ Sodium (Na)	mg/L mg/L	<0.0000100 4.02	0.115	3.90	<0.0000100 4.13	<0.000010 5.5	<0.000010 5.3	<0.000010 3.5	3.3	<0.000010 2.9	<0.0000100 4.10	1.2
	Strontium (Sr)	mg/L	0.0749	0.00296	0.0729	0.0783	0.18	0.18	0.18	0.19	0.17	0.177	0.007
	Thallium (TI)	mg/L	<0.0000100			<0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000100	
	Tin (Sn) Titanium (Ti)	mg/L mg/L	<0.000100 <0.0100	-	<0.000100 <0.0100	<0.000100 <0.0100	<0.00010 <0.010	<0.00010 <0.010	<0.00010	<0.00010 <0.010	<0.00010	<0.000100	-
	Uranium (U)	mg/L	0.000232	0.0000115	0.000220	0.000243	0.00093	0.00094	0.00095	0.00093	0.00085	0.000920	0.0000
	Vanadium (V)	mg/L	<0.000500	-	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-
	Zinc (Zn) ⁷	mg/L	0.00330	-	<0.00300	0.00390	<0.0030	<0.0030	<0.0030	0.0038	<0.0030	0.00316	-
	Aluminum (AI) Antimony (Sb)	mg/L mg/L	<0.00300 <0.000100	-	<0.00300 <0.000100	<0.00300 <0.000100	<0.0030 0.00013	<0.0030 0.00013	<0.0030 <0.00010	<0.0030 <0.00010	<0.0030 <0.00010	<0.00300 0.000112	-
	Arsenic (As)	mg/L	0.000510	0.0000265	0.000480	0.000530	0.00021	0.00020	0.00014	0.00017	0.00014	0.000172	0.0000
	Barium (Ba)	mg/L	0.198	0.00874	0.191	0.208	0.10	0.094	0.10	0.093	0.088	0.0962	0.006
	Beryllium (Be) Bismuth (Bi)	μg/L mg/L	<0.0200 <0.0000500	-	<0.0200 <0.0000500	<0.0200 <0.000500	<0.020 <0.00050	<0.020 <0.00050	<0.020 <0.00050	<0.020 <0.00050	<0.020 <0.000050	<0.0200 <0.0000500	-
	Boron (B)	mg/L	<0.0000300	-	<0.0000300	<0.0000300	<0.010	<0.010	<0.000030	<0.010	<0.000030	<0.0000300	-
	Cadmium (Cd) ^{2,7}	μg/L	<0.00500	-	<0.00500	<0.00500	0.0060	<0.0050	0.0082	<0.0050	0.010	0.00692	0.002
	Calcium (Ca)	mg/L	27.5	0.709	26.9	28.3	55	54	57	55	56	55.3	1.1
	Chromium (Cr) Cobalt (Co)	mg/L μg/L	<0.000100 <0.100	-	<0.000100 <0.100	<0.000100 <0.100	0.00016 <0.10	0.00014 <0.10	0.00011 <0.10	0.00011 <0.10	0.00012 <0.10	0.000128 <0.100	0.0000
	Copper (Cu)	mg/L	<0.000500	-	<0.000500	<0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000500	-
	Iron (Fe)	mg/L	<0.0100	-	<0.0100	<0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0100	-
	Lead (Pb) Lithium (Li)	mg/L mg/L	<0.0000500 0.00153	0.0000577	<0.0000500 0.00150	<0.0000500 0.00160	<0.000050 0.0054	<0.000050 0.0053	<0.000050 0.0059	<0.000050 0.0057	<0.000050 0.0058	<0.0000500 0.00562	0.000
Dissolved Metals	Magnesium (Mg)	mg/L	15.9	0.208	15.7	16.1	18	19	17	19	16	17.7	1.3
Dissolved ivietals	Manganese (Mn)	mg/L	0.000127	0.0000400	<0.000100	0.000170	0.00015	0.00012	0.00011	<0.00010	0.00016	0.000128	0.0000
	Mercury (Hg) Molybdenum (Mo)	µg/L	<0.00000500 0.000375		<0.00000500 0.000343	<0.00000500 0.000414	<0.0000050 0.00088	<0.000050 0.00089	<0.000050 0.00090	<0.0000050 0.00087	<0.000050 0.00098	<0.00000500 0.000903	0.0000
	Nickel (Ni)	mg/L mg/L	<0.000375	- 0.0000359	<0.000343		<0.00088	<0.00089	<0.00090	<0.00087	0.00098	0.000903	0.0000
	Potassium (K)	mg/L	1.25	0.0458	1.20	1.29	0.62	0.55	0.48	0.47	0.52	0.526	0.06
	Selenium (Se)	μg/L	<0.0500	- 0.700	<0.0500	<0.0500	6.5	5.7	7.4	6.2	5.6	6.28	0.73
	Silicon (Si) Silver (Ag)	mg/L mg/L	1.60 <0.0000100	0.780	1.12 <0.000100	2.50 <0.0000100	0.47	0.21 <0.000010	1.9	1.0 < 0.000010	1.8	1.08 <0.0000100	0.75
	Sodium (Na)	mg/L mg/L	4.15	0.183	3.95	4.31	5.3	5.0	3.4	3.4	3.0	4.02	1.0
	Strontium (Sr)	mg/L	0.0773	0.00645	0.0714	0.0842	0.17	0.17	0.18	0.17	0.17	0.172	0.004
	Thallium (TI)	mg/L	<0.0000100			<0.0000100	<0.000010		<0.000010		<0.000010	<0.0000100	
	Tin (Sn) Titanium (Ti)	mg/L	<0.000100 <0.0100	-	<0.000100 <0.0100	<0.000100 <0.0100	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.00010 <0.010	<0.000100	-
	Uranium (TI)	mg/L mg/L		0.0000131	<0.0100 0.000239	<0.0100 0.000263	<0.010 0.00095	<0.010 0.0010	0.00084	<0.010 0.00083	<0.010 0.00080	<0.0100 0.000883	0.0000
	Vanadium (V)	mg/L	<0.000500	-	<0.000239		<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.000500	-
	Zinc (Zn)	mg/L				<0.00100		<0.0010	<0.0010	<0.0010	0.0017	0.00114	1

Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g.,

hardness), guidelines were screened using concurrent values. ² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness.

⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9\,}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L)$ was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the

nearest day. ¹² Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.1. Redside Shiner Supporting Selenium Toxicity Study Water Quality, May to June 2019

	Analyte	Units	RG_S	STPD
	-		Min	Max
	Conductivity, Field	μS/cm	253	333
	Specific Conductivity, Field	μS/cm	394	429
	Conductivity, Lab	μS/cm	387	427
	Hardness (as CaCO3)	mg/L	205	215
	pH, Field ³	рН	7.7	8.4
	pH, Lab	pН	8.15	8.35
Physical Characteristics	ORP, Lab	mV	402	469
nyonan onanaotomono	Total Suspended Solids, Lab	mg/L	<1.00	1.90
		_		
	Total Dissolved Solids 2	mg/L	223	243
	Turbidity, Lab	NTU	0.750	3.43
	Dissolved Oxygen-Field 4	mg/L	6.4	13
	Dissolved Oxygen-Field	%	49	144
	Temperature-Field	°C	3.4	16
	Acidity (as CaCO3)	mg/L	<1.00	2.30
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	140	161
Acidity and Alkalinity	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.00	3.20
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.00	<1.00
	Alkalinity, Total (as CaCO3)	mg/L	140	162
	Ammonia as N ⁵	mg/L	<0.00500	0.0192
	Bromide (Br)	mg/L	< 0.0500	<0.050
	Chloride (CI)	mg/L	2.45	7.44
	Fluoride (F) ⁷	mg/L	0.131	0.171
	Nitrate (as N) ²	-		
Anions and Nutrients	Nitrate (as N)	mg/L	0.134	0.868
	Nitrite (as N) 6	mg/L	0.00410	0.00700
	Total Kjeldahl Nitrogen	mg/L	0.160	0.375
	Orthophosphate-Dissolved (as P)	mg/L	<0.00100	0.00150
	Phosphorus (P)-Total	mg/L	0.00260	0.0116
	Sulphate (SO ₄) ^{2,7}	mg/L	48.2	60.9
<u> </u>	Dissolved Organic Carbon	mg/L	0.910	2.32
Organic Carbon (Soil)	Total Organic Carbon	mg/L	0.840	2.56
		·		
	Aluminum (Al)	mg/L	0.00350	0.0258
	Antimony (Sb)	mg/L	<0.000100	0.00015
	Arsenic (As)	mg/L	0.000140	0.00022
	Barium (Ba)	mg/L	0.0870	0.103
	Beryllium (Be)	μg/L	<0.0200	<0.0200
	Bismuth (Bi)	mg/L	<0.0000500	
	Boron (B)	mg/L	<0.0100	<0.0100
	Cadmium (Cd)	μg/L	0.00610	0.0149
	Calcium (Ca)	mg/L	51.8	57.5
	Chromium (Cr) ⁸	mg/L	0.000150	0.00030
	Cobalt (Co)	μg/L	<0.100	0.110
	Copper (Cu)	mg/L	<0.000500	<0.00050
	Iron (Fe)	mg/L	0.0210	0.0580
	Lead (Pb) ⁷		<0.0000500	
	Lithium (Li)	mg/L	0.00530	0.00670
Total Metals	Magnesium (Mg) 7	mg/L	15.2	18.9
Total Motalo	Manganese (Mn)	mg/L	0.00372	0.00676
	Mercury (Hg) 9	μg/L	<0.000500	<0.00050
	Molybdenum (Mo)	mg/L	0.000884	0.00098
	Nickel (Ni) 7	mg/L	<0.000500	0.00051
	Potassium (K)	mg/L	0.476	0.620
	Selenium (Se)	μg/L	5.25	6.98
	Silicon (Si)-Total	mg/L	0.290	1.91
	Silver (Ag) 3		<0.0000100	<0.00001
	Sodium (Na)	mg/L	2.91	5.52
	Strontium (Sr)	mg/L	0.166	0.187
	Thallium (TI)	mg/L	<0.0000100	
	Tin (Sn)		<0.000100	
	Titanium (Ti)	mg/L mg/L		<0.00010
	Uranium (U)	mg/L	0.000854	0.00094
	Vanadium (V)	mg/L	<0.000854	
	Zinc (Zn) ⁷	mg/L	<0.00300	0.00380
	Aluminum (Al)	mg/L	<0.00300	<0.0030
	Antimony (Sb)	mg/L	<0.000100	0.00013
	Arsenic (As)	mg/L	0.000140	0.00021
	Barium (Ba)	mg/L	0.0879	0.103
	Beryllium (Be)	μg/L	<0.0200	<0.0200
	Bismuth (Bi)	mg/L	<0.0000500	
	Boron (B)	mg/L	<0.0100	<0.0100
	Cadmium (Cd) 2,7	μg/L	<0.00500	0.0104
	Calcium (Ca)	mg/L	54.0	56.7
	Chromium (Cr)	mg/L		0.00016
	Cobalt (Co)	μg/L	<0.100	<0.100
	Copper (Cu)	mg/L	<0.000500	
	Iron (Fe)	mg/L	<0.0100	<0.0100
	Lead (Pb)	mg/L	<0.0000500	
	Lithium (Li)	mg/L	0.00530	0.00590
Dissolved Metals	Magnesium (Mg)	mg/L	15.8	19.1
2.0001700 Micials	Manganese (Mn)	mg/L	<0.000100	
	Mercury (Hg)	μg/L	<0.00000500	<0.000000
	Molybdenum (Mo)	mg/L	0.000867	0.00098
	Nickel (Ni)	mg/L	<0.000500	0.00057
	Potassium (K)	mg/L	0.470	0.618
	Selenium (Se)	μg/L	5.64	7.41
	Silicon (Si)	mg/L	0.211	1.86
		mg/L	<0.000100	
	ISilver (Aa)		2.95	5.31
	Silver (Ag) Sodium (Na)	[[[(1/1		
	Sodium (Na)	mg/L mg/L	0 167	() 1/4
	Sodium (Na) Strontium (Sr)	mg/L	0.167 <0.000100	0.179
	Sodium (Na) Strontium (Sr) Thallium (TI)	mg/L mg/L	<0.0000100	<0.00001
	Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn)	mg/L mg/L mg/L	<0.000100 <0.000100	<0.00001 <0.00010
	Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Titanium (Ti)	mg/L mg/L mg/L mg/L	<0.0000100 <0.000100 <0.0100	<0.00001 <0.00010 <0.0100
	Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Titanium (Ti) Uranium (U)	mg/L mg/L mg/L mg/L mg/L	<0.0000100 <0.000100 <0.0100 0.000800	<0.00001 <0.00010 <0.0100 0.00099
	Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Titanium (Ti)	mg/L mg/L mg/L mg/L mg/L	<0.0000100 <0.000100 <0.0100 0.000800	<0.00001 <0.00010 <0.0100

Value < LRL and LRL > GL

¹ Unless otherwise noted, British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life were used. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

² When appropriate, site specific benchmarks were applied instead of BC water quality guidelines (Teck 2014)

³ Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

⁴ Unrestricted change permitted within this pH range.

 $^{^{\}rm 5}$ Temperature and pH dependent; range of minimum and maximum values.

⁶ Dependent on concurrent chloride, range of values reported (BCMOE 2017)

⁷ For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable

hardness, then guidelines were determined using the maximum applicable hardness. ⁸ Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

 $^{^9}$ A conservative guideline assuming 8% of total mercury is methyl-mercury (0.00125 $\mu g/L$) was applied.

¹⁰ In situ field measures were collected at RG_GO13 as part of the Lentic Area Supporting Study on May 13 and 16, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the nearest day.

¹¹ In situ field measures were collected at RG_GRLK as part of the Lentic Area Supporting Study on May 14, 2019. Missing temperature and field pH for guideline screening were substituted with data collected on the

nearest day.

12 Guidelines based on other concurrent water chemistry values and derived from the BC Biotic Ligand Model (BLM) (BCMOE 2019).

Table D.2: Water Chemistry Laboratory Reporting Limit (LRL) Evaluation Relative to Guidelines

Parameter	Units	Quality G	ımbia Water uidelines ^a	Maximum LRL
Anions, Organics, Nutrients, and Physic	al Properties	30-Day	Maximum	
Conductivity (@ 25C)	uS/cm	-	-	2.0
ardness (as CaCO3) otal Suspended Solids	mg/L mg/L	-	-	0.50 1.0
otal Dissolved Solids	mg/L	<u>-</u>	-	20
urbidity	NŤU	-	-	0.10
cidity (as CaCO3) Ikalinity, Bicarbonate (as CaCO3)	mg/L	-	-	1.0
lkalinity, Carbonate (as CaCO3)	mg/L mg/L	- -	-	1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	1.0
Alkalinity, Total (as CaCO3)	mg/L	>20	-	1.0
Ammonia as N ^D Bromide (Br)	mg/L mg/L	0.102	0.752	0.0050 0.25
Chloride (CI)	mg/L	<u>-</u> 150	600	2.5
luoride (F)	mg/L	-	1.7	0.10
litrate (as N) litrite (as N)	mg/L	3.0	32.8	0.025
otal Kjeldahl Nitrogen	mg/L mg/L	0.2	0.6	0.0050 0.050
Orthophosphate-Dissolved (as P)	mg/L	=	-	0.0010
Phosphorus (P)-Total	mg/L	-	.5	0.01
Sulfate (SO4) Dissolved Organic Carbon	mg/L mg/L	-	429	1.5 0.50
otal Organic Carbon	mg/L	<u>-</u>	-	0.50
otal Metals				
luminum (AI)-Total Intimony (Sb)-Total	mg/L mg/L	0.009	-	0.0030 0.00010
Arsenic (As)-Total	mg/L	0.009	0.0050	0.00010
Barium (Ba)-Total	mg/L	1	-	0.000
Beryllium (Be)-Total Bismuth (Bi)-Total	ug/L mg/L	0.13	-	0.020 0.000
Boron (B)-Total	mg/L	1.2	-	0.000
Cadmium (Cd)-Total	ug/L	-	-	0.005
Calcium (Ca)-Total Chromium (Cr)-Total [©]	mg/L mg/L	- 0.0010	-	0.050 0.00
Cobalt (Co)-Total	mg/L ug/L	0.0010 4	- 110	0.00
Copper (Cu)-Total	mg/L	-	-	0.001
ron (Fe)-Total .ead (Pb)-Total ^u	mg/L mg/L	- 0.0057	1	0.010 0.0001
ithium (Li)-Total	mg/L	0.0057	0.061	0.0001
//agnesium (Mg)-Total	mg/L	-	-	0.10
//anganese (Mn)-Total ^d	mg/L	0.96	1.4	0.0001
Лercury (Hg)-Total	μg/L	0.01		0.0005
Molybdenum (Mo)-Total	mg/L	1	2	0.0001
Vickel (Ni)-Total Potassium (K)-Total	μg/L mg/L	80	-	0.001 0.050
Selenium (Se)-Total	ug/L	2	-	0.05
Silicon (Si)-Total	mg/L	-	<u>-</u>	0.10
Silver (Ag)-Total ^d	mg/L	0.00005	0.0001	0.00001
Sodium (Na)-Total	mg/L	-	-	0.050
Strontium (Sr)-Total	mg/L	-	-	0.0002
hallium (TI)-Total	mg/L	=	-	0.00001
in (Sn)-Total	mg/L	-	-	0.000
itanium (Ti)-Total Jranium (U)-Total	mg/L	-	-	0.010 0.0000
/anadium (V)-Total	mg/L mg/L	-	-	0.0005
inc (Zn)-Total ^d	mg/L	0.0075	0.033	0.0003
Dissolved Metals	g/ _	0.00.0	0.000	0.0000
Aluminum (AI)-Dissolved ^f	mg/L	0.05	0.1	0.0030
antimony (Sb)-Dissolved	mg/L	-	-	0.00010
rsenic (As)-Dissolved	mg/L	-	-	0.00010
Barium (Ba)-Dissolved	mg/L	-	-	0.000
Reryllium (Be)-Dissolved	ug/L	-	-	0.020
sismuth (Bi)-Dissolved Foron (B)-Dissolved	mg/L mg/L	-	-	0.000
Cadmium (Cd)-Dissolved d	ug/L	0.18	0.47	0.010
Calcium (Ca)-Dissolved	mg/L	-	-	0.050
Chromium (Cr)-Dissolved	mg/L	-	-	0.00
Cobalt (Co)-Dissolved	ug/L	-	-	0.10
Copper (Cu)-Dissolved ^g	mg/L	0.0002	0.012	0.0005
ron (Fe)-Dissolved	mg/L	-	0.35	0.010
ead (Pb)-Dissolved	mg/L	-	-	0.0001
ithium (Li)-Dissolved Magnesium (Mg)-Dissolved	mg/L mg/L	-	-	0.00
Manganese (Mn)-Dissolved	mg/L	<u> </u>	-	0.00010
lercury (Hg)-Dissolved	mg/L	<u> </u>	-	0.00010
folybdenum (Mo)-Dissolved	mg/L	-	-	0.00005
lickel (Ni)-Dissolved	mg/L	-	-	0.001
otassium (K)-Dissolved	mg/L	-	-	0.050
elenium (Se)-Dissolved	ug/L	-	-	0.050
silicon (Si)-Dissolved	mg/L	-	-	0.050
ilver (Ag)-Dissolved	mg/L	-	-	0.000
odium (Na)-Dissolved	mg/L	-	-	0.050
trontium (Sr)-Dissolved hallium (TI)-Dissolved	mg/L	-	-	0.00020 0.00001
in (Sn)-Dissolved	mg/L mg/L	-	-	0.0001
itanium (Ti)-Dissolved	mg/L	-	-	0.000
ranium (U)-Dissolved	mg/L	<u>-</u>	-	0.00001
/anadium (V)-Dissolved	mg/L	-	-	0.0005
linc (Zn)-Dissolved	mg/L	-	-	0.0010

Shading indicates a concentration greater than the lowest guideline.

^a British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCMOE 2018, 2019).

^b Based on most conservative guideline using highest temperature (20) and pH (9).

^c Minimum water quality guidelines for Nitrite (as N) reported in BCMOE (2018) for chloride concentrations < 2 mg/L.

 $^{^{\}rm d}$ Hardness-based guidelines calculated using the minimum hardness observed for all samples (79.7 mg/L).

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

^fBased on guidline considering a median pH >6.5. Median field pH was >6.5.

⁹ Copper GLs were calculated using the BC Biotic Ligand Model Software (BLM) (BCMOE 2019).

Field Data

Table D.3: Field Duplicate Results for Water Chemistry, Elk Valley, May 2019

Parameter		RG_GRLK	RG_DUP		RG_ER	RG_DUP		RG_EROL	RG_DUP	
	Units			RPD (%)		_	RPD (%)			RPD (%)
Date Time		7-May-2019 13:00	7-May-2019 13:00	(/0)	7-May-19 11:55	7-May-19 11:55	(70)	13-May-19 13:56	13-May-19 13:56	(/0)
Physical Tests (Water)										
Conductivity (@ 25C)	uS/cm	315	314	0.32	293	293	0	420	419	0.24
Hardness (as CaCO3) pH, lab	mg/L pH	162 8.39	176 8.39	8.3 0	138 8.28	139 8.21	0.72 0.85	234 8.16	228 8.15	2.6 0.12
ORP, lab	mV	452	446	1.3	474	439	7.7	432	408	5.7
Total Suspended Solids Total Dissolved Solids	mg/L mg/L	15 178	9.3 176	47 1.1	11.1 175	17 175	42 0	1.1 230	236	9.5 2.6
Turbidity	NŤU	2.46	2.78	12	11.2	10.3	8.4	0.44	0.64	37
Anions and Nutrients (Water) Acidity (as CaCO3)	mg/L	<1.0	<1.0	-	1	4.3	125	4.6	5.4	16
Alkalinity, Bicarbonate (as CaCO3)	mg/L	146	143	2.1	109	111	1.8	196	194	1.0
Alkalinity, Carbonate (as CaCO3) Alkalinity, Hydroxide (as CaCO3)	mg/L mg/L	3.4 <1.0	3.4 <1.0	0 -	<1.0 <1.0	<1.0 <1.0	-	<1.0 <1.0	<1.0 <1.0	-
Alkalinity, Total (as CaCO3)	mg/L	149	146	2.0	109	111	1.8	196	194	1.0
Ammonia as N	mg/L	0.0068	0.005	31	0.005	0.0083	50	<0.0050	<0.0050	-
Bromide (Br) Chloride (Cl)	mg/L mg/L	<0.050 0.55	<0.050 0.51	- 7.5	<0.050 4.15	<0.050 4.15	- 0	<0.050 4.27	<0.050 4.28	0.23
Fluoride (F)	mg/L	0.598	0.565	5.7	0.087	0.096	9.8	0.125	0.125	0
Nitrate (as N) Nitrite (as N)	mg/L mg/L	<0.0050 <0.0010	<0.0050 <0.0010	-	0.184 0.001	0.181 0.0013	1.6 26	0.291 0.0016	0.29 0.0016	0.34 0
Total Kjeldahl Nitrogen	mg/L	0.242	0.234	3.4	0.113	0.147	26	0.093	0.079	16
Orthophosphate-Dissolved (as P) Phosphorus (P)-Total	mg/L mg/L	<0.0010 0.017	<0.0010 0.0193	- 13	0.001 0.0163	0.0015 0.0177	40 8.2	<0.0010 0.0034	<0.0010 0.0046	30
Sulfate (SO4)	mg/L	20.9	20.9	0	33.1	33	0.30	28	28	0
Organic / Inorganic Carbon (Water)	ma/l	3.04	3.93	26	2.05	2 22	12	0.81	0.6	30
Dissolved Organic Carbon Total Organic Carbon	mg/L mg/L	3.04	5.37	26	2.05 2.65	2.33 2.54	13 4.2	0.81	0.6	12
Total Metals (Water)		0.0007								
Aluminum (AI)-Total Antimony (Sb)-Total	mg/L mg/L	0.0337 <0.00010	0.0265 <0.00010	24 -	0.192 <0.00010	0.143 <0.00010	29 -	0.011 <0.00010	0.0081 <0.00010	30
Arsenic (As)-Total	mg/L	0.00043	0.00039	9.8	0.0005	0.00048	4.1	0.00014	0.00012	15
Barium (Ba)-Total Beryllium (Be)-Total	mg/L ug/L	0.0559 <0.020	0.0561 <0.020	0.36	0.0433 <0.020	0.0441 <0.020	1.8	0.106 <0.020	0.105 <0.020	0.95
Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron (B)-Total Cadmium (Cd)-Total	mg/L ug/L	<0.010 0.0081	<0.010 0.0057	- 35	<0.010 0.0141	<0.010 0.011	- 25	<0.010 0.0112	<0.010 0.0125	- 11
Calcium (Ca)-Total	mg/L	37.9	37.8	0.26	38.6	38.3	0.78	62.8	63.4	1.0
Chromium (Cr)-Total	mg/L	0.00012	0.0001	18	0.00036	0.00029	22	0.00017	0.00016	6.1
Cobalt (Co)-Total Copper (Cu)-Total	ug/L mg/L	<0.10 <0.00050	<0.10 <0.00050	-	0.18 0.00062	0.15 0.00055	18 12	<0.10 <0.00050	<0.10 <0.00050	-
Iron (Fe)-Total	mg/L	0.053	0.043	21	0.292	0.228	25	0.04	0.035	13
Lead (Pb)-Total Lithium (Li)-Total	mg/L mg/L	0.000088 0.003	0.00007 0.0029	23 3.4	0.000352 0.0021	0.000298 0.0021	17 0	<0.000050 0.0051	<0.00050 0.005	2.0
Magnesium (Mg)-Total	mg/L	19.1	18.9	1.1	11.9	12.4	4.1	16	16.2	1.2
Manganese (Mn)-Total Mercury (Hg)-Total	mg/L ug/L	0.00475 <0.00050	0.0042 <0.00050	12	0.0187 0.00101	0.0177 0.00094	5.5 7.2	0.00521 <0.00050	0.00512 <0.00050	1.7
Molybdenum (Mo)-Total	mg/L	0.00124	0.00126	1.6	0.000599	0.000608	1.5	0.000738	0.000737	0.14
Nickel (Ni)-Total Potassium (K)-Total	mg/L mg/L	<0.00050 0.954	<0.00050 0.947	0.74	<0.00050 0.62	<0.00050 0.634	2.2	<0.00050 0.609	<0.00050 0.589	3.3
Selenium (Se)-Total	ug/L	0.263	0.328	22	0.631	0.631	0	2.9	2.91	0.34
Silicon (Si)-Total	mg/L	2.5	2.48	0.80	2.63	2.55	3.1	2.19	2.21	0.91
Silver (Ag)-Total Sodium (Na)-Total	mg/L mg/L	<0.000010 1.82	<0.000010 1.77	2.8	<0.000010 4.98	<0.000010 4.98	- 0	<0.000010 3.64	<0.000010 3.64	- 0
Strontium (Sr)-Total	mg/L	0.132	0.131	0.76	0.147	0.147	0	0.174	0.173	0.58
Thallium (TI)-Total Tin (Sn)-Total	mg/L mg/L	<0.000010 <0.00010	<0.000010 <0.00010	-	<0.000010 <0.00010	<0.000010 <0.00010	-	<0.000010 <0.00010	<0.00010 <0.00010	-
Titanium (Ti)-Total	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Uranium (U)-Total Vanadium (V)-Total	mg/L mg/L	0.000783 <0.00050	0.0008 <0.00050	2.1	0.000707 <0.00050	0.000718 <0.00050	1.5 -	0.000651 <0.00050	0.000658 <0.00050	1.1
Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	•	0.0124	0.003	122	<0.0030	<0.0030	-
Dissolved Metals (Water) Aluminum (AI)-Dissolved	ma/l	<0.0030	<0.0030	-	0.0052	0.0053	1.9	<0.0030	<0.0030	-
Antimony (Sb)-Dissolved	mg/L mg/L	<0.0030	<0.0030	-	<0.00010	<0.00010	-	<0.0030	<0.0030	-
Arsenic (As)-Dissolved	mg/L	0.00042	0.00045	6.9	0.0004	0.00043	7.2	0.00014	0.00013	7.4
Barium (Ba)-Dissolved Beryllium (Be)-Dissolved	mg/L ug/L	0.0569 <0.020	0.0586 <0.020	2.9	0.0414 <0.020	0.0423 <0.020	2.2	0.114 <0.020	0.114 <0.020	-
Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron (B)-Dissolved Cadmium (Cd)-Dissolved	mg/L ug/L	<0.010 <0.0050	<0.010 <0.0050	-	<0.010 <0.0050	<0.010 <0.0050	-	<0.010 0.0109	<0.010 0.0095	- 14
Calcium (Ca)-Dissolved	mg/L	35.6	38.4	7.6	37.2	36.6	1.6	66.8	64.5	3.5
Chromium (Cr)-Dissolved Cobalt (Co)-Dissolved	mg/L ug/L	<0.00010 <0.10	<0.00010 <0.10	-	0.0001 <0.10	0.0001 <0.10	0	0.00011 <0.10	0.00011 <0.10	0
Copper (Cu)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Lead (Pb)-Dissolved Lithium (Li)-Dissolved	mg/L mg/L	<0.000050 0.003	<0.000050 0.0031	3.3	<0.000050 0.0019	<0.000050 0.002	- 5.1	<0.000050 0.0048	<0.000050 0.0047	2.1
Magnesium (Mg)-Dissolved	mg/L	17.8	19.3	8.1	11	11.7	6.2	16.4	16.3	0.61
Manganese (Mn)-Dissolved Mercury (Hg)-Dissolved	mg/L mg/L	<0.00010 <0.000050	<0.00010 <0.000050	-	0.00019 <0.0000050	0.00024 <0.0000050	23	0.00301 <0.0000050	0.00283 <0.0000050	6.2
Molybdenum (Mo)-Dissolved	mg/L	0.00136	0.0013	4.5	0.000623	0.000657	5.3	0.000657	0.000638	2.9
Nickel (Ni)-Dissolved Potassium (K)-Dissolved	mg/L mg/L	<0.00050 0.93	<0.00050 0.979	- 5.1	<0.00050 0.556	<0.00050 0.595	6.8	<0.00050 0.604	<0.00050 0.601	0.50
Selenium (Se)-Dissolved	ug/L	0.264 2.41	0.262 2.5	0.76	0.709 2.25	0.671	5.5	3.36 2.25	3.39 2.2	0.89 2.2
Silicon (Si)-Dissolved Silver (Ag)-Dissolved	mg/L mg/L	<0.000010	<0.000010	3.7 -	<0.000010	2.31 <0.000010	2.6	<0.000010	<0.000010	-
Sodium (Na)-Dissolved Strontium (Sr)-Dissolved	mg/L	1.71 0.132	1.81 0.131	5.7 0.76	4.57 0.141	4.84 0.146	5.7 3.5	3.76 0.174	3.65 0.171	3.0 1.7
Thallium (TI)-Dissolved	mg/L mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	3.5	<0.000010	<0.000010	1./
Tin (Sn)-Dissolved Titanium (Ti)-Dissolved	mg/L	<0.00010 <0.010	<0.00010 <0.010	-	<0.00010 <0.010	<0.00010 <0.010	-	<0.00010 <0.010	<0.00010 <0.010	-
Uranium (U)-Dissolved	mg/L mg/L	0.000814	0.000807	0.86	0.000721	0.000756	4.7	0.000695	0.000707	1.7
Vanadium (V)-Dissolved Zinc (Zn)-Dissolved	mg/L mg/L	<0.00050 <0.0010	<0.00050 <0.0010	-	<0.00050 <0.0010	<0.00050 <0.0010	-	<0.00050 <0.0010	<0.00050 <0.0010	-
LIIIO (LII)-DI330IVGU	my/L	~U.UU IU	-U.UU IU	-	\ U.UU.IU	٠U.UU.U	-	NO.0010	~U.UUIU	-

Notes: RPD was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL.

Data were reported as <LRL, and the LRL is reported in the table.

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

Table D.3: Field Duplicate Results for Water Chemistry, Elk Valley, May 2019

Parameter		RG_ER	RG_DUP	RPD	RG_EROL	RG_DUP	RPD
Date	Units	21-May-19	21-May-19	(%)	27-May-19	27-May-19	(%)
Time		10:26	10:26		15:30	15:45	
Physical Tests (Water)	C/a-ra	204	252	40	204	400	4.0
Conductivity (@ 25C) Hardness (as CaCO3)	uS/cm mg/L	304 128	253 120	18 6.5	384 213	403 210	4.8 1.4
oH, lab	pH	8.23	8.16	0.85	8.3	8.34	0.48
ORP, lab	mV	442	425	3.9	396	383	3.3
Total Suspended Solids Total Dissolved Solids	mg/L	23.4 165	19.3 134	19 21	<u> </u>	1.1 229	9.5 7.2
Turbidity	mg/L NTU	17.3	11.9	37	0.31	0.29	6.7
Anions and Nutrients (Water)	111.0	17.0	11.0	0.1	0.01	0.20	0.1
Acidity (as CaCO3)	mg/L	1	1.2	18	2.2	2.3	4.4
Alkalinity, Bicarbonate (as CaCO3) Alkalinity, Carbonate (as CaCO3)	mg/L	142 <1.0	115 <1.0	21	191 1	179 2	6.5 67
Alkalinity, Hydroxide (as CaCO3)	mg/L mg/L	<1.0	<1.0	-	<1.0	<1.0	-
Alkalinity, Total (as CaCO3)	mg/L	142	115	21	191	181	5.4
Ammonia as N	mg/L	0.005	0.0063	23	0.0903	0.0057	176
Bromide (Br) Chloride (CI)	mg/L mg/L	<0.050 3.18	<0.050 2.23	35	<0.050 2.74	<0.050 3.69	30
Fluoride (F)	mg/L	0.091	0.082	10	0.1	0.121	19
Nitrate (as N)	mg/L	0.269	0.316	16	0.2	0.312	44
Nitrite (as N)	mg/L	<0.0010	<0.0010	-	0.0012	0.0015	22
Total Kjeldahl Nitrogen Orthophosphate-Dissolved (as P)	mg/L mg/L	0.118 0.007	0.101 0.0035	16 67	0.146 <0.0010	0.087 <0.0010	51 -
Phosphorus (P)-Total	mg/L	0.007	0.0033	31	0.0078	0.0044	56
Sulfate (SO4)	mg/L	16.5	17.9	8.1	17.6	30.4	53
Organic / Inorganic Carbon (Water)		1.0=	1.05		2.52	0.70	
Dissolved Organic Carbon Fotal Organic Carbon	mg/L mg/L	1.95 2.25	1.92 2.17	1.6 3.6	0.56 0.69	0.72 0.78	25 12
Total Metals (Water)	mg/L	2.20	£.11	5.5	0.00	0.10	12
Aluminum (AI)-Total	mg/L	0.273	0.452	49	0.0081	0.0032	87
Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	- 5.2	<0.00010	<0.00010	-
Arsenic (As)-Total Barium (Ba)-Total	mg/L mg/L	0.00055 0.0542	0.00058 0.0514	5.3 5.3	0.00014 0.108	0.00014 0.107	0.93
Beryllium (Be)-Total	ug/L	0.0342	0.025	22	<0.020	<0.020	- 0.93
Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Boron (B)-Total	mg/L	<0.010	<0.010	-	<0.010	<0.010	- 0.4
Cadmium (Cd)-Total Calcium (Ca)-Total	ug/L mg/L	0.0127 34.9	0.0131 34.2	3.1 2.0	0.0091 62.4	0.0088 58.4	3.4 6.6
Chromium (Cr)-Total	mg/L	0.00042	0.00066	44	0.00028	0.00025	11
Cobalt (Co)-Total	ug/L	0.2	0.31	43	<0.10	<0.10	-
Copper (Cu)-Total	mg/L	0.00097	0.00121	22	<0.00050	<0.00050	-
ron (Fe)-Total .ead (Pb)-Total	mg/L mg/L	0.314 0.000376	0.563 0.000623	57 49	0.025 <0.000050	0.02 <0.00050	22
Lithium (Li)-Total	mg/L	0.0024	0.0025	4.1	0.0039	0.004	2.5
Magnesium (Mg)-Total	mg/L	12.5	11.8	5.8	15.2	15.1	0.66
Manganese (Mn)-Total	mg/L	0.0145 0.00101	0.0219 0.00147	41 37	0.00437 <0.00050	0.00384 <0.00050	13
Mercury (Hg)-Total Molybdenum (Mo)-Total	ug/L mg/L	0.00101	0.00147	10	0.000614	0.000619	0.81
Nickel (Ni)-Total	mg/L	0.0005	0.00073	37	<0.00050	<0.00050	-
Potassium (K)-Total	mg/L	0.887	0.832	6.4	0.534	0.534	0
Selenium (Se)-Total Silicon (Si)-Total	ug/L mg/L	0.955 3.53	0.988 3.55	3.4 0.56	2.52 2.24	2.68 2.24	6.2 0
Silver (Ag)-Total	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium (Na)-Total	mg/L	3.97	3.36	17	3.2	3.14	1.9
Strontium (Sr)-Total	mg/L	0.121	0.118	2.5	0.133	0.15	12
Thallium (TI)-Total Tin (Sn)-Total	mg/L mg/L	<0.000010 <0.00010	<0.00010 <0.00010	-	<0.000010 <0.00010	<0.00010 <0.00010	
itanium (Ti)-Total	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
Jranium (U)-Total	mg/L	0.001	0.000925	7.8	0.000514	0.000547	6.2
/anadium (V)-Total	mg/L	0.00071	0.0009	24	<0.00050	<0.00050	-
Zinc (Zn)-Total Dissolved Metals (Water)	mg/L	0.0045	0.0046	2.2	0.0059	0.003	65
Aluminum (Al)-Dissolved	mg/L	0.01	0.0103	3.0	<0.0030	<0.0030	-
Antimony (Sb)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)-Dissolved Barium (Ba)-Dissolved	mg/L	0.0004 0.0541	0.0004 0.0504	7.1	0.00015 0.102	0.00014 0.101	6.9 1.0
Beryllium (Be)-Dissolved	mg/L ug/L	<0.0541	<0.020	- 7.1	<0.020	<0.020	1.0
sismuth (Bi)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-
foron (B)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
cadmium (Cd)-Dissolved calcium (Ca)-Dissolved	ug/L mg/l	<0.0050 31.7	<0.0050 29.7	6.5	0.0071 61	0.0086 61	19 0
Chromium (Cr)-Dissolved	mg/L mg/L	<0.00010	<0.00010	6.5	0.00024	0.00022	8.7
Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	-	<0.10	<0.10	-
copper (Cu)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-
on (Fe)-Dissolved ead (Pb)-Dissolved	mg/L mg/L	<0.010 <0.00050	<0.010 <0.00050	-	<0.010 <0.00050	<0.010 <0.00050	<u>-</u>
ithium (Li)-Dissolved	mg/L	0.0017	0.0016	6.1	0.0038	0.004	5.1
lagnesium (Mg)-Dissolved	mg/L	11.9	11.2	6.1	14.7	14	4.9
langanese (Mn)-Dissolved lercury (Hg)-Dissolved	mg/L	0.00285 <0.0000050	0.00225	24	0.00318	0.00252	23
lercury (Hg)-Dissolved lolybdenum (Mo)-Dissolved	mg/L mg/L	<0.0000050 0.000553	<0.0000050 0.000533	3.7	<0.000050 0.000583	<0.000050 0.000586	0.51
lickel (Ni)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Potassium (K)-Dissolved	mg/L	0.746	0.685	8.5	0.509	0.498	2.2
elenium (Se)-Dissolved ilicon (Si)-Dissolved	ug/L mg/L	0.999 2.87	1.02 2.7	2.1 6.1	2.25 2.28	2.49 2.23	10 2.2
ilver (Ag)-Dissolved	mg/L	<0.000010	<0.00010	-	<0.000010	<0.000010	-
odium (Na)-Dissolved	mg/L	3.7	3.36	9.6	3.03	3.14	3.6
trontium (Sr)-Dissolved hallium (TI)-Dissolved	mg/L mg/L	0.114 <0.000010	0.108 <0.000010	5.4	0.132 <0.000010	0.14 <0.00010	5.9
in (Sn)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	
itanium (Ti)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
ranium (U)-Dissolved anadium (V)-Dissolved	mg/L mg/L	0.000883 <0.00050	0.000826 <0.00050	6.7	0.000504 <0.00050	0.000561 <0.00050	11
anaulum (v /-DISSUIVCU	mg/L mg/L	0.00050	0.00050	17	0.0011	0.001	9.5

Notes: RPD was calculated using < Laboratory Reporting Limit (LRL) results at the LRL if one result in a duplicate pair was below the LRL. RPD was not calculated if both results were < LRL.

Data were reported as <LRL, and the LRL is reported in the table.

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

Table D.4: Angling Catch and Catch-Per-Unit-Effort, May 2019

Area Type	Area Description	Area Code	Net ID	UT (NAD83, 2	Zone 11U)	Date	Start Time	End Time	Fishing Hours	Effort (Fishing Days)	Total Catch	Female Catch	Male Catch		Sacrificed	CPUE [®]
			LNLK-AN-01	638585	5442223	10-May-19	14:28	15:30	1.03	0.04	15	6	9	0	0	15
Reference	Loon Lake	RG LNLK	LNLK-AN-02	638569	5442211	11-May-19	9:50	10:35	0.75	0.03	28	nd	nd	0	10	37
TOTOTOTO	LOOIT LANC	I NO_LIVER	LNLK-AN-03	638569	5542211	16-May-19	9:45	10:45	1.75	0.07	42	23	19	0	0	24
					•			Total	3.53	0.15	85	nd	nd	0	10	24

Notes: ID = identifier; UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort, nd = not determined.

^a CPUE calculated as: (# fish caught/hours)

Table D.5: Gill Net Catch and Catch-Per-Unit-Effort Data, May-June, 2019

Part						TM Zone 11U)							
BEN-CH-02 6269803 6446619 0 3 3 27489-19 1726 11420	ΙΔΙΏ	ea Description	Area Code	Net ID	Easting	Northing	_	_	Set Date	Lift Date	Set Time	Lift Time	Effort (Fishing Hours)
## REG-Not 3 (2001) FER-G-Not 3 (2001) FER-G-Not 4 (2001) FER-G-Not 5 (2001) FER-G-Not 6 (2001) FER-G-Not 7 (2001) FER-G-Not 7 (2001) FER-G-Not 8 (2001) FER-G-Not 8 (2001) FER-G-Not 9 (2002) FER-G-No													0.25 0.25
Recheld (2001) 5.44070 0 3 3 27-May-19 (27-May-19) 13:26 13:40 14:40 Recheld (2001) 5.46070 0 3 3 27-May-19 (27-May-19) 14:26 14:40 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 14:26 15:00 12:26 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 14:26 15:00 12:26 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 14:26 15:00 12:26 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 14:26 15:00 12:26 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 12:20 (25-56 Recheld (2001) 5.46070 0 3 27-May-19 (27-May-19) 15:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 13:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 12:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (27-May-19) 12:20 (25-56 Recheld (2001) 5.46070 0 2 2-May-19 (25-56 Recheld (2001) 5													0.25
BR-GN-06 C-20015 54467769 0 3 27-May-19 17-May-19 14-25 14-40 14-40 14-4													0.25
Reservoir (Creek) Reservoir (Coloranus Reservoir (Creek) Reservoir (27-May-19	27-May-19	14:25		0.25
R.C. P.C.													0.25
ER-CN-00 026012 5446886 0 2 2 25489y-10 22-Mgy-19 13-01 13-15 ER-CN-11 026012 5446886 0 2 25489y-10 22-Mgy-19 13-01 13-15 ER-CN-11 026012 5446886 0 2 25489y-10 22-Mgy-19 13-20 13-15 ER-CN-14 026012 5446886 0 1.5 25469y-10 22-Mgy-19 13-20 13-15 ER-CN-14 026012 5446886 0 1.5 25469y-10 22-Mgy-19 12-20 12-15 ER-CN-14 026012 5446886 0 1.5 3048y-19 12-20 12-25 ER-CN-14 026012 5446886 0 1.5 3048y-19 12-20 12-25 ER-CN-15 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-20 12-25 ER-CN-16 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-20 12-25 ER-CN-19 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-25 13-05 ER-CN-19 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-25 13-05 ER-CN-19 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-10 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 4 3-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 4 3-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 4 3-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 5446717 0 2 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 4 3-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 5 4 3-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 5 1-Jun-19 1-Jun-19 12-26 12-25 ER-CN-12 026002 544686 0 5 5 1-Jun													0.17 0.50
FR.Ch.11 020012 5446866 0 2 2248gv-10 20-May-10 13:20 13:25 14:10 FR.Ch.11 626912 5446866 0 1.5 20-May-10 20-May-10 13:20 12:25 14:10 FR.Ch.11 626912 5446866 0 1.5 30-May-10 30-May-10 20-May-10 12:20 12:25 12:25 12								2					0.25
FR.Ch.12 026012 5446886 0 1.5 264mg-10 224mg-10 34.05 44.10 12.15													0.25
ER-CR-13 626912 5446866 0 1.5 30-May-19 30-May-19 12-00 12-15													0.25 0.42
FR.CN-14 620912 5446886 O 1.5 30-May-19 30-May-19 12-20 12-35 13-10 FR.CN-16 620912 5446886 O 1.5 30-May-19 30-May-19 12-30 13-10 FR.CN-16 620912 5446717 O 2 1-Jun-19 1-Jun-19 12-30 12-35 13-10 FR.CN-16 620926 5446717 O 2 1-Jun-19 1-Jun-19 12-35 12-30 12-35 13-35 FR.CN-17 620926 5446717 O 2 1-Jun-19 1-Jun-19 12-35 13-35 13-35 FR.CN-12 620930 5446717 O 2 1-Jun-19 1-Jun-19 12-35 13-35 13-35 13-35 FR.CN-12 620930 5446717 O 2 1-Jun-19 1-Jun-19 13-15 13-25 13-35 13-35 FR.CN-12 620930 5446717 O 2 1-Jun-19 1-Jun-19 13-15 13-25 13-3													0.42
Re-CN-16				ER-GN-14	626912	5446686	0	1.5	30-May-19	30-May-19	12:20	12:35	0.25
Fig. Ch. 17													0.33
Reg-RN-18													0.17 0.083
## RG-N-19 6269026 5446717 0 2 1-Jun-19 1-Jun-19 12-25 13-25 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 13-Jun-19 13-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 13-Jun-19 13-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 13-Jun-19 13-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 12-Jun-19 12-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 12-Jun-19 12-Jun-19 1-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun-19 1-Jun-19 12-Jun-19 1-Jun-19 ## RG-N-N-20 6269026 5446717 0 2 1-Jun-19 1-Jun													0.25
Regin				ER-GN-19	626926	5446717	0	2	1-Jun-19	1-Jun-19	12:45	12:55	0.17
Region R													0.17
Recent R													0.17 0.08
Reservoir (Englishman Creek) RG_ER													0.25
Reservoir (Englishman Creek) RG_ER (ER.CA).26 (2080) 5.4446917 0 2 1.5un-19 1.1un-19 13:15 13:40 13:25 13:40 ER.CA).28 (2095) 5.4446866 0.5 4 3.5un-19 3.1un-19 13:25 13:40 12:55 ER.CA).29 (2095) 5.446866 0.5 4 3.5un-19 3.1un-19 13:25 13:40 12:55 ER.CA).29 (2095) 5.446866 0.5 4 3.5un-19 3.1un-19 13:25 13:40 12:55 ER.CA).29 (2095) 5.446866 0.5 1.5 3.5un-19 3.1un-19 13:25 14:400 14:15 ER.CA).30 (2070) 5.446862 0.5 4 3.5un-19 3.1un-19 13:25 14:400 14:15 ER.CA).31 (2020) 5.446860 0.5 1.5 3.5un-19 3.1un-19 14:20 14:40 ER.CA).31 (2020) 5.446860 0.5 1.5 3.5un-19 6.1un-19 14:30 14:45 ER.CA).32 (2095) 5.446860 0.5 1.5 5.5 4.5un-19 6.1un-19 14:30 14:45 ER.CA).33 (2020) 5.446940 0.5 1.5 6.5 4.5un-19 6.1un-19 13:00 13:15 ER.CA).33 (2020) 5.446940 0.5 1.5 6.5 4.5un-19 6.1un-19 14:30 14:45 ER.CA).33 (2020) 5.446940 0.3 5 13.5un-19 13:5un-19 10:30 13:15 ER.CA).33 (2020) 5.446940 0.3 5 13.5un-19 13:5un-19 10:30 10:45 ER.CA).33 (2020) 5.446940 0.3 5 13:5un-19 13:5un-19 10:30 10:45 ER.CA).39 (2020) 5.446940 0.3 5 13:5un-19 13:5un-19 11:5un-19 11:5u				ER-GN-24	626926	5446717			1-Jun-19	1-Jun-19	12:45	12:55	0.17
Reservoir (Englishman (Creek) RG_CR0-22 628926 5446977 0 0 0 1 1-30-119 1-30-119 132-5 132-5 132-5 14		Koocanusa											0.17
Bergishman Creek			DC ED										0.17 0.25
PRICE PRIC	(1		RG_ER					1					0.25
### PROPRIES FR.GN.31 622053 5446943 0.5 2 3.Jun-19 3.Jun-19 14.25 14.40		Creek)				5446822							0.25
BR-CRN-32 628966 5446890 0.5 2 6-Jun-19 6-Jun-19 14:30 14:45 15:51													0.25
BR-GN-34 622001 5446940 0.5 1.5 6-Jun-19 6-Jun-19 14:55 15:10 13:15 ER-GN-34 627001 5446882 0.3 5 13-Jun-19 11-Jun-19 10:11 10:29 10:45 ER-GN-36 628094 5448946 0.3 5 13-Jun-19 13-Jun-19 10:11 10:29 10:45 ER-GN-36 627062 5446946 0.3 5 13-Jun-19 13-Jun-19 10:11 10:29 10:45 ER-GN-36 627069 5446946 0.3 5 13-Jun-19 13-Jun-19 11:15 11:35 ER-GN-36 627069 5446947 0.3 5 13-Jun-19 13-Jun-19 12:30 12:45 ER-GN-36 627069 5446941 0.5 5 13-Jun-19 13-Jun-19 12:30 12:45 ER-GN-40 627069 5446941 0.5 5 14-Jun-19 14-Jun-19 10:00 10:55 ER-GN-42 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-44 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:50 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:50 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:50 12:45 ER-GN-46 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:20 12:45 ER-GN-46 627050 5446951 0.1 2 15-Jun-19 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00 13:00													0.25 0.25
BR-GN-34 627001 5446882 0.3 2.5 11-Jun-19 11-Jun-19 13:00 13:15													0.25
REGN-35 627014 5448926 0.3 5 13-Jun-19 13-Jun-19 10-30 10-45									11-Jun-19				0.25
ER-GN-37 627062 5446946 0.3 5 13-Jun-19 3-Jun-19 11-15 11:35 ER-GN-38 627069 5446961 0.3 2 13-Jun-19 13-Jun-19 12:30 12:45 ER-GN-40 627069 5446961 0.3 2 13-Jun-19 13-Jun-19 12:30 12:45 ER-GN-40 627069 5446961 0.5 5 14-Jun-19 14-Jun-19 10:00 10:55 ER-GN-41 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 10:00 10:55 ER-GN-42 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:20 11:35 ER-GN-42 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-44 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-44 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05 ER-GN-45 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 13:10 13:25 ER-GN-46 627016 5446917 0.1 2 15-Jun-19 15-Jun-19 13:20 12:35 ER-GN-46 627016 5446917 0.1 2 15-Jun-19 15-Jun-19 12:58 13:10 ER-GN-49 626986 5446863 0.3 2 19-Jun-19 19-Jun-19 10:50 11:05 ER-GN-49 626986 5446863 0.3 2 19-Jun-19 19-Jun-19 11:00 13:00 ER-GN-50 627069 5446863 0.3 2 2 19-Jun-19 11:00 13:00 ER-GN-50 627069 5446863 0.3 2 2 19-Jun-19 11:00 13:00 ER-GN-50 627069 5446863 0.3 2 2 19-Jun-19 11:00 13:00 ER-GN-50 629348 5436863 0.3 2 2 2 2 2 2 2 2 2													0.30
FR.GN-38 627069 5446991 3.3 5 13-Jun-19 13-Jun-19 12-00 12-15													0.25
RG_GN-43 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05	p												0.25
RG_GN-43 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05	3008			ER-GN-39	627058	5446961	0.3		13-Jun-19	13-Jun-19	12:30	12:45	0.25
RG_GN-43 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05	Ψ̈́												0.25
BR-GN-43 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 11:50 12:05	line												0.92 0.25
RR-GN-44 627050 5446941 0.5 5 14-Jun-19 14-Jun-19 12:30 12:45	2												0.25
ER.GN-46 627016 5446917 0.1 2 15-Jun-19 15-Jun-19 12:58 13:10				ER-GN-44	627050	5446941	0.5	5	14-Jun-19	14-Jun-19	12:30	12:45	0.25
ER-GN-47 627049 5446934 0.1 3 15-Jun-19 15-Jun-19 13:27 13:40													0.25
ER-GN-48													0.20
Region R													0.25
Regression George				ER-GN-49	626986	5446863	0.3	2.5	19-Jun-19	19-Jun-19	11:30	11:45	0.25
RG-GN-52 627009 5446876 0.3 3 21-Jun-19 21-Jun-19 9:10 11:10 Total													2.0
RG_GG_N_01 629803 5436683 0 5 27-May-19 27-May-19 13:40 13:50 14:00													0.45 2.0
CC-GN-02 630220 5436848 0 1.5 27-May-19 27-May-19 13:50 14:00				LIV OIV-02	027000	0440070	0.0		21-0dil-10	21-0dil-10	0.10		17
Rocanusa Reservoir (Gold Creek) RG_CGN-14 629583 5436520 0 1.5 28-May-19 28-May-19 9:20 9:40 10:00 1.5 28-May-19 28-May-19 9:40 10:00 10:15 28-May-19 28-May-19 10:05 10:15 10:30 10:00 1.5 28-May-19 28-May-19 10:05 10:15 10:30 10:00 1.5 28-May-19 28-May-19 10:05 10:15 10:30 10:00 1.5 28-May-19 28-May-19 10:40 10:55 10:30 10:00 1.5 28-May-19 28-May-19 10:40 10:55 10:30 10:00 1.5 28-May-19 28-May-19 10:40 10:55 10:30 10:00 10:55 10:30 10:00 10:55 10:30													0.17
RG_GC_GN-04 629348 5436520 0 1.5 28-May-19 28-May-19 9:40 10:00													0.17
RG_GC_GN-05 629348 5436520 0 1.5 28-May-19 28-May-19 10:05 10:15													0.33
RG_GC_GN-07 629740 5436622 0 1.5 28-May-19 28-May-19 10:40 10:55													0.17
RG_GC_GN-08 629740 5436622 0 1.5 28-May-19 28-May-19 11:00 11:15													0.25
RG_GC_GN-09 629740 5436622 0 1.5 28-May-19 28-May-19 11:20 11:35													0.25 0.25
Reservoir (Gold Creek) RG_GC RG_GN-10 GC-GN-11 GC-GN-12 GC-GN-12 GC-GN-12 GC-GN-13 GC-GN-13 GC-GN-14 GC-GN-14 GC-GN-15 GC-GN-15 GC-GN-16 GC-GN-16 GC-GN-17 GC-GN-17 GC-GN-17 GC-GN-17 GC-GN-18 GC-GN-18 GC-GN-19 GC-GN-19 GC-GN-19 GC-GN-19 GC-GN-19 GC-GN-19 GC-GN-12 GC-GN-10 GC-GN													0.25
Reservoir (Gold Creek) RG_GC RG_GN-12				GC-GN-10	629302	5436632	0	2	28-May-19	28-May-19	11:40	11:50	0.17
Reservoir (Gold Creek) RG_GC-GN-13 629676 5437385 29-May-19 29-May-19 10:25 10:35 GC-GN-14 629658 5437389 29-May-19 29-May-19 10:40 10:55 GC-GN-15 629460 5430550 0.5 3 21-Jun-19 21-Jun-19 14:10 14:36 GC-GN-16 628834 5436581 1 4 22-Jun-19 22-Jun-19 9:07 9:23 GC-GN-17 628946 5436541 0 4 22-Jun-19 22-Jun-19 9:32 9:49 GC-GN-18 629140 543654 0 4 22-Jun-19 22-Jun-19 10:15 10:32 GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436550 0.5 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22													0.33
GC-GN-14 629658 5437389 29-May-19 29-May-19 10:40 10:55 GC-GN-15 629460 5430550 0.5 3 21-Jun-19 21-Jun-19 14:10 14:36 GC-GN-16 628834 5436581 1 4 22-Jun-19 22-Jun-19 9:07 9:23 GC-GN-17 628946 5436541 0 4 22-Jun-19 22-Jun-19 9:32 9:49 GC-GN-18 629140 543624 0 4 22-Jun-19 22-Jun-19 10:15 10:32 GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436550 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22													0.42 0.17
GC-GN-15 629460 5430550 0.5 3 21-Jun-19 21-Jun-19 14:10 14:36 GC-GN-16 628834 5436581 1 4 22-Jun-19 22-Jun-19 9:07 9:23 GC-GN-17 628946 5436541 0 4 22-Jun-19 22-Jun-19 9:32 9:49 GC-GN-18 629140 543624 0 4 22-Jun-19 22-Jun-19 10:15 10:32 GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22	Re	,	RG_GC										0.17
GC-GN-17 628946 5436541 0 4 22-Jun-19 22-Jun-19 9:32 9:49 GC-GN-18 629140 543624 0 4 22-Jun-19 22-Jun-19 10:15 10:32 GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22		Creek)		GC-GN-15	629460	5430550	0.5		21-Jun-19	21-Jun-19	14:10	14:36	0.43
GC-GN-18 629140 543624 0 4 22-Jun-19 22-Jun-19 10:15 10:32 GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22							1						0.27
GC-GN-19 629187 5436449 0 4 22-Jun-19 22-Jun-19 11:17 11:31 GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22													0.28
GC-GN-20 692878 5436703 0.5 3 22-Jun-19 22-Jun-19 11:52 12:10 GC-GN-21 692878 546703 0.5 3 22-Jun-19 22-Jun-19 13:15 13:32 GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22				GC-GN-19	629187		0	4	22-Jun-19	22-Jun-19		11:31	0.23
GC-GN-22 628757 5436690 0.6 3 22-Jun-19 22-Jun-19 13:48 14:02 GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22				GC-GN-20	692878	5436703			22-Jun-19	22-Jun-19	11:52	12:10	0.30
GC-GN-23 628740 5436676 0.5 3 22-Jun-19 22-Jun-19 14:27 14:40 GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22													0.28
GC-GN-24 629460 5436550 0.5 3 23-Jun-19 23-Jun-19 9:07 10:22													0.23
				GC-GN-24	629460	5436550	0.5	3	23-Jun-19	23-Jun-19	9:07	10:22	1.2
GC-GN-25 629009 5436565 0.2 2.5 24-Jun-19 24-Jun-19 9:10 9:55 Total				GC-GN-25	629009	5436565	0.2	2.5	24-Jun-19	24-Jun-19	9:10	9:55	0.75 8.0

Notes: ID = identifier; UTM = Universal Transverse Mercator; NAD = North American Datum; m = meters; ft = feet; CPUE = catch-per-unit-effort; $nd = not dete^a$ CPUE calculated as: (# fish caught/($ft^2 x hours$))

Table D.5: Gill Net Catch and Catch

			s	Set Informa	tion				Red	dside Sh	iner				Peamo	outh Ch	nub
Area Type	Area Description	Area Code	Net Panel Length (ft)	Net Panel Height (ft)	Mesh (inches)	Net Area (ft²)	Catch	Mortalities	Sacrificed	CPUE a	Male	Female	Juvenile	Catch	Mortalities	Sacrificed	CPUE a
			50 50	6	1	300 300	13 28	0	0	0.17	8 16	4 8	1 4	9	0	0	0.12 0.040
			50	6	1	300	7	0	0	0.093	3	4	0	5	0	0	0.067
			50 50	6	1	300 300	43	0	0	0.57	21	20	2	2 15	0	0	0.027
			50	6	<u> </u>	300	2 17	0	0	0.027	nd nd	nd nd	nd nd	15	0	0	0.20
			50	6	1	300	1	0	0	0.020	nd	nd	nd	4	0	0	0.080
			50 50	6	1 1	300 300	48 3	0	0	0.32	nd nd	nd nd	nd nd	9	0	0	0.060 0.027
			50	6	1	300	9	0	0	0.040	3	6	0	3	0	0	0.027
			50	6	1	300	9	0	0	0.12	4	5	0	5	0	0	0.067
			50 50	6	<u> </u>	300 300	3 11	0	0	0.024	nd 5	nd 6	nd 0	7	0	0	0.056 0.027
			50	6	1	300	57	0	0	0.76	30	27	0	8	0	0	0.11
			50	6	1	300	63	0	0	0.63	29	24	0	20	0	0	0.20
			50 50	6	<u> </u>	300 300	3	0	0	0.080	nd nd	nd nd	nd nd	6	0	0	0.040
			50	6	1	300	1	0	0	0.013	nd	nd	nd	10	0	0	0.13
			50	6	1	300	0	0	0	0	0	0	0	3	0	0	0.060
			50 50	6	<u> </u>	300 300	1 6	0	0	0.020	nd nd	nd nd	nd nd	12 6	0	0	0.24 0.12
			50	6	1	300	3	0	0	0.12	nd	nd	nd	6	0	0	0.24
			50	6	<u> </u>	300	1	0	0	0.013	nd	nd	nd	10	0	0	0.13
			50 50	6	<u> </u>	300 300	0 1	0	0	0.020	0 nd	0 nd	0 nd	3 12	0	0	0.060
	Koocanusa		50	6	1	300	6	0	0	0.12	nd	nd	nd	6	0	0	0.12
	Reservoir (Englishman	RG_ER	50	6	<u> </u>	300 300	6	0	0	0.080	nd	nd	nd	7	0	0	0.093
	Creek)		50 50	6	<u> </u>	300	5 0	0	0	0.067	0	3 0	0	0	0	0	0
			50	6	1	300	0	0	0	0	0	0	0	0	0	0	0
			50 50	6	<u> </u>	300 300	7	0	0	0.053	3 5	1 2	0	10	0	0	0.13 0.027
			50	6	1	300	7	0	0	0.093	3	4	0	5	0	0	0.027
			50	6	1	300	140	11	0	1.9	61	79	0	14	0	0	0.19
			50 50	6	<u> </u>	300 300	3 16	0	0	0.033	nd nd	nd nd	nd nd	0 5	0	0	0.067
			50	6	1	300	13	0	1	0.21	nd	nd	nd	0	0	0	0.067
eq			50	6	1	300	8	0	0	0.11	nd	nd	nd	0	0	0	0
Mine-exposed			50 50	6	<u> </u>	300 300	10 6	0	0	0.13	nd nd	nd	nd nd	0	0	0	0
Θ-Θ			50	6	<u> </u>	300	12	0	0	0.044	7	nd 5	0	3	1	0	0.011
Ξ			50	6	1	300	3	0	0	0.040	0	3	0	0	0	0	0
			50 50	6	<u> </u>	300 300	3 1	0	0	0.040	0	3	0	3	0	0	0.040
			50	6	<u> </u>	300	10	0	0	0.013	3	7	0	1	0	0	0.013
			50	6	1	300	12	0	0	0.20	7	5	0	0	0	0	0
			50 50	6	1 1	300 300	0 20	3	0	0.27	9	0 11	0	2	0	0	0.031
			50	6	<u></u> 1	300	0	0	0	0.27	0	0	0	0	0	0	0.027
			50	6	1	300	80	1	0	0.13	36	44	0	13	0	0	0.022
			50 50	6	1	300 300	18 29	0	0	0.13 0.048	9 18	9 11	0	10 10	0	0	0.074 0.017
			30	U	ı	15,600	753	15	3	0.0029	nd	nd	nd	259	1	0	0.0010
			50	6	1	300	0	0	0	0	0	0	0	0	0	0	0
			50 50	6	<u> </u>	300 300	0	0	0	0	0	0	0	0	0	0	0.060
			50	6	1	300	0	0	0	0	0	0	0	0	0	0	0
			50	6	<u> </u>	300	0	0	0	0	0	0	0	0	0	0	0
			50 50	6	<u> </u>	300 300	0	0	0	0	0	0	0	0	0	0	0
			50	6	1	300	0	0	0	0	0	0	0	4	0	0	0.053
			50 50	6	<u> </u>	300 300	0	0	0	0	0	0	0	2	0	0	0.053 0.040
			50	6	1	300	11	0	0	0.11	9	2	0	1	0	0	0.040
	Koocanusa		50	6	1	300	2	0	0	0.016	2	0	0	10	0	0	0.080
	Reservoir (Gold	RG_GC	50 50	6	<u> </u>	300 300	1 25	0	0	0.020	1 12	0 13	0	7	0	0	0.14 0.013
	Creek)		50	6	1	300	30	0	0	0.23	21	9	0	0	0	0	0
			50	6	1	300	5	0	0	0.063	4	1	0	0	0	0	0
			50 50	6	1 1	300 300	9	0	0	0.11	7 5	2	0	0	0	0	0.012
			50	6	1	300	13	0	0	0.19	8	5	0	0	0	0	0
			50 50	6	2	300	10	0	1	0.11	6	4	0	0	0	0	0
			50 50	6	<u>3</u>	300 300	19 7	0	0	0.22	10 7	9	0	0	0	0	0.047
			50	6	1	300	4	0	0	0.062	3	1	0	0	0	0	0
			50 50	6	<u> </u>	300 300	54 59	0	0	0.14	26 29	28 30	0	5	0	0	0.013 0.018
	Ī		30	υ	ı	7,500	258	0	9 11	0.26 0.0043	29 150	108	0 0	4 46	0	0	0.018

Notes: ID = idermined.

^a CPUE calc

Table D.5: Gill Net Catch and Catch

				Kol	kanee		Wes	tslope	Cutthro	oat Trout		Bu	II Trout	:	M	lountai	n White	efish
Area Type	Area Description	Area Code	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª
			0 0 0	0 0	0 0	0 0	0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
			3	0	0	0.040	0	0	0	0 0.013	0	0	0	0 0.013	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0 0.020	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	0	0	0.013	0	0	0	0	0	0	0	0	0 1	0	0	0.0080
			5 0	0	0	0.067	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.013
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.013
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Koocanusa Reservoir		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(Englishman	RG_ER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Creek)		0	0	0	0.013	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0 0.013	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.022
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
osed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine-exposed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0 11	0 0	0 0	0 0.00004	0 2	0 0	0 0	0 0.000008	0 2	0 0	0	0.000008	0 5	0 0	0 0	0 0.00002
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	1	0	0	0.010	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0.013	0	0	0	0	0	0	0	0
			0	0	0	0	2	0	0	0.020	0	0	0	0	0	0	0	0
	Koocanusa	DO 00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reservoir (Gold Creek)	RG_GC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<u> </u>	L	U	0	0	0	4	0	0	0.000066	0	0	U	0	0	0	0	0

Notes: ID = id

Table D.5: Gill Net Catch and Catch

Area Type	Area Description		i				_	-ai gesc	ale Su	CKEL		Yello	w Perc	ch	No	rtnern	Pikemi	innow
		Area Code	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE a
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.027
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.013
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.013
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0.040
			0	0	0	0	0	0	0	0	0	0	0	0	2 1	0	0	0.040 0.040
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.020
			0	0	0	0	0	0	0	0	0	0	0	0	5 1	0	0	0.10 0.040
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0 1	0	0	0.020
	Koocanusa Reservoir	DO 50	0	0	0	0	0	0	0	0	0	0	0	0	5 1	0	0	0.10 0.013
	(Englishman Creek)	RG_ER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cleek)		0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.027 0.040
			0	0	0	0 0.013	1	0	0	0.013	0	0	0	0	5 2	0	0	0.067 0.027
			0	0	0	0	0 1	0	0	0.013	0	0	0	0	1	0	0	0.027
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
eq			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sodx			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine-exposed			0	0	0	0	1	0	0	0.0036	0	0	0	0	3	0	0	0.011
≅			0	0	0	0	0	0	0	0	0	0	0	0	1 0	0	0	0.013
			0	0	0	0	2	0	0	0.027	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.013
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0.053
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0.0017	0	0	0	0.0017	2 17	0	0	0.0033
			0 1	0	0	0.000004	1 7	0	0 0	0.0017 0.00003	1 2	0 0	0 0	0.0017 0.00008	2 68	0 0	0	0.0033 0.0003
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Koocanusa		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reservoir (Gold Creek)	RG_GC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	,		0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.038
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.043
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.014
			0	0	0	0	0	0	0	0	0	0	0	0	0 2	0	0	0.0053
			0 0	0 0	0 0	0 0	0 0	7 16	0 0	0 0	0.031 0.00027							

Notes: ID = id

Table D.6: Hoop Net Catch and Catch-Per-Unit-Effort, May 2019

				_	TM Zone 11U)												Red	dside Shir	ner			L	ongnos.	e Suck	er	I	Longn	ose Da	ce
Area Type	Station ID	Net ID	Net Size	Easting	Northing	Set Date	Lift Date	Set Time	Removal Time	Fishing Hours (hrs)	Depth F (m		Set Configuration	Effort (Fishing days)	Catch	Mortalities	Sacrificed	CPUE ª	Male	Females	Juvenile	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUEª
		GRLK-HN-01	Small	655575	5524612	07-May-19	08-May-19	13:20	10:00	21	0.50	1.0	Outflow	0.86	1,000	2	0	1,161	nd	nd	nd	4	0	0	4.6	0	0	0	0
		GRLK-HN-02	Small	655575	5524621	08-May-19	09-May-19	10:30	10:10	24	0.50	1.0	Outflow	0.99	1,000	0	0	1,014	nd	nd	nd	0	0	0	0	0	0	0	0
0		GRLK-HN-03 GRLK-HN-04	Small Small	655575 655575	5524612 5524612	09-May-19 10-May-19	10-May-19 11-May-19	10:15 11:45	11:40 10:00	25 22	0.50 0.50	1.0	Outflow Outflow	0.93	1,000	0	0	944 1,079	500 nd	500 nd	nd nd	0	0	0	0	0	0	0	0
ence	DO 00114	GRLK-HN-05	Small	655575	5524612	14-May-19	15-May-19	13:20	11:50	23	0.25	1.0	Outflow	0.94	1,000	0	0	1,067	nd	nd	nd	50	0	0	53	0	0	0	0
Reference	RG_GRLK	GRLK-HN-06	Small	655575	5524612	15-May-19	16-May-19	11:50	10:25	23	0.25	1.0	Outflow	0.94	500	0	0	531	nd	nd	nd	50	0	0	53	0	0	0	0
œ		GRLK-HN-07	Small	655575	5524612	16-May-19	17-May-19	10:30	9:30	23	0.50	1.0	Outflow	0.96	200	0	0	209	nd	nd	nd	100	0	0	104	0	0	0	0
		GRLK-HN-08 GRLK-HN-09	Small Small	655575 655784	5524612 5524593	17-May-19	18-May-19 22-May-19	9:35 9:10	9:15 9:20	24 24	0.50	1.0	Outflow Outflow	0.99 1.0	200 975	0	0	203 968	nd 20	nd 25	nd 5	50 1	0	0	51 0.99	0	0	0	0
		GRLK-FIN-U9	Smail	000764	5524593	21-May-19	22-May-19	9:10	9:20	24	U	1.0	Total	8.7	6,875	2	0	794	nd	nd	nd	255	0	0	29	0	0	0	0
		ER-HN-01	Small	626957	5446850	07-May-19	08-May-19	12:50	9:20	21	0.20	1.5	Inflow	0.85	40	0	0	47	0	0	40	0	0	0	0	0	0	0	0
		ER-HN-02	Small	626957	5446850	08-May-19	09-May-19	9:30	15:17	30	0.20	1.5	Inflow	1.2	29	0	0	23	0	0	29	0	0	0	0	0	0	0	0
		ER-HN-03	Small	626954	5446838	13-May-19	14-May-19	10:38	12:36	26	0.80	1.6	Inflow	1.1	83	0	0	77	11	13	59	0	0	0	0	0	0	0	0
	RG_ER	ER-HN-04	Small	626954 626954	5446838 5446838	14-May-19	15-May-19	12:11	14:32	26	0.80	1.6	Inflow	1.1	4	0	0	3.6	0	1	3	0	0	0	0	0	0	0	0
		ER-HN-05 ER-HN-06	Small Small	626954	5446838	15-May-19 16-May-19	16-May-19 17-May-19	11:42 11:17	13:50 9:00	26 22	0.60	1.0	Inflow Inflow	0.90	11 30	0	0	10 33	0	0	11 29	0	0	0	0	0	0	0	0
		ER-HN-07	Small	626954	5446838	17-May-19	18-May-19	9:30	9:22	24	0.60	1.0	Inflow	0.99	19	0	0	19	0	0	19	0	0	0	0	0	0	0	0
		-				,	,						Total	7.3	216	0	0	30	11	15	190	0	0	0	0	0	0	0	0
		GC-HN-01	Small	629388	5436988	07-May-19	08-May-19	14:55	10:10	19	0.20	1.3	Inflow	0.80	2	0	0	2.5	1	1	0	0	0	0	0	0	0	0	0
		GC-HN-02	Small	629414	5437165	08-May-19	09-May-19	12:33	9:50	21	0.10	0.70	Inflow	0.89	274	0	0	309	0	0	274	0	0	0	0	0	0	0	0
	RG GC	GC-HN-03 GC-HN-04	Small Small	629414 629412	5437165 5436693	09-May-19 13-May-19	10-May-19 14-May-19	12:33 12:30	9:50 10:06	21	0.10 0.50	0.70 1.0	Inflow Inflow	0.89	38 8	0	0	43 8.9	3 1	2	31 5	0	0	0	0	0	0	0	0
	110_00	GC-HN-05	Small	629412	5436693	14-May-19	15-May-19	12:30	10:06	22	0.50	1.0	Inflow	0.90	6	0	0	6.7	1	0	5	0	0	0	0	0	0	0	0
		GC-HN-06	Small	629398	5436610	15-May-19	16-May-19	10:31	12:21	26	0.80	1.2	Inflow	1.1	17	0	0	16	1	0	16	0	0	0	0	0	0	0	0
													Total	14	580	0	0	42	7	7	331	0	0	0	0	0	0	0	0
		EROL-HN-01	Small	640828	5478162	06-May-19	07-May-19	16:50	16:30	24	0	1.5	Inflow	0.99	10	0	0	10	5	2	3	4	0	0	4.1	2	0	0	2.0
		EROL-HN-02 EROL-HN-03	Small Small	640828 640828	5478162 5478162	07-May-19 08-May-19	08-May-19 09-May-19	16:30 12:00	12:00 7:45	20 20	0.50 0.50	0.50	Inflow Inflow	0.81	79 101	0	0	97 123	41 38	23 36	15 27	5 5	0	0	6.2	2	0	0	2.5
		EROL-HN-04	Small	640828	5478168	09-May-19	10-May-19	8:46	10:00	25	0.50	0.50	Inflow	1.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
		EROL-HN-05	Small	640828	5478162	10-May-19	11-May-19	11:09	11:15	24	0.50	0.50	Inflow	1.0	33	0	0	33	13	18	2	1	0	0	1.0	0	0	0	0
		EROL-HN-06	Small	640877	5478014	10-May-19	11-May-19	12:03	10:59	23	0.50	0.50	Inflow	0.96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EROL-HN-07	Small	640828	5478162	13-May-19	14-May-19	14:00	12:34	23	0.50	0.50	Inflow	0.94	79	1	0	84	29	25	26	9	0	1	9.6	0	0	0	0
		EROL-HN-08 EROL-HN-09	Small Small	640835 640828	5478132 5478162	13-May-19 14-May-19	14-May-19 15-May-19	14:39 13:20	12:22 13:55	22 25	0.75 0.75	0.75	DS of Inflow Inflow	0.90 1.0	0	0	0	0	0	0	0	3	0	0	2.9	0	0	0	0
		EROL-HN-10	Small	640313	5478204	14-May-19	15-May-19	14:45	14:09	23	0.75	0.75	-	0.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sed	RG_EROL	EROL-HN-11	Small	640828	5478162	15-May-19	16-May-19	14:15	10:15	20	0.75	0.75	Inflow	0.83	64	0	0	77	41	20	3	18	0	7	22	1	0	0	1.2
Mine-exposed		EROL-HN-12	Small	640817	5478205	15-May-19	16-May-19	14:30	10:45	20	0.75	0.75	Inflow	0.84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Βe		EROL-HN-13	Small	640828	5478162	16-May-19	17-May-19	10:25	11:20	25	0.75	0.75	Inflow	1.0	79	0	0	76	38	31	10	0	0	0	0	1	0	0	0.96
≅		EROL-HN-14 EROL-HN-15	Small Small	640817 640828	5478205 5478162	16-May-19 17-May-19	17-May-19 18-May-19	10:45 11:15	11:30 11:25	25 24	0.75 0.75	0.75	Inflow Inflow	1.0	0	0	0	0.99	1	0	0	0	0	0	0	0	0	0	0
		EROL-HN-16	Small	640817	5478205	17-May-19	18-May-19	11:20	11:30	24	0.75	0.75	Inflow	1.0	0	0	0	0.33	0	0	0	0	0	0	0	0	0	0	0
		EROL-HN-17	Small	640828	5478162	20-May-19	22-May-19	18:00	13:15	43	0.50	0.50	Inflow	1.8	18	0	0	10	14	2	2	3	0	0	1.7	1	0	0	0.55
		EROL-HN-18	Small	640817	5478205	20-May-19	22-May-19	18:05	13:20	43	0.75	0.75	Inflow	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EROL-HN-19	Small	640812	5478204	28-May-19	29-May-19	15:15	16:30	25	0.50	0.50	Inflow	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EROL-HN-20	Small	040020	5476162	28-May-19	29-May-19	15:30	16:15	25	0	1.2	Inflow Total	1.0 21	0 464	0 1	0	0 22	220	0 157	0 88	49	0	0 8	0.97 2.3	0 9	0	0	0.43
		ELWDGC-HN-01	Small	653112	5521317	09-May-19	10-May-19	12:00	12:45	25	0	0.75	Outflow	1.0	0	0	0	0	0	0	0	1	0	0	0.97	0	0	0	0.43
	RG ELWDGC	ELWDGC-HN-02	Small	653112	5521317	10-May-19	11-May-19	12:50	8:30	20	0.50	0.75	Outflow	0.82	0	0	0	0	0	0	0	3	0	0	3.7	0	0	0	0
		ELWDGC-HN-03	Small	653112	5521317	13-May-19	14-May-19	15:40	13:00	21	0.50	1.0	Inflow	0.89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		GO13-HN-01	Small	652948	5514063	07-May 10	08-May 10	10:00	12:00	26	0	0.75	Total Inflow	2.7 1.1	0	0	0	0	0	0	0	4	0	0	1.5	0	0	0	0
		GO13-HN-02	Small Small	652932	5514063	07-May-19 08-May-19	08-May-19 09-May-19	12:40	8:00	19	0.50	1.0	Outflow	0.81	0	0	0	0	0	0	0	16	0	3	20	0	0	0	0
		GO13-HN-03	Small	652932	5514070	09-May-19	10-May-19	9:00	9:00	24	0.50	1.0	Outflow	1.0	0	0	0	0	0	0	0	36	0	5	36	0	0	0	0
		GO13-HN-04	Small	652960	5514044	09-May-19	10-May-19	8:45	9:30	25	0.50	1.0	Inflow	1.0	0	0	0	0	0	0	0	80	0	0	78	0	0	0	0
		GO13-HN-05	Small	652960	5514044	10-May-19	11-May-19	9:40	11:25	26	0.50	1.0	Inflow	1.1	3	0	0	2.8	1	1	1	55	0	0	51	0	0	0	0
		GO13-HN-06 GO13-HN-07	Small Small	652932 652932	5514070 5514070	10-May-19 11-May-19	11-May-19 13-May-19	9:10 11:40	11:40 9:05	26 45	0.50	1.0 0.75	Outflow Outflow	1.1	0	0	0	0	0	0	0	8	0	0	7.2 0.53	0	0	0	0
	RG_GO13	GO13-HN-08	Small	652960	5514070	11-May-19	13-May-19	11:40	9:05	46	0.30	1.0	Inflow	1.9	0	0	0	0	0	0	0	38	0	0	20	0	0	0	0
		GO13-HN-09	Small	652956	5514044	17-May-19	20-May-19	9:00	9:50	73	0.00	1.0	Inflow	3.0	0	0	0	0	0	0	0	1	0	0	0.33	0	0	0	0
		GO13-HN-10	Small	652934	5514067	23-May-19	24-May-19	8:40	9:05	24	0.50	1.0	Outflow	1.0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0
		GO13-HN-11	Small	652934	5514067	27-May-19	28-May-19	10:45	13:25	27	0.50	1.0	Outflow	1.1	1	0	0	0.90	1	0	0	38	0	0	34	0	0	0	0
		GO13-HN-12	Small Small	652934 652934	5514067 5514067	28-May-19 29-May-19	29-May-19	13:25 8:55	8:45 9:10	19 24	0.50	1.0	Outflow Outflow	1.0	0	0	0	0	0	0	0	42 52	0	0	52 51	6	0	0	7.4
		GO13-HN-13																										· U	U

Notes: ID = identifier; UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; HN = hoop net; nd = not determined; "-" indicates unknown.

a Total catch-per-unit-effort (CPUE) calculated as the total catch of a single species over the total effort (days) for individual hoop net configurations.

Table D.6: Hoop Net Ca

		Noi	rthern	Pikemi	nnow		Peamo	outh Ch	ub	Ea	astern B	Brook 1	Γrout		Bul	l Trout		M	lountai	in White	efish	L	argesc	ale Sud	cker		Yello	w Perc	h	West	slope C	Cutthroa	at Trout
Area Type	Station ID	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
nce		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	0 213
Reference	RG_GRLK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	53
œ		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200 100	0	0	209
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	8.9
		6	0	0	0 7.0	3	0	0	0 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	559	0	0	65
		4	0	0	3.2	2	0	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	50.55	29 6	0	0	27 5.5	5	0	0	4.6 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.7 0	0	0	0	0
	RG_ER	31	0	0	28	3	0	0	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	6.4	7	0	0	6.4
		73 78	0	0	81 78	0 16	0	0	0 16	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7.0	2	0	0	1.1 2.0	0	0	0	0
		227 0	0	0	31	29 0	0	0	4.0 0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	1.1 0	14	0	0	1.9	7	0	0	0.96
		77	0	0	87	20	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	16	0	0	0	1.2 0
	RG GC	55 5	0	0	62 5.6	2	0	0	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3.4	0	0	0	0
	1.0_60	5	0	0	5.6	2	0	0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.1	0	0	0	0
		11 153	0	0	10 11	8 32	0	0	7.4 2.3	0 0	0	0	0	0 0	0	0	0 0	0 0	0	0	0	0	0	0	0	1 19	0	0	0.93 1.4	0 1	0	0	0.073
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.073
		0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0 2.4
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1.1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	RG EROL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sodx	NG_ENOL	0	0	0	0	0	0	0	2.4 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine-exposed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Σ		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	0	0	0.048	2	0	0	0.096	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.14
	DC FLWDCC	0	0	0	0	0	0	0	0	6	0	0	6.8 7.3	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
	RG_ELWDGC	0	0	0	0	0	0	0	0	4	0	0	4.5	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	17	0	0	6.2	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 1.0	1 0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0 1.0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 2	0		0 1.8	0	0	0	0	0	0	0	0	0	0	0	0
	RG_GO13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.53	0	0	0	0	0	0	0	0	0	0	0	0
	1.0_0010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
]	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.06	4	0	0	0.24	0	0	0	0	0	0	0	0	1	0	0	0.06

Notes: ID = identifier; UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; HN = hoop net; nd = not determined; "-" indicates unknown.

a Total catch-per-unit-effort (CPUE) calculated as the total catch of a single species over the total effort (days) for individual hoop net configurations.

Area Type Desc	Area escription	Area Code	Trap ID LNLK-MT-01 LNLK-MT-02 LNLK-MT-03 LNLK-MT-05 LNLK-MT-06 LNLK-MT-06 LNLK-MT-06 LNLK-MT-09 LNLK-MT-09 LNLK-MT-09 LNLK-MT-10	Easting 638569 638569 638569 638569 638569 638569 638032 638032 638212	5442211 5442223 5442211 5542211 5542211 5442211 5441679 5441988	08-May-19 10-May-19 11-May-19 14-May-19 16-May-19 17-May-19	09-May-19 10-May-19 11-May-19 14-May-19 16-May-19	17:20 13:50 9:45 10:17	10:50 14:28 10:30	# of Traps 2 1	Effort (trap days)	Catch 024	O Mortalities	o Sacrificed	C PUE	Wale Ware	Female 851	Ouvenile 22	o Catch	o Mortalities	O Sacrificed	O CPUEª	o o Catch	O Mortalities	o Sacrificed	o CPUEª
Reference	.oon Lake	RG_LNLK	LNLK-MT-02 LNLK-MT-03 LNLK-MT-04 LNLK-MT-05 LNLK-MT-06 LNLK-MT-07 LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638585 638569 638569 638569 638569 638032 638212 638032	5442223 5442211 5542211 5542211 5442211 5441679 5441988	10-May-19 11-May-19 14-May-19 16-May-19 17-May-19	10-May-19 11-May-19 14-May-19	13:50 9:45	14:28	1	0.03	•••••• <u> </u>		0	309	270	158	22		0	0	0				0
Reference	.oon Lake	RG_LNLK	LNLK-MT-03 LNLK-MT-04 LNLK-MT-05 LNLK-MT-06 LNLK-MT-07 LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638569 638569 638569 638569 638032 638212 638032	5442211 5542211 5542211 5442211 5441679 5441988	11-May-19 14-May-19 16-May-19 17-May-19	11-May-19 14-May-19	9:45	• •				0	0	909	13	11	0	0	0	0	0				0
Reference	.oon Lake	RG_LNLK	LNLK-MT-04 LNLK-MT-05 LNLK-MT-06 LNLK-MT-07 LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638569 638569 638569 638032 638212 638032	5542211 5542211 5442211 5441679 5441988	14-May-19 16-May-19 17-May-19	14-May-19			2	0.06	55	0	0	880	nd	nd	nd	0	0	0	0	0	0	0	0
Reference	oon Lake	RG_LNLK	LNLK-MT-05 LNLK-MT-06 LNLK-MT-07 LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638569 638569 638032 638212 638032	5542211 5442211 5441679 5441988	16-May-19 17-May-19			10:45	1	0.02	36	0	0	1,851	15	21	0	0	0	0	0	0	0	0	0
Reference	oon Lake	RG_LNLK	LNLK-MT-07 LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638032 638212 638032	5441679 5441988			9:45	10:30	1	0.03	134	0	0	4,288	62	42	30	0	0	0	0	0	0	0	0
Reference	oon Lake	RG_LNLK	LNLK-MT-08 LNLK-MT-09 LNLK-MT-10	638212 638032	5441988		17-May-19	9:23	9:50	3	0.06	227	0	0	4,036	78	129	20	0	0	0	0	0	0	0	0
Reference	oon Lake	RG_LNLK	LNLK-MT-09 LNLK-MT-10	638032	5441988	17-May-19	17-May-19	8:40	11:01	2	0.20	176	0	0	899	81	73	22	0	0	0	0	0	0	0	0
			LNLK-MT-10			17-May-19	17-May-19	9:11	10:32	2	0.11	252	0	3	2,240	107	117	28	0	0	0	0	0	0	0	0
			~~~~~~~~~~	638212	5441679	18-May-19	18-May-19	10:35	12:27	2	0.16	141	0	0	906	44	80	17	0	0	0	0	0	0	0	0
Grav			LNLK-M1-11	~~~~~~~	5441988	18-May-19	18-May-19	10:47	11:50	4	0.17	595	0	0	3,400	309	250	36	0	0	0	0	0	0	0	0
Grav			LNLK-MT-12	638596 638596	5442211 5442211	18-May-19 20-May-19	18-May-19 20-May-19	10:55 10:29	11:20 11:10	3	0.05 0.09	404 221	0	0 4	7,757 2,587	31 53	22 168	0	0	0	0	0	0	0	0	0
Grav			LNLK-MT-12 LNLK-MT-13	638032	5441679	20-May-19 20-May-19	20-May-19 20-May-19	10:29	11:50		0.09	26	0	0	398	19	6	1	0	0	0	0	0	0	0	0
Grav			LNLK-MT-14	638212	5441988	20-May-19	20-May-19	10:21	11:26	3	0.14	351	0	3	2,592	147	183	21	0	0		0	0		0	0
Grav						,	,		Total	30	2.63	3,092	0	10	1,175	nd	nd	nd	0	0	0	0	0	0	0	0
Grav			GRLK-MT-01	655677	5524570	14-May-19	15-May-19	11:00	11:00	5	5.00	194	0	0	39	nd	nd	nd	0	0	0	0	0	0	0	0
	rave Lake	RG_GRLK	GRLK-MT-02	655677	5524570	15-May-19	16-May-19	11:30	10:30	5	4.79	323	0	0	67	nd	nd	nd	0	0	0	0	0	0	0	0
									Total	10	9.8	517	0	0	53	nd	nd	nd	0	0	0	0	0	0	0	0
			ER-MT-01	627011	5446885	08-May-19	09-May-19	13:10	12:00	2	1.90	1	0	0	0.53	nd	nd	nd	0	0	0	0	7	0	0	3.7
		ļ	ER-MT-02	626961	5446838	09-May-19	10-May-19	12:15	15:15	2	2.25	51	0	0	23	15	33	3	0	0	0	0	1	0	0	0.44
			ER-MT-03	626975	5446855	13-May-19	14-May-19	9:48	12:01	2	2.18	63	0	0	29	31	26	6	0	0	0	0	1	0	0	0.46
			ER-MT-04	626975	5446855	14-May-19	15-May-19	12:15	12:01	2	1.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			ER-MT-05 ER-MT-06	626975 626975	5446855 5446855	15-May-19	16-May-19	11:28 9:00	13:20	3 2	3.23 1.98	0	0	0	0	0	0	0	0	0	0	0	0 8	0	0	0
Koo	loocanusa	•	ER-MT-06	626975	5446855	16-May-19 17-May-19	17-May-19 18-May-19	9:00	8:49 9:11	3	3.02	30	0	0	9.9	0	0	29	0	0	0	0	34	0	0	4.0 11
Res	Reservoir	RG_ER	ER-MT-08	627040	5446941	20-May-19	21-May-19	9:06	10:17	3	3.15	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.64
1	nglishman	_	ER-MT-09	627040	5446941	22-May-19	23-May-19	9:56	10:15	4	4.05	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0.99
C	Creek)		ER-MT-10	626912	5446771	27-May-19	28-May-19	11:05	13:00	3	3.24	4	0	0	1.2	4	0	0	0	0	0	0	0	0	0	0
			ER-MT-11	626759	5446562	27-May-19	28-May-19	11:30	13:10	3	3.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			ER-MT-12	626912	5446771	28-May-19	29-May-19	13:00	12:25	3	2.93	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.34
			ER-MT-13	626759	5446562	27-May-19	28-May-19	11:30	13:10	3	3.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		ļ	ER-MT-14	627054	5446950	03-Jun-19	04-Jun-19	15:15	9:30	4	4.28	0	0	0	0	0	0	0	0	0	0	0	1	0	•	0.23
			1						Total	39	40.62	149	0	0	3.7	nd	nd	nd	0	0	0	0	59		0	1.5
			GC-MT-01	629414	5437168	08-May-19	09-May-19	12:45	9:50	2	1.76	2	0	0	1.1	nd	nd -	nd	0	0	0	0	4	0	0	2.3
			GC-MT-02	629414	5437168	09-May-19	10-May-19	9:50	9:50 ^b	2	2.00	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2.0
			GC-MT-03	629433	5436633	13-May-19	14-May-19	13:31	13:31 ^b	4	4.00	14	0	0	3.5	9	_5 ∞∞∞∞	0		0	0	0	1	0	0	0.25
			GC-MT-04	629433	5436633	14-May-19	15-May-19	9:40 ^b	9:40	4	4.00	4	0	0	1.00	1	3	0	0	0	0	0	0	0	0	0
			GC-MT-05	629368	5436610	15-May-19	16-May-19	10:27	11:07	2	2.06	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.97
			GC-MT-06	629428	5436599	21-May-19	22-May-19	9:25	9:11	2	1.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	oocanusa		GC-MT-07 GC-MT-08	629375 629375	5436546 5436539	21-May-19 24-May-19	22-May-19 27-May-19	9:33 10:41	9:23 13:30	2	1.99 9.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reservoir	RG_GC	GC-MT-08 GC-MT-09	629375	5436539	24-May-19 24-May-19	27-May-19 27-May-19	10:41	13:30	3 5	9.35 15.55	0	0	0	0	0	0	0	0		0	0	0		0	0
(Gold	iold Creek)		GC-MT-09	629803	5436683	<b> </b>	27-May-19 28-May-19	13:45	9:45		1.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		ľ	GC-MT-11	630086	5436804	27-May-19 27-May-19	28-May-19	13:50	10:00	2 2	1.68	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1.2
			GC-MT-12	629348	5436526	28-May-19	29-Mav-19	10:15	9:15	4	3.83	2	0	0	0.52	nd	nd	nd	0	0	0	0	1	0	0	0.26
		ľ	GC-MT-13	629684	5437411	28-May-19	29-May-19	10:25	9:30	4	3.85	0	0	0	0	0	0	0	0	0	0	0	2	}•••••	0	0.52
			GC-MT-14	629460	5436550	20-Jun-19	21-Jun-19	9:30	8:20	9	7.56	11	0	0	1.5	8	3	0	0	0	0	0	1	0	0	0.13
			GC-MT-15	629460	5436550	21-Jun-19	22-Jun-19	8:30	10:45	9	8.62	8	0	0	0.93	2	6	0	0	0	0	0	0	0	0	0
									Total	56							Ů						17		0	

1896296

				U1 (NAD83, Z										Re	edside Shir					•	nose Dad	e	N	lorthern	Pikemir	inow
Area Type	Area Description	Area Code	Trap ID	Easting	Northing	Set Date	Lift Date	Set Time	Lift Time	# of Traps	Effort (trap days)	Catch	Mortalities	Sacrificed	CPUE"	Male	Female	Juvenile	Catch	Mortalities	Sacrificed	CPUE	Catch	Mortalities	Sacrificed	CPUE
			GO13-MT-01	652969	5514038	09-May-19	10-May-19	8:10	8:00	3	2.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-02	652916	5514075	09-May-19	10-May-19	8:10	8:50	3	3.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-03	652969	5514038	10-May-19	11-May-19	8:00	11:15	3	3.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-04	652969	5514075	10-May-19	11-May-19	8:50	11:20	3	3.31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-05	652969	5514038	11-May-19	13-May-19	11:20	8:30	3	5.65	1	0	0	0.18	nd	nd	nd	0	0	0	0	0	0	0	0
			GO13-MT-06	652969	5514075	11-May-19	13-May-19	11:20	8:50	3	5.69	1	0	0	0.18	nd	nd	nd	0	0	0	0	0	0	0	0
			GO13-MT-07	652969	5514038	13-May-19	15-May-19	8:00	9:00	2	4.08	0	0	0	0	0	0	0	un	un	un	un	un	un	un	un
			GO13-MT-08	652969	5514075	13-May-19	15-May-19	8:00	9:00	2	4.08	0	0	0	0	0	0	0	un	un	un	un	un	un	un	un
			GO13-MT-09	652969	5514038	15-May-19	17-May-19	8:00	9:00	2	4.08	0	0	0	0	0	0	0	un	un	un	un	un	un	un	un
	Goddard Marsh	RG_G013	GO13-MT-10	652969	5514075	15-May-19	17-May-19	8:00	9:00	2	4.08	0	0	0	0	0	0	0	un	un	un	un	un	un	un	un
			GO13-MT-11	652932	5514071	23-May-19	24-May-19	9:10	9:10	2	2.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-12	652958	5514046	23-May-19	24-May-19	9:15	9:00	2	1.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-13	652909	5514077	27-May-19	28-May-19	10:45	13:15	2	2.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-14	652956	5514044	27-May-19	28-May-19	10:45	13:15	2	2.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-15	652956	5514044	28-May-19	29-May-19	13:40	8:40	2	1.58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			GO13-MT-16	652909	5514077	28-May-19	29-May-19	13:40	8:45	2	1.59	0	0	0	0	0	0	0	1	0	0	0.63	0	0	0	0
			GO13-MT-17	652956	5514044	29-May-19	30-May-19	9:00	8:55	2	1.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
			GO13-MT-18	652909	5514077	29-May-19	30-May-19	9:15	9:00	2	1.98	1	0	0	0.51	1	0	0	0	0	0	0	0	0	0	0
									Total	42	56	3	0	0	0.054	nd	nd	nd	1	0	0	0.018	0	0	0	0

Notes: ID = Identifier; U1M = Universal
Transverse Mercator; NAD = North American
Datum; CPUE = catch-per-unit-effort; MT =
minnow trap; nd = not determined; un =
unknown due to missing field sheets (start and
end times are estimates based on previous
rlavs)
** Total catch-per-unit-effort (CPUE) = total # of

fish / effort (trap days).

^b Lift and set times are estimates.

Table D.7: Minnow Trap Catch and Ca

				Peam	outh (	Chub		Eastern	Brook 1	rout		Longr	ose Suc	ker		Mounta	in Whit	efish		Yello	ow Perc	:h		Larges	cale Su	cker	Wes	tslope (	Cutthroa	at Trout
Area Type	Area Description	Area Code	Catch	Mortalities	Sacrificed	CPUE ⁴	Catch	Mortalities	Sacrificed	CPUEª	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE⁴	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE*
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Φ.	Loon Lake	RG_LNLK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reference			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ref			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	<b>0</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
	Grave Lake	RG_GRLK	0	0	0	0	0	0	0	0	4	0	0	0.83	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	2.7
			0	0	0	0	0	0	0	0	4	0	0	0.41	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	1.3
			1	0	0	0.53	0	0	0	0	1	0	0	0.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	0	0	1.8 1.4	0	0	0	0	0	0	0	0	0	0	0	0	1 1	0	0	0.44 0.46	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Koocanusa		3	0	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.50	0	0	0	0
	Reservoir	RG_ER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.33 0	0	0	0	0.33 0	0	0	0	0
	(Englishman		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Creek)		2	0	0	0.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	0	0	0.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			14	0	0	0.34	0	0	0	0	1	0	0	0.025	0	0	0	0	3	0	0	0.074	2	0	0	0.049	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
			0	0	0	0 0.25	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
			o>>>>> 1	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0	0	······	0	0	0	0	0	0	0	0	0	0	0
			i	0	0	0.49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Koocanusa		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reservoir	RG_GC	n	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(~~~~~	0	0
	(Gold Creek)		0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0			0	0	0		0			0	0	0	3	٠		0.78	0	0	0	0	0	0	0	0
			2	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			~~~~	0	nfran	ngnom	0	0	0	0	0	~~~~	0	0	0	0	0	0	1	å~~~~	*****	0.12	0	0	0	0	0	0	0	0
			5	0		_	0	0	0	0			0	•	0	0	0	0	4		0	•	0	0	0	0	0	0	0	0

ower Elk Rive

Oxbow

RG_EROL

0 0 0

0 0 0

				Peam	outh C	hub	ı	Eastern	Brook T	rout		Longno	ose Suc	ker	1	Mountai	n White	fish		Yell	ow Perci	1		Largeso	cale Suci	ker	Wes	tslope C	utthroa	t Trout
Area Type	Area Description	Area Code	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE.ª	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE"	Catch	Mortalities	Sacrificed	CPUEª	Catch	Mortalities	Sacrificed	CPUEª
	Stanford Pond	RG_STPD		0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				39 39 10 10 30 4 1 35 36 6 32 35 36 6 32 35 36 47 50 21 120 21 120 38 10 1 1 30 31 35 36 37 38 38 39 47 47 50 50 50 50 50 50 50 50 50 50	0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	35 11 58 22 44 36 38 5.0 12 45 10 7.7 31 38 42 44 44 42 45 50 34 50 50 50 60 60 60 60 60 60 60 60 60 60 60 60 60						0 0 0 0 0 0 0 0 0 0 0 0 0 0					0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	50 13 7 19 35 38 22 231 27 294 144 305 252 218 201 34 159 114 246 3,980 0	0 0 0 0 0	0	19 15 7.7 10 9 6.9 7.9 32 7.6 99 47 71 41 59 51 60 41 30 60 41 30 60 0 88	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	Elk River Wetland d/s Grave Creek	RG_ELWDGC	0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0	0 0 0 1 1 2 1 2 0 2	0 0 0 0 0 0 0	0	0 0 0 0.31 0.41 0.86 0.15 0.29 0	0 1 1 8 0 0 15 5	0 0 0 0 0	0 0 0 0 0 0	0 0.30 0.30 2.5 0 0 2.2 0.74 1.3	0 0 0 0 11 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0	0	0 0 0 0	0 0 0 0	0 0 0 0 0		0 0 0 0 0 0 0	0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

1896296

				Peam					Brook 1			•	ose Suc				in White				ow Perci			Larges				•	Cutthroa	
Area Type	Area Description	Area Code	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE,	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE	Catch	alities	Sacrificed	CPUE"	Catch	Mortalities	Sacrificed	CPUE*	Catch	Mortalities	Sacrificed	CPUE"
			0	0	0	0	0	0	0	0	33	0	1	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	1	0	0	0.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	9	0	0	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	1	0	0	0.30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	34		0	6.0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	40	howw	0	7.0	1	0	0	0.18	0	سنسا	0	0	0	0	0	0	0	0	0	0
			un	un	un	un	un	un	min	un	un		un	un	un	un	un		un		un	un	un	un	un	un	un			un
			un	un	un	un	un	un		un	un	un	un	un	un	un	un		un			un	un	un		un	un	un		un
	Goddard Marsh	RG G013	un ••••••	un	un			un		un	un	 0200000		un ••••••		X		un		000000000000000000000000000000000000000		un	un			un	un	un		un •>>>
	Goddard Marsh	KG_G013	un	un		un	un		un	un	un			un			un	un	un	uiii		un	un			un	un			un
			0		0		0	0		0	2	0	0	1.0 0.51	0		سيسا	0	0	0	0		0	0	0	0	0	0	0	
			0	0	0		0	0	0		20		0	9.1	0	0		0		0			0	0		0	0	0		0
												0	0	0.45			}~~~			0			0	0	00:000:00	0		0		
				0				0	0	0	0			0			0	0				0	0			0				0
			0	0	0	0	0	0	0	0	16			10	0	0		0	0		0	0	0	0	0	0	0	0		0
			0	0	0	0	0	0	0	0	8	0	0	4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	35	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	201	0	1	3.6	1	0	0	0.018	0	0	0	0	0	0	0	0	0	0	0	0

Notes: ID = Identifier; U I M = Universal

Transverse Mercator; NAD = North American

Datum; CPUE = catch-per-unit-effort; MT =
minnow trap; nd = not determined; un =
unknown due to missing field sheets (start and
end times are estimates based on previous
davs)

a Total catch-per-unit-effort (CPUE) = total # of
fish / effort (trap days).

^b Lift and set times are estimates.

Table D.8: Seine Catch and Catch-Per-Unit-Effort, May 2019

							TM Zone 11U)				•			Red	dside Sh	niner				Longno	se Dac	e	Lo	ngnose	Sucke	er		Rainbo	w Trout		Nort	hern Pik	eminnov	,	Pe	eamout	th Chi
Area	Area Description	Area Code	Net ID	Date	Time	Easting	Northing	Length (m)	Distance (m)	# of Hauls	Area Seined (m²)	Catch	Mortalities	Sacrificed	CPUE a	Male	Female	Juvenile	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	10 0	Catch	Ē	Sacrificed
Reference	Loon Lake	RG LNLK	LNLK-SN-01	17-May-19	9:40	638596	5442211	5	15	1	75			0	5.5	181		71	0	0	0	0			0	0		0		0.027		0	0 (0
			ER-SN-01	08-May-19	14:20	627002	5446870	5	Total 20	1	75	416 125	0	0	5.5	181 40	164	71 25	0	0	0	0	0		0	0	2 0	0	0 0	0. 027	3		0 0.0				9
			ER-SN-02	10-May-19	11:22	626970	5446845	15	20	1	300	7	0	0	0.023	0	0	7	0	0	0	0	0		0	0	0	0	0	0	0		0 0.0			0	0
			ER-SN-03	10-May-19	11:39	626955	5446838	15	20	1	300	26	0	0	0.087	15	9	2	0	0	0	0	0	-	0	0	0	0	0	0	10		0 0.0			0	0
	Koocanusa	50.55	ER-SN-04	15-May-19	11:20	627016	5446900	15	30	1	450	191	0	0	0.42	19	17	155	7	0	0	0.016	0		0	0	0	0	0	0	33	-	0.0		_	0	0
	Reservoir	RG_ER	ER-SN-05	13-Jun-19	9:30	627001	5446882	10	20	1	200	10	0	0	0.050	4	6	0	0	0	0	0	0		0	0	0	0	0	0	1	-	0.0			0	0
	(Englishman Creek)		ER-SN-06 ER-SN-07	14-Jun-19 15-Jun-19	9:20 9:30	627030 626994	5447117 5446894	30	50 40	1	1,500 1,200	59 3	0	0	0.039	21	38	0	0	0	0	0	0		0	0	0	0	0	0	6	0	0 0.0			0	0
			ER-SN-08	15-Jun-19	10:10	627014	5446926	30	30	1	900	9	0	0	0.0023	2	7	0	0	0	0	0	0		0	0	0	0	0	0	0		0 (0	0
									Total	8	4,950	430	0	0	0.087	103	138	189	7	0	0	0.0014	0	0	0	Ö	0	0	0	0	53		0.0				9
			GC-SN-01	8-May-19	11:05		5437166	5	50	1	250	5	0	0	0.020	1	1	3	0	0	0	0	0		0	0	0	0	0	0	2		0.0			0	0
	Koocanusa	BO 00	GC-SN-02	9-May-19	10:40	629471	543721	15	50	1	750	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0		0 (0	0
	Reservoir (Gold Creek)	RG_GC	GC-SN-03 GC-SN-04	21-Jun-19 22-Jun-19	15:08 11:15	629460	5436550 5436550	30 30	20	1	600	2,211 1,109	0	0	3.7 1.8	6	3	2,200	0	0	0	0	0		0	0	0	0	0	0	230		0 0.0			0	0
	(Gold Creek)		GC-3N-04	22-Juli-19	11.13	029400	3430330	30	Total	4	2200	3325	0	0	1.5	14	8	3,303	-	0	0	0	0		0	0	0	0	0	0			0 0.0				0
	Elk River Wetland	RG ERWSF	ERWSF-SN-01	23-May-19	17:00	639124	5484643	15	10	1	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (_	_	0	0
	South of Fernie	KG_EKWSF							Total	1	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (<u> </u>	0	0	0
			EROL-SN-01	14-May-19	13:35	640814	5478202	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.020	0	0	0	0	0	0	0 () (0	0	0
	Lower Elk River		EROL-SN-02	14-May-19	13:45	640815	5478206	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0		0 (-		0
	Oxbow	RG_EROL	EROL-SN-03	14-May-19	14:00	640806	5478232	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0		0 (-	0	0
			EROL-SN-04	14-May-19	14:10	640803	5478244	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0		0 (0
									Total	4	200		0	0	0	0	0	0	0	0	0	0				0.0050	0	0		0			0 (0
			STPD-SN-01	9-May-19	15:45	639888	5483070	15	10	1	150	0	0	0	0	0	0	0	0	0	0	0	6			0.040	0	0	0	0	0	-	0 (0	0
			STPD-SN-02	9-May-19	16:00	639899	5483073	15	10	1	150	1	0	0	0.0067	nd	nd	nd	0	0	0	0	6	-		0.040	0	0	0	0	0		0 (0
Mine-exposed			STPD-SN-03	9-May-19	16:15	639885	5483108	15	10	1	150	38	0	0	0.25	15	14 0	9	41	0	0	0.27				0.013	0	0	0	0	0		0 (0	0
			STPD-SN-04	10-May-19	13:59	639836	5483189	10	5		50	0	0	0	0	0	0	0	0	0	0	0	2	-	0	0	0	0	0	0	0	-	-			0	0
			STPD-SN-05 STPD-SN-06	10-May-19 10-May-19	14:05 14:40	639835 639839	5483175 5483162	10	5	1	50 50	0	0	0	0	0	0	0	0	0	0	0				0.040	0	0	0	0	0		0 (-	0	0
			STPD-SN-07	10-May-19	14:50	639840	5483159	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0			0	0.040	0	0	0	0	0		0 0			0	0
			STPD-SN-08	10-May-19	15:12	639837	5483144	10	5	1	50	2	0	0	0.040	0	2	0	0	0	0	0		-	-	0.26	0	0	0	0	0	-	0 0			0	0
	Stanford Pond	RG_STPD	STPD-SN-09	10-May-19	15:22	639840	5483132	10	5	1	50	0	0	0	0.040	0	0	0	0	0	0	0			0	0.20	0	0	0	0	0		0 0			0	0
			STPD-SN-10	10-May-19	15:30	639842	5483130	10	5	1	50	1	0	0	0.020	1	0	0	0	0	0	0	-		-	0.040	0	0	0	0	0		0 (_	-		0
			STPD-SN-11	10-May-19	15:45	639854	5483118	10	5	1	50	0	0	0	0.020	0	0	0	0	0	0	0	1		-	0.020	0	0	0	0	0	-	0 (0	0
			STPD-SN-12	13-May-19	11:14	639885	5483108	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	1			0.020	0	0	0	0	0		0 (0
			STPD-SN-13	13-May-19	11:30	639885	5483107	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0				0.020	0	0	0	0	0		0 (0
			STPD-SN-14	13-May-19	11:40	639889	5483133	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	4		-	0.080	0	0	0	0	0		0 (0	0
			STPD-SN-15	13-May-19	11:56	639837	5483144	10	5	1	50	0	0	0	0	0	0	0	0	0	0	0	6			0.12	0	0	0	0	0		0 (_	-	0	0
				,		1			Total	15	1,050	42	0	0	0.040	nd	nd	nd	41	0	0	0.039	46	0		0.044	0	0	0	0	0	0	0 (ر	0	0	0
			ELWDGC-SN-01	10-May-19	13:45	653029	5521435	15	15	1	225	0	0	0	0	0	0	0	0	0	0	0	2			0.0089	0	0	0	0	0	0	0 (_	0	0
			ELWDGC-SN-02				5521340	10	10	1	100	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0 (0
	Elk River Wetland d/s Grave Creek	RG_ELWDGC	ELWDGC-SN-03	10-May-19				10	10	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (<i>ا</i> ر	0	0	0
	u/S Glave Creek		ELWDGC-SN-04					30	20	1	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (٠ ر	0	0	0
									Total	4	1,025	0	0	0	0	0	0	0	0	0	0	0	2	0	0 (0.0020	0	0	0	0	0	0	0 (,	0	0	0
			GO13-SN-01	9-May-19	14:00		5514063	15	15	1	225	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0		0 (/	0	0	0
	Goddard Marsh	RG GO13	GO13-SN-02	9-May-19	14:15		5514088	10	10	1	100		0	0	0	0	0	0	0	0	0	0			0	0	0	0		0	0		0 (0	
	Journal Walsil	1.0_0010	GO13-SN-03	9-May-19	14:30	652909	5514088	10	10	1	100		0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0			0 (0
									Total	3	425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 (<u>, </u>	0	0	0

Notes: ID = identifier; UTM = Universal Transverse Mercator; NAD = North American Datum; CPUE = catch-per-unit-effort; SN = seine net; nd = not determined.

Notes: ID = identifier; UTM = Universal Transverse Mercatc ^a Total catch-per-unit-effort (CPUE; number of fish / m²) cal

 $^{^{\}rm a}$ Total catch-per-unit-effort (CPUE; number of fish / ${\rm m}^{\rm 2}$) calculated as the number of fish caught over the area seined.

Table D.8: Seine Catch and Catch-Per-Unit-Effort

			иb	b Yellow Perch				White	Sucker	,		Bul	II Trout	t		Kok	anee		La	rgesca	ale Suc	cker	Pumpkinseed				Mountain Whitefish				
Area	Area Description	Area Code	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE ª	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a	Catch	Mortalities	Sacrificed	CPUE a
Reference	Loon Lake	RG_LNLK	0 0	0 0	0 0	0 0	0 0	0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0	0 0	0	0 0	0 0	0 0							
			0.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		С	0.0033	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Koocanusa		0.057	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.0067	0	0	0	0	0	0	0	0	1	0	0	0.0033
	Reservoir	RG ER	0.12	9	0	0	0.020	69 0	0	0	0.15	0	0	0	0.0022	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	(Englishman Creek)	KG_EK	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0.0020	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0.0050
			0	0	0	0	0	0	0	0	0	2	0	0	0.0022	4	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0.013
			0.023 0.21	9	0	0	0.0018	69	0	0	0.014 0	0	0	0	0.0006	36	0	0	0.0073	3	0	0	0.0006	0	0	0	0	19	0	0	0.0038
	Koocanusa		0.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reservoir	RG_GC	0.090	30	0	0	0.015	0	0	0	0.12	0	0	0	0.0017	0	0	0	0	0	0	0	0	1	0	0	0.0017	0	0	0	0
	(Gold Creek)		0.0050	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elk River Wetland South of Fernie		0.025	30	0	0	0.014 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0005	0	0	0	0
		RG_ERWSF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lower Elk River		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Oxbow	RG_EROL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OXDOW		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		DO 0775	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine-exposed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0. (0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stanford Pond	RG_STPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elk River Wetland	RG ELWDGC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	d/s Grave Creek	RG_ELWDGC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0.018
	Goddard Marsh	RG_GO13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0.12
	Goudaid Maisil	1.0_0013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.010
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0.040

rr, NAD = North American Datum; CPUE = catch-per-unit-effort; SN = seine net; nd = not determined. culated as the number of fish caught over the area seined.

Table D.9: In Situ Water Quality for Reference and Mine-Exposed Areas, May to June 2019

				(NAD93, 2	ΓM Zone 11U)	Date			Field Pa	rameters			-
ea De	Area Description	Area Code	Туре	Easting	Northing	Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductivity (µS/cm)	Conductivity (µS/cm)	pН	Notes No
						06-May-19 07-May-19	14.7 16.7	11.9 9.35	124 98.5	243 262	196 221	8.48 8.37	-
						08-May-19 09-May-19 10-May-19	16.9 14.7 16.4	9.75 10.8 11.0	101 106 114	251 252 250	212 203 207	8.61 8.69 8.72	-
	Loon Lake	RG_LNLK	Middle of lake	638585	5442223	11-May-19 14-May-19	16.7 19.4	11.2 9.49	115 104	250 250 255	210 229	8.53 8.41	-
						16-May-19 17-May-19	19.5 17.6	10.2 9.42	124 98.9	252 255	226 219	8.56 8.87	-
						18-May-19 20-May-19	15.8 13.5	8.35 9.66	84.3 92.7	254 252	209 197	8.86 8.91	
			Outflow					8.92 toring occurred			213	8.78	-
	Grave Lake	RG_GRLK	-	655479	5524705	14-May-19 15-May-19	13.9 10.7	9.40 10.1	91.0 91.2	301 299	237 217	8.12 8.05	Area Supporting Study
						07-May-19 08-May-19 09-May-19	11.3 15.4 16.7	9.75 10.7 10.6	89.5 101 107	282 288 289	207 234 239	7.94 8.15 8.36	-
						10-May-19 11-May-19	13.1 16.7	11.2 7.10	107 80.1	279 274	216 230	8.36 8.35	-
						13-May-19 14-May-19	14.2 14.1	9.20 8.80	98.0 94.0	249 233	198 184	8.15 8.21	
						15-May-19 16-May-19	14.2 10.7	9.10 12.0	98.0 120	220 191	175 138	8.17 8.01	-
						17-May-19 18-May-19	9.90 9.30 6.70	8.70 9.07 8.51	85.0 78.9 69.6	189 205 381	135 144 249	8.15 8.37 8.29	-
	Koocanusa					20-May-19 21-May-19 22-May-19	8.50 8.40	9.91 10.3	85.0 87.9	282 323	193 221	8.32 8.36	-
	Reservoir (Englishman	RG_ER	Inflow	626957	5446850	23-May-19 27-May-19	12.7 11.5	9.61 9.93	90.8 91.1	228 217	175 161	8.11 8.08	-
	Creek)					28-May-19 29-May-19	13.4 13.9	9.96 10.0	96.3 97.5	212 198	166 156	8.16 8.08	
						31-May-19 01-Jun-19	13.0 14.0	10.0 9.96	95.1 95.9	201 199	155 157	8.08 8.05	
						03-Jun-19 04-Jun-19	18.9 12.7	7.68 6.82	81.9 64.4	186 177	165 136	7.81 8.49	-
						06-Jun-19 11-Jun-19 13-Jun-19	14.2 16.5 16.5	7.74 8.10 8.50	75.0 91.0 96.0	178 207 208	142 174 173	8.26 7.96 7.59	-
						14-Jun-19 15-Jun-19	15.5 16.2	8.70 9.20	96.0 96.0	213 217	174 180	7.92 8.11	-
						18-Jun-19 19-Jun-19	20.7	8.10 8.60	99.0 92.4	208 207	191 172	7.80 8.01	-
						20-Jun-19 07-May-19	18.4 12.7	8.69 9.20	92.8 87.0	211 154	185 117	8.40 7.95	_
						08-May-19 09-May-19	8.40 14.3	11.5 11.4	97.3 119	150 237	103 203	7.67 8.65	
						10-May-19 13-May-19	11.1 8.00	11.4 8.20	104 76.0	264 225	192 151	8.09 7.77	-
						14-May-19 15-May-19 16-May-19	16.1 10.2 9.60	8.21 10.1 10.7	92.0 97.0 103	246 262 146	205 183 103	8.20 7.65 8.10	-
	Koocanusa Reservoir	RG_GC	Inflow	629388	5436988	21-May-19 22-May-19	7.70 7.80	9.90	83.1 85.1	178 139	119 93.6	8.41 8.49	
	(Gold Creek)					24-May-19 27-May-19	11.1 11.9	8.34 9.64	76.8 90.4	178 179	130 134	8.30 8.01	
						28-May-19 29-May-19	12.9 13.4	10.2 9.78	96.8 93.9	171 179	132 139	8.02 8.09	-
						21-Jun-19 22-Jun-19	18.7 17.9	8.62 8.23	90.9 90.6	209 212	180 187	8.54 8.69	-
						23-Jun-19 24-Jun-19 06-May-19	18.3 16.6 13.8	8.75 8.21 9.09	92.9 84.5 87.9	217 215 505	187 180 397	8.72 8.57 7.76	
				640531 640458	5496858 5486845	07-May-19 08-May-19	12.3 11.9	9.09 9.00 8.70	94.0 90.0	459 449	348 337	7.76 7.91 7.91	-
						09-May-19 10-May-19	14.4 13.9	8.40 8.10	93.0 89.0	453 417	361 392	7.86 7.93	
						11-May-19 13-May-19	14.7 16.5	7.70 8.90	86.0 91.1	404 413	325 346	7.83 8.06	
		RG_ERIMF	Outflow			14-May-19 16-May-19	15.6 17.4	8.92 8.63	89.9 89.9	423 371	347 318	8.03 8.22	
						17-May-19 18-May-19 20-May-19	14.6 13.6 11.4	9.90 9.07 8.17	111 85.4 74.9	366 345 352	293 270 261	7.72 7.62 8.30	-
						21-May-19 22-May-19	10.7 12.0	9.13 10.4	82.4 97.9	361 358	262 271	8.04 7.86	-
	Elk River Impoundment					23-May-19 06-May-19	11.8 13.4	7.97 8.65	74.2 84.3	345 491	258 371	7.59 7.84	-
	in Fernie	_				07-May-19 08-May-19	12.5 12.7	8.10 8.50	85.0 90.0	409 408	312 312	7.72 7.81	
						09-May-19 10-May-19	13.1 14.2	7.50 6.90	80.0 76.0	396 406	305 322	7.83 7.90	•
						11-May-19 13-May-19 14-May-19	14.6 17.4 17.4	8.20 8.73 8.84	90.0 90.6 92.4	410 393 385	329 337 330	7.84 8.05 8.12	
			Inflow			15-May-19 16-May-19	17.4 17.1 12.9	8.91 8.68	92.4 92.8 82.7	373 199	317 138	8.12 8.22 8.25	
						17-May-19 18-May-19	11.2 13.4	7.90 7.63	82.0 72.5	171 337	126 262	8.10 7.59	-
						20-May-19 21-May-19	11.3 10.7	8.37 7.80	77.2 70.3	348 350	257 254	8.18 8.04	
						22-May-19 23-May-19	12.1 12.3 12.2	10.2 10.8 14.5	95.3 102 136	340 363 527	257 275 398	7.99 7.76 8.03	-
						17-May-19 18-May-19 20-May-19	8.10 7.40	14.5 13.8 14.8	136 116 123	527 558 586	398 379 390	7.48 8.29	•
					5484618	21-May-19 22-May-19	8.80 9.10	12.6 14.8	103 127	608 588	420 409	7.46 7.94	-
			Outflow	639104		23-May-19 24-May-19	10.3 17.1	9.02 8.12	81.2 83.8	345 523	248 443	7.81 8.24	-
						27-May-19 28-May-19	10.7 10.8	10.6 14.7	97.0 134	538 529	397 386	7.77	-
						29-May-19 30-May-19 31-May-19	12.7 12.9 11.3	16.5 19.3 18.7	156 185 171	499 511 511	381 392 376	8.35 7.58 7.54	-
	Elk River	BC ==				01-Jun-19 14-May-19	11.3 11.9 11.4	20.6 11.6	171 191 106	511 509 542	376 379 402	7.54 7.73 7.69	-
	Wetland South of Fernie	RG_ERWSF				15-May-19 16-May-19	13.5 12.1	17.4 13.5	170 126	535 536	418 404	7.32 8.00	-
						17-May-19 18-May-19	9.20 8.30	8.70 12.6	86.0 106	575 562	402 383	7.46 7.58	
			IB	60000	E40401=	20-May-19 22-May-19	7.70 8.80	14.2 16.7	119 144	586 585	393 404	8.18 8.03	-
			Inflow	639099	5484615	23-May-19 24-May-19 27-May-19	16.1 14.9 11.9	9.11 8.35 8.87	93.8 84.3 83.2	570 646 529	472 521 396	7.65 7.42 7.43	-
						28-May-19 29-May-19	11.3	11.4 15.3	104 145	529 528 504	390 386	7.43 7.88 8.25	
						30-May-19 31-May-19	13.7 11.5	15.7 13.9	151 128	489 489	383 362	7.68 7.61	
		Ì	I	Ì	Ī	01-Jun-19	11.9	17.3	160	496	371	7.76	_

					ΓM Zone 11U)				Field Pa	rameters			
Area Type	Area Description	Area Code	Туре	Easting	Northing	Date	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Specific Conductivity (µS/cm)	Conductivity (μS/cm)	рН	Notes
Mine-exposed					5477971	06-May-19 07-May-19 08-May-19 09-May-19	8.70 8.70 8.70 7.10	12.4 10.6 10.6 see I	107 102 102	470 396 400 388	324 273 275 255	7.53 7.73 7.76 7.78	- - - Oxygen data unreliable
Mine			Outflow	640888		10-May-19 11-May-19 13-May-19	7.80 8.30 10.6	9.90 9.60 8.45	93.0 92.0 76.5	395 375 402	265 256 291	7.70 7.67 7.42	
						14-May-19 16-May-19 17-May-19	8.80 7.60 6.90	9.33 7.88 7.10	80.7 66.2 65.0	383 391 396	264 260 258	7.68 8.00 7.76	
		RG EROL				18-May-19 20-May-19 22-May-19	6.80 6.20 7.90	8.67 9.28 9.41	71.1 74.8 79.1	387 393 403	253 252 271	7.54 7.80 7.81	
	Lower Elk					27-May-19 28-May-19 29-May-19 06-May-19	10.6 11.5 11.5 12.5	9.85 9.60 10.0 11.3	88.5 88.5 92.1 106	379 410 374 503	275 304 278 382	7.74 7.80 7.72 7.57	
	River Oxbow					07-May-19 08-May-19 09-May-19	11.0 9.10 7.20	7.80 7.70 see i	79.0 76.0	429 426 437	313 297 287	7.67 7.67 7.49	- - Oxygen data unreliable
						10-May-19 11-May-19 13-May-19	8.20 9.10 12.5	7.50 7.30	74.0 68.4	429 429 420	291 299 320	7.61 7.50 7.55	Oxygen data unreliable
			Inflow	640828	5478162	14-May-19 15-May-19 16-May-19 17-May-19	11.8 12.9 8.90 7.60	7.96 8.21 8.48 6.20	73.0 78.0 73.4 61.6	419 410 428 421	314 315 296 281	7.60 7.21 7.90 7.72	- - -
						18-May-19 20-May-19 22-May-19	7.40 7.20 9.20	7.38 7.46 7.30	61.7 62.0 63.3	405 419 420	269 277 292	7.55 7.64 7.79	-
						27-May-19 28-May-19 29-May-19	11.3 13.7 13.9	9.68 7.16 10.1	88.4 69.1 98.1	389 414 387	286 324 304	7.69 7.61 7.75	
				639899	5483073	06-May-19 07-May-19 08-May-19 09-May-19	15.6 15.4 12.7 13.2	17.2 13.5 14.3 13.0	172 152 151 139	475 402 405 405	389 328 310 313	8.28 8.12 8.17 8.19	
						10-May-19 11-May-19 13-May-19	15.7 14.7 15.5	15.0 15.2 13.1 13.7	172 147 138	401 401 393	329 322 322	8.21 8.16 8.38	-
						14-May-19 15-May-19 16-May-19	15.7 15.1 15.2	15.0 13.9 13.0	151 138 130	395 394 401	324 319 326	8.35 8.36 8.46	-
			Outflow			17-May-19 18-May-19 20-May-19 21-May-19	11.9 8.70 6.30 6.50	10.7 8.45 10.8 10.2	113 73.3 87.6 83.0	421 402 425 422	316 276 272 273	7.80 7.72 8.25 8.21	
	Stanford Pond					22-May-19 23-May-19 24-May-19	7.90 8.30 15.5	10.8 11.1 9.87	91.3 95.3 101	419 417 400	282 284 333	8.25 8.20 8.49	-
		RG_STPD				27-May-19 28-May-19 29-May-19	11.5 9.90 12.5	10.5 10.9 8.76	95.6 96.2 82.2	390 399 394	287 284 300	7.97 8.40 8.40	
						30-May-19 31-May-19 01-Jun-19 03-Jun-19	11.7 10.8 8.60 7.00	13.0 12.0 10.9 5.71	121 109 93.3 47.5	383 383 384 403	286 278 263 265	7.97 7.94 7.90 7.38	- - -
				639836	5483189	04-Jun-19 06-May-19 07-May-19	10.2 13.9 15.0	8.55 12.9 13.0	76.2 125 144	387 493 411	277 389 333	7.95 7.77 8.08	
			Inflow			08-May-19 09-May-19 10-May-19	12.9 13.0 17.0	15.7 12.3 11.5	166 131 128	407 408 426	314 315 341	8.15 8.13 8.16	-
						11-May-19 13-May-19 14-May-19 15-May-19	14.4 15.6 15.6 15.1	10.3 13.0 15.5 14.1	114 130 159 141	409 396 393 390	327 324 323 316	8.03 8.35 8.36 8.44	-
						16-May-19 17-May-19 18-May-19	15.1 5.50 8.80	12.3 8.30 8.94	123 78.0 77.1	397 342 407	322 214 282	8.50 8.30 7.71	
						20-May-19 21-May-19 22-May-19	4.10 3.40 6.80	7.01 6.41 8.77	53.1 48.8 72.3	427 429 426	254 253 277	8.05 7.94 8.26	-
						23-May-19 24-May-19 27-May-19 28-May-19	8.60 12.7 10.9 9.70	8.52 10.0 9.33 9.16	72.9 94.4 84.8 80.8	417 409 400 401	287 313 293 283	8.14 8.42 7.73 8.53	- - -
						29-May-19 30-May-19 31-May-19	4.50 11.1 9.40	5.30 12.6 9.63	41.5 118 84.8	405 393 385	247 288 271	7.90 8.05 7.82	
						01-Jun-19 03-Jun-19 04-Jun-19	9.40 10.5 10.9	9.54 7.09 7.47	83.5 63.4 67.8	388 394 388	272 285 284	7.84 7.73 7.89	
			Outflow	653181	5521258	07-May-19 08-May-19 09-May-19 10-May-19	9.70 8.80 8.50 11.0	11.0 8.78 8.79 10.8	96.7 75.7 74.7 98.0	471 473 472 476	334 327 324 348	8.84 8.81 8.92 8.87	- - -
	Elk River Wetland d/s	RG ELWDGC				11-May-19 13-May-19 14-May-19	10.3 14.8 13.9	10.9 9.59 10.5	97.7 96.5 102	488 495 505	351 399 396	7.48 7.50 7.44	
	Grave Creek		Inflow	653179	5521292	07-May-19 08-May-19 09-May-19 10-May-19	9.20 7.70 7.60 11.1	11.5 8.55 10.2 10.8	95.8 72.1 87.0 98.6	480 483 489 474	344 323 326 348	8.64 8.68 8.67 8.86	
			iiiiow	0031/9	JJZ 1Z9Z	11-May-19 13-May-19 14-May-19	9.30 13.9 14.9	9.84 10.0 9.64	98.6 86.6 97.6 96.1	506 493 508	348 355 388 411	7.49 7.53 7.55	- - -
			-	652976 652966	5514051 5514058	13-May-19 16-May-19	11.7 11.3 Field shee	6.30 5.85 t missing for da	57.8 53.7 ta collected be	1,023 1,034 tween May 9 and	736 765 22, 2019	7.89 7.82	Data collected as part of the Lentic Area Supporting Study
	Goddard		Outflow	652932 652906	5514071 5514082	23-May-19 24-May-19 27-May-19 28-May-19	6.90 9.70 10.5 13.6	8.56 8.30 8.07 7.21	70.6 73.2 72.1 70.6	1,085 1,072 1,064 1,076	709 759 767 830	7.94 7.85 8.31 8.02	- - -
	Marsh	RG_GO13		032900	JJ 14U8Z	28-May-19 29-May-19	10.5	6.18	55.5	1,075 1,065 etween May 9 and	769	8.02	-

Note: "-" indicates information not available or none recorded.

23-May-19 24-May-19 27-May-19 28-May-19 29-May-19

652958

652967

5514046

5514031

Table D.10: Meristics for Female Redside Shiner Collected from Reference and Mine-Exposed Areas, May to June, 2019

		male Redside	I		Age	I	·		urvey	_		Total Length		Body W	eight (g)	Residual	Gonadosomatic	Liver
Area	Area Description	Area Code	Processing Date	Fish ID	Structure Collected	Tissue Sampled	D	Е	L	т	Age (y)	Total Length (cm)	Fork Length (cm)	Pre ^b	Post ^b	Gonad Weight (g)	Gonadosomatic Index ^d	Liver Weight (g)
			11-May-19 11-May-19	LNLK-01 LNLK-02	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	<u>-</u>	13.3 10.9	11.8 9.8	23.120 16.330	22.550 15.400	1.756 1.142	10% 13%	0.552 0.424
			11-May-19 11-May-19	LNLK-03 LNLK-04	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A		9.0 10.5	8.3 9.9	8.040 12.670	7.950 11.707	0.646 0.743	9.2% 13%	0.200 0.347
			11-May-19 11-May-19	LNLK-05 LNLK-06	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	<u>-</u>	12.8 11.0	11.9 9.9	22.430 13.070	21.153 12.232	1.312 1.031	12% 14%	0.882 0.373
			11-May-19 11-May-19	LNLK-07 LNLK-08	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	<u>-</u>	9.4 11.1	8.5 10.1	9.340 13.100	8.812 12.376	0.860 0.923	15% 13%	0.103 0.415
			11-May-19 11-May-19	LNLK-09 LNLK-10	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	<u>-</u>	10.9 11.5	9.8 10.4	13.930 14.370	12.762 13.649	1.018 0.885	16% 11%	0.473 0.411
			17-May-19 17-May-19	LNLK-11 LNLK-12	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	2	7.4 7.5	6.7 6.9	3.762 3.896	3.175 3.451	0.211 0.249	21% 18%	0.071 0.074
Reference	Loon Lake	RG_LNLK	17-May-19 20-May-19	LNLK-13 LNLK-14	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	2	8.5 8.9	7.7 7.9	6.329 7.221	5.607 6.003	0.281 0.272	16% 21%	0.128 0.154
			20-May-19 20-May-19	LNLK-15 LNLK-16	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	4 2	9.8 9.0	8.9 8.1	8.677 7.215	7.686 6.177	0.543 0.518	18% 22%	0.204 0.169
			20-May-19 20-May-19	LNLK-17 LNLK-18	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	3 2	7.6 7.8	6.9 7.1	4.126 5.003	3.598 4.459	0.183 0.433	17% 20%	0.051 0.114
			20-May-19 20-May-19	LNLK-19 LNLK-20	pf, oto pf, oto	RO, GO, M	+~~+	A A	A A	A A	3	8.5 8.3	7.5 7.2	6.289 5.928	5.278 5.185	0.293 0.359	21% 19%	0.114 0.123
								nple	Size	(n)	10 2.7	20 9.7	20 8.8	20 10.242	20 9.461	20 0.683	20 16%	20 0.269
						s	Standar	rd D	Med eviati		3.0	9.2 1.7	8.4 1.6	8.359 5.746	7.818 5.653	0.595 0.428	16% 3.9%	0.185 0.212
								anda	ard Er Minin	ror	0.2	0.4 7.4	0.4 6.7	1.285 3.762	1.264 3.175	0.096 0.183	0.87% 9.2%	0.047 0.051
			13-Jun-19	ER-01	pf, oto	RO, GO, M	A		Maxim A		4.0	13.3 13.6	11.9 12.1	23.120 20.956	22.550 18.678	1.756 1.042	22% 16%	0.882 0.394
			13-Jun-19	ER-02	pf, oto	RO, GO, M	Α	Α	Α	Α	3	12.4	10.9	17.535	16.124	0.976	14%	0.351
	Koocanusa Reservoir		21-Jun-19	ER-03	pf, oto	RO, GO, M			A Size Avera		3	3	9.0	11.182 3	9.983 3	0.351 3	14% 3	0.178 3
	(Englishman Creek)	RG_ER				c	Standar		Med	ian	3.0	12.1 12.4	10.7 10.9	16.558 17.535	14.928 16.124	0.790 0.976	14% 14%	0.308 0.351
	Creek)					s		anda	eviati ard Er Minin	ror	0.7	1.6 0.9	1.6 0.9	4.960 2.864	4.469 2.580	0.381	1.2% 0.71%	0.114 0.066
								M	/laxim	um	3.0	10.4 13.6	9.0	11.182 20.956	9.983 18.678	1.042	14% 16%	0.178
			22-Jun-19 22-Jun-19	GC-01 GC-02	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A	A	A	3	10.2 11.6	9.0	9.078 13.405	8.304 11.973	0.307	12% 14%	0.097 0.246
			24-Jun-19 24-Jun-19	GC-03 GC-04	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A A	A A	A	1	10.0 9.7	8.6 8.4	8.669 8.727	7.944 7.730	0.580 0.335	15% 15%	0.134 0.117
			24-Jun-19 24-Jun-19	GC-05 GC-06	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A A	A	A	3 2	10.6 10.2	8.5 8.9	11.553 9.733	10.068 8.713	0.473 0.326	17% 14%	0.176 0.130
	Koocanusa		24-Jun-19 24-Jun-19	GC-07 GC-08	pf, oto pf, oto	RO, GO, M RO, GO, M	+ -	A A	A	A A	3 2	10.4 10.3	9.2 9.1	9.613 9.886	9.493 8.814	0.351 0.550	4.9% 16%	0.131 0.121
	Reservoir (Gold Creek)	RG_GC	24-Jun-19 24-Jun-19	GC-09 GC-10	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	4 1	11.3 10.2	9.9 9.0	12.781 9.746	11.513 8.381	0.517 0.307	14% 17%	0.570 0.108
			24-Jun-19	GC-11	pf, oto	RO, GO, M		A nple	A Size	A (n)	3 11	11.3 11	10.2 11	14.482 11	12.824 11	0.637 11	16% 11	0.162 11
								4	Avera Med		2.5 3.0	10.5 10.3	9.2 9.0	10.698 9.746	9.614 8.814	0.437 0.428	14% 15%	0.181 0.131
						S	Standar Sta		eviati ard Er		1.0 0.3	0.6 0.2	0.7 0.2	2.025 0.611	1.753 0.528	0.120 0.036	3.4% 1.03%	0.135 0.041
									Minin Iaxim		1.0 4.0	9.7 11.6	8.4 10.4	8.669 14.482	7.730 12.824	0.307 0.637	4.9% 17%	0.097 0.570
			15-May-19 15-May-19	ERIMF-01 ERIMF-02	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A A	A	A A		7.8 7.5	7.2 6.9	4.500 4.406	4.337 4.362	0.370 0.479	12% 12%	0.043 0.098
			15-May-19 15-May-19	ERIMF-03 ERIMF-04	pf, oto pf, oto	RO, GO, M RO, GO, M	A A	A A	A A	A A	- 3	7.0 7.5	6.4 7.0	3.415 4.424	3.213 3.987	0.475 0.252	20% 16%	0.067 0.118
			17-May-19	ERIMF-05 ERIMF-06	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A A	A	A A	3	7.2 6.0	6.5 5.6	3.898 2.296	3.331 1.984	0.189 0.162	19% 21%	0.098 0.061
	Elk River Impoundment in Fernie	RG_ERIMF	21-May-19 23-May-19 23-May-19	ERIMF-07 ERIMF-08	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A	A	A	3 5	9.4 9.0	8.6 8.2	9.745 7.436	8.581 6.770	0.671 0.486	19% 15%	0.358 0.179
			23-May-19 23-May-19	ERIMF-09 ERIMF-10	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A A	A	A A	3	8.8 7.5	8.0 6.8	6.482 4.858	5.940 4.368	0.406 0.321	15% 17%	0.120 0.105
			23-May-19 23-May-19	ERIMF-11	pf, oto	RO, GO, M RO, GO, M	A	A A	A	A	3	7.6	6.8	4.533	4.009	0.197	16% 23%	0.078 0.020
			23-May-19	ERIMF-12 ERIMF-13	pf, oto pf, oto	RO, GO, M	Α	Α	A	Α	2	6.5 6.8	5.9 6.3	2.700 3.354	2.267	0.188	19%	0.068
Mine-exposed			23-May-19 23-May-19	ERIMF-14 ERIMF-15	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A	A	A	2	7.5 7.3	6.8	3.957 4.254	3.468 3.615	0.202	17% 20%	0.073
			23-May-19	ERIMF-16	pf, oto	RO, GO, M		-	A Size Avera		13	7.0 16	6.3 16	3.556 16	3.089 16	0.168 16	18% 16	0.144 16
							· · · · · · · · · · · · · · · · · · ·		Med	ian	3.0	7.5 7.5	6.9 6.8	4.613 4.330	4.141 3.801	0.313 0.237	17% 18%	0.107 0.088
						S	Standar Sta	anda	ard Er	ror	0.3	0.9	0.8	1.865 0.466	1.693 0.423	0.152 0.038	3.1% 0.77%	0.077
				T	1	I	,	М	Minim Maxim	um	5.0	9.4	5.6 8.6	2.296 9.745	1.984 8.581	0.162 0.671	12% 23%	0.020
			24-May-19 29-May-19	ERWSF-01 ERWSF-02	pf, oto pf, oto	RO, GO, M	A	A A	A A	A A	3	10.0 8.0	9.1 7.3	8.431 4.750	7.977 4.322	0.678	13% 15%	0.244
	Elk River		30-May-19	ERWSF-03	pf, oto	RO, GO, M		•	Size	` ′	3 3	6.1 3	5.7 3	4.547 3	4.148 3	0.260 3	14% 3	0.580 3
	Wetland South of Fernie	RG_ERWSF							Avera Med	ian	3.3 3.0	8.0 8.0	7.4 7.3	5.909 4.750	5.482 4.322	0.410 0.293	14% 14%	0.305 0.244
						S	Standar Sta	anda	ard Er	ror	0.6 0.3	2.0 1.1	1.7 1.0	2.186 1.262	2.162 1.248	0.232 0.134	0.88% 0.51%	0.250 0.144
									Minin //axim		3.0 4.0	6.1 10.0	5.7 9.1	4.547 8.431	4.148 7.977	0.260 0.678	13% 15%	0.092 0.580
			15-May-19 24-May-19	STPD-01 STPD-02	pf, oto pf, oto	RO, GO, M RO, GO, M	A	A A	A A	A A	2	9.6 8.1	8.7 7.2	8.589 5.794	7.745 4.951	0.535 0.392	16% 21%	0.194 0.113
			24-May-19 24-May-19	STPD-03 STPD-04	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A A	A A	A A	3 2	8.4 8.4	7.4 7.5	6.124 5.704	5.534 5.066	0.536 0.407	18% 18%	0.063 0.091
			24-May-19 24-May-19	STPD-05 STPD-06	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A A	A A	A A	2	7.5 7.9	6.7 7.3	4.526 5.354	3.897 4.799	0.290 0.314	20% 16%	0.111 0.103
			24-May-19 30-May-19	STPD-07 STPD-08	pf, oto pf, oto	RO, GO, M RO, GO, M	Α	A A	A	A A	1	6.9	6.4 6.7	2.859 3.842	2.631 3.348	0.189 0.254	15%	0.043 0.088
			30-May-19 30-May-19 30-May-19	STPD-08 STPD-09 STPD-10	pf, oto	RO, GO, M RO, GO, M RO, GO, M	l+-	A A	A A	A A A	2 2 3	7.5 8.2 8.2	7.8	5.422	4.647	0.254 0.203 0.552	19% 18% 26%	0.088 0.070 0.077
	Stanford Pond	RG_STPD	31-May-19	STPD-11	pf, oto pf, oto	RO, GO, M	1	Α	Α	Α	3	8.2 7.8	7.8 7.2	5.570 4.612 3.852	4.680 4.009	0.245	18%	0.103
	Samora FUNG	O_OIFU	31-May-19 1-Jun-19	STPD-12 STPD-13	pf, oto pf, oto	RO, GO, M	A	A	A	A	3	7.4 7.7	6.8 7.2	3.852 4.867	3.380 4.506	0.211	18% 14%	0.073
			4-Jun-19 4-Jun-19	STPD-14 STPD-15	pf, oto pf, oto	RO, GO, M	† · · · · ·	A A	A	A	3	7.9 8.5	7.2 7.6	5.687 5.977	4.783 5.540	0.412	23% 13%	0.098
			4-Jun-19	STPD-16	pf, oto	RO, GO, M	A Sar		A Size		2 16	7.0 16	6.3 16	3.239 16	2.776 16	0.196 16	20% 16	0.052 16
									Avera Med	ian	2.6 3.0	7.9 7.9	7.2 7.2	5.126 5.388	4.518 4.664	0.337 0.309	18% 18%	0.092 0.092
						s	Standar Sta		eviati ard Er		0.7 0.2	0.7 0.2	0.6 0.1	1.362 0.340	1.240 0.310	0.125 0.031	3.4% 0.84%	0.034 0.009
									Minin Maxim		1.0 4.0	6.9 9.6	6.3 8.7	2.859 8.589	2.631 7.745	0.189 0.552	13% 26%	0.043 0.194
Notes: ID = identif	fier; cm = centimetr	es; g = grams; pf	= pectoral fin; o	to = otoliths; R	O = ripe ova	ry tissue; GO =	under	deve	elopeo	l (gr							ge structures for fish	

Notes: ID = identifier; cm = centimetres; g = grams; pf = pectoral fin; oto = otoliths; RO = ripe ovary tissue; GO = underdeveloped (green) ovary tissue; M = muscle; "-" = no data/not applicable. Tissue and age structures for fish IDs RG_LNLK-01 to 10 and RG_ERIMF-01 to 03 were not analyzed because the fertilization was unsuccessful.

^a DELT = deformities, erosion, lesions, tumors; A = absent

^b Total body weight including expressed eggs (i.e. prior to egg expression).

^c Body weight after expressing ripe eggs.

d Gonadosomatic index = 100 x (Residual Gonad Weight + Expressed Egg Weight) / Pre Body weight, where Expressed Egg Weight = Pre - Post Body Weight.



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

Date Received: 08-MAY-19

Report Date: 16-MAY-19 09:34 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2269908
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-10

Legal Site Desc:

(ref)

Lyudmyla Shvets, B.Sc. Account Manager

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	Sample ID Description Sampled Date Sampled Time Client ID	L2269908-1 WS 06-MAY-19 14:52 RG_ELWDGC_WS _20190506-1452	L2269908-2 WS 06-MAY-19 14:52 RG_ELWDGC_WS _20190506-1452 FB-HG		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)	531			
	Hardness (as CaCO3) (mg/L)	270			
	pH (pH)	8.38			
	ORP (mV)	398			
	Total Suspended Solids (mg/L)	2.0			
	Total Dissolved Solids (mg/L)	323 DLHC			
	Turbidity (NTU)	1.53			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	185			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	4.4			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	190			
	Ammonia as N (mg/L)	0.0351			
	Bromide (Br) (mg/L)	<0.050			
	Chloride (CI) (mg/L)	4.15			
	Fluoride (F) (mg/L)	0.209			
	Ion Balance (%)	97.0			
	Nitrate (as N) (mg/L)	1.11			
	Nitrite (as N) (mg/L)	0.0058			
	Total Kjeldahl Nitrogen (mg/L)	0.294			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0056			
	Sulfate (SO4) (mg/L)	83.8			
	Anion Sum (meq/L)	5.74			
	Cation Sum (meq/L)	5.57			
	Cation - Anion Balance (%)	-1.5			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.07			
	Total Organic Carbon (mg/L)	1.39			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0075			
	Antimony (Sb)-Total (mg/L)	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00020			
	Barium (Ba)-Total (mg/L)	0.0785			
	Beryllium (Be)-Total (ug/L)	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050			
	Boron (B)-Total (mg/L)	0.014			
	Cadmium (Cd)-Total (ug/L)	0.0089			

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

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16-MAY-19 09:34 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2269908-1 WS 06-MAY-19 14:52 RG_ELWDGC_WS _20190506-1452	L2269908-2 WS 06-MAY-19 14:52 RG_ELWDGC_WS _20190506-1452 FB-HG		
Grouping	Analyte		15.10		
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)	73.5			
	Chromium (Cr)-Total (mg/L)	0.00014			
	Cobalt (Co)-Total (ug/L)	0.12			
	Copper (Cu)-Total (mg/L)	<0.00050			
	Iron (Fe)-Total (mg/L)	0.196			
	Lead (Pb)-Total (mg/L)	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0107			
	Magnesium (Mg)-Total (mg/L)	21.4			
	Manganese (Mn)-Total (mg/L)	0.0397			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.00127			
	Nickel (Ni)-Total (mg/L)	0.00066			
	Potassium (K)-Total (mg/L)	0.740			
	Selenium (Se)-Total (ug/L)	8.27			
	Silicon (Si)-Total (mg/L)	2.28			
	Silver (Ag)-Total (mg/L)	<0.000010			
	Sodium (Na)-Total (mg/L)	3.68			
	Strontium (Sr)-Total (mg/L)	0.331			
	Thallium (TI)-Total (mg/L)	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010			
	Uranium (U)-Total (mg/L)	0.000979			
	Vanadium (V)-Total (mg/L)	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB			
	Dissolved Metals Filtration Location	LAB			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00016			
	Barium (Ba)-Dissolved (mg/L)	0.0757			
	Beryllium (Be)-Dissolved (ug/L)	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.014			
	Cadmium (Cd)-Dissolved (ug/L)	0.0052			
	Calcium (Ca)-Dissolved (mg/L)	73.9			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10			

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

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16-MAY-19 09:34 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

L2269908-1 L2269908-2 Sample ID WS Description WS 06-MAY-19 06-MAY-19 Sampled Date 14:52 14:52 Sampled Time RG ELWDGC WS RG ELWDGC WS Client ID 20190506-1452 _20190506-1452 FB-HG Grouping Analyte **WATER Dissolved Metals** Copper (Cu)-Dissolved (mg/L) < 0.00050 Iron (Fe)-Dissolved (mg/L) 0.015 Lead (Pb)-Dissolved (mg/L) < 0.000050 Lithium (Li)-Dissolved (mg/L) 0.0107 Magnesium (Mg)-Dissolved (mg/L) 20.8 Manganese (Mn)-Dissolved (mg/L) 0.00745 Mercury (Hg)-Dissolved (mg/L) < 0.0000050 Molybdenum (Mo)-Dissolved (mg/L) 0.00130 Nickel (Ni)-Dissolved (mg/L) 0.00052 Potassium (K)-Dissolved (mg/L) 0.738 Selenium (Se)-Dissolved (ug/L) 10.0 Silicon (Si)-Dissolved (mg/L) 2.21 Silver (Ag)-Dissolved (mg/L) < 0.000010 Sodium (Na)-Dissolved (mg/L) 3.49 Strontium (Sr)-Dissolved (mg/L) 0.331 Thallium (TI)-Dissolved (mg/L) < 0.000010 Tin (Sn)-Dissolved (mg/L) < 0.00010 Titanium (Ti)-Dissolved (mg/L) < 0.010 Uranium (U)-Dissolved (mg/L) 0.000946 Vanadium (V)-Dissolved (mg/L) < 0.00050 Zinc (Zn)-Dissolved (mg/L) < 0.0010

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

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Qualifier	Description			
SFPL	Sample was	Filtered and Preserved at the laborator	y - DOC/D-META	AL/D-HG FILTERED AND PRESERVED AT THE LA
QC Samples w	ith Qualifiers & Comr	nents:		
QC Type Desc	ription	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike		Barium (Ba)-Dissolved	MS-B	L2269908-1
Matrix Spike		Calcium (Ca)-Dissolved	MS-B	L2269908-1
Matrix Spike		Magnesium (Mg)-Dissolved	MS-B	L2269908-1
Matrix Spike		Sodium (Na)-Dissolved	MS-B	L2269908-1
Matrix Spike		Strontium (Sr)-Dissolved	MS-B	L2269908-1
Matrix Spike		Barium (Ba)-Total	MS-B	L2269908-1
Matrix Spike		Calcium (Ca)-Total	MS-B	L2269908-1
Matrix Spike		Magnesium (Mg)-Total	MS-B	L2269908-1
Matrix Spike		Selenium (Se)-Total	MS-B	L2269908-1
Matrix Spike		Strontium (Sr)-Total	MS-B	L2269908-1
Qualifiers for	Individual Parameter	s Listed:		
Qualifier	Description			
DLHC	Detection Limit Rais	sed: Dilution required due to high concer	tration of test and	alyte(s).
MS-B	Matrix Spike recove	ry could not be accurately calculated du	e to high analyte	background in sample.

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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Reference Information

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

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

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction

with stannous chloride, and analyzed by CVAAS or CVAFS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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APHA 4500-P PHOSPHORUS

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Orthophosphate-Dissolved (as P)

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

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

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

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

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

Water

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

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

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

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

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

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

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

 Laboratory Definition Code
 Laboratory Location

 CL
 ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

REP-Lentic 19-10

PO4-DO-L-COL-CL

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Workorder: L2269908 Report Date: 16-MAY-19 Page 1 of 11

Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water							
Batch R4635463								
WG3050093-3 DUP		L2269908-1						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050093-2 LCS								
Acidity (as CaCO3)			106.0		%		85-115	14-MAY-19
WG3050093-1 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	14-MAY-19
ALK-MAN-CL	Water							
Batch R4634423								
WG3049092-11 LCS								
Alkalinity, Total (as CaCo	D3)		96.0		%		85-115	13-MAY-19
WG3049092-10 MB								
Alkalinity, Total (as CaCo	D 3)		<1.0		mg/L		1	13-MAY-19
BE-D-L-CCMS-VA	Water							
Batch R4633493								
WG3047666-2 LCS								
Beryllium (Be)-Dissolved			84.0		%		80-120	13-MAY-19
WG3047666-1 MB		LF						
Beryllium (Be)-Dissolved			<0.000020)	mg/L		0.00002	13-MAY-19
BE-T-L-CCMS-VA	Water							
Batch R4633555								
WG3047590-2 LCS								
Beryllium (Be)-Total			89.2		%		80-120	13-MAY-19
WG3047590-1 MB								
Beryllium (Be)-Total			<0.000020)	mg/L		0.00002	13-MAY-19
BR-L-IC-N-CL	Water							
Batch R4630449								
WG3046497-6 LCS								
Bromide (Br)			103.1		%		85-115	09-MAY-19
WG3046497-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	09-MAY-19
-DIS-ORG-LOW-CL	Water							
Batch R4635817								
WG3050807-2 LCS								
Dissolved Organic Carbo	on		106.7		%		80-120	15-MAY-19
WG3050807-1 MB								
Dissolved Organic Carbo	on		<0.50		mg/L		0.5	15-MAY-19
-TOT-ORG-LOW-CL	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL Batch R4635232	Water							
WG3050176-6 LCS Total Organic Carbon			114.9		%		80-120	14-MAY-19
WG3050176-5 MB Total Organic Carbon			<0.50		mg/L		0.5	14-MAY-19
CL-IC-N-CL	Water							
Batch R4630449 WG3046497-6 LCS Chloride (CI)			100.3		%		90-110	09-MAY-19
WG3046497-5 MB Chloride (CI)			<0.50		mg/L		0.5	09-MAY-19
EC-L-PCT-CL	Water							
Batch R4634423								
WG3049092-11 LCS Conductivity (@ 25C)			103.3		%		90-110	13-MAY-19
WG3049092-10 MB Conductivity (@ 25C)			<2.0		uS/cm		2	13-MAY-19
F-IC-N-CL	Water							
Batch R4630449 WG3046497-6 LCS Fluoride (F)			102.9		%		90-110	00 MAY 10
WG3046497-5 MB			102.9		76		90-110	09-MAY-19
Fluoride (F)			<0.020		mg/L		0.02	09-MAY-19
HG-D-CVAA-VA	Water							
Batch R4632265								
WG3048419-2 LCS Mercury (Hg)-Dissolved			95.0		%		80-120	13-MAY-19
WG3048419-1 MB Mercury (Hg)-Dissolved			<0.000005	С	mg/L		0.000005	13-MAY-19
WG3048419-4 MS Mercury (Hg)-Dissolved		L2269908-1	85.6		%		70-130	13-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4634650								
WG3049335-2 LCS Mercury (Hg)-Total			93.6		%		80-120	14-MAY-19
WG3049335-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	14-MAY-19
MET-D-CCMS-VA	Water							



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est I	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IET-D-CCMS-VA	Water							
Batch R4633493								
WG3047666-2 LCS Aluminum (Al)-Dissolved			100.4		%		00.400	40 MAN/ 40
			91.3		%		80-120	13-MAY-19
Antimony (Sb)-Dissolved			96.2		%		80-120	13-MAY-19
Arsenic (As)-Dissolved							80-120	13-MAY-19
Barium (Ba)-Dissolved			94.9		%		80-120	13-MAY-19
Bismuth (Bi)-Dissolved			91.2		%		80-120	13-MAY-19
Boron (B)-Dissolved			84.4		%		80-120	13-MAY-19
Cadmium (Cd)-Dissolved			99.0		%		80-120	13-MAY-19
Calcium (Ca)-Dissolved			86.7		%		80-120	13-MAY-19
Chromium (Cr)-Dissolved			98.1		%		80-120	13-MAY-19
Cobalt (Co)-Dissolved			96.8		%		80-120	13-MAY-19
Copper (Cu)-Dissolved			96.9		%		80-120	13-MAY-19
Iron (Fe)-Dissolved			92.3		%		80-120	13-MAY-19
Lead (Pb)-Dissolved			91.2		%		80-120	13-MAY-19
Lithium (Li)-Dissolved			82.6		%		80-120	13-MAY-19
Magnesium (Mg)-Dissolve	d		105.1		%		80-120	13-MAY-19
Manganese (Mn)-Dissolve	ed		98.6		%		80-120	13-MAY-19
Molybdenum (Mo)-Dissolv	ed		89.5		%		80-120	13-MAY-19
Nickel (Ni)-Dissolved			97.5		%		80-120	13-MAY-19
Potassium (K)-Dissolved			98.0		%		80-120	13-MAY-19
Selenium (Se)-Dissolved			97.2		%		80-120	13-MAY-19
Silicon (Si)-Dissolved			97.2		%		60-140	13-MAY-19
Silver (Ag)-Dissolved			86.1		%		80-120	13-MAY-19
Sodium (Na)-Dissolved			99.6		%		80-120	13-MAY-19
Strontium (Sr)-Dissolved			89.4		%		80-120	13-MAY-19
Thallium (TI)-Dissolved			90.2		%		80-120	13-MAY-19
Tin (Sn)-Dissolved			88.1		%		80-120	13-MAY-19
Titanium (Ti)-Dissolved			92.9		%		80-120	13-MAY-19
Uranium (U)-Dissolved			92.9		%		80-120	13-MAY-19
Vanadium (V)-Dissolved			98.5		%		80-120	13-MAY-19
Zinc (Zn)-Dissolved			97.4		%		80-120	13-MAY-19
WG3047666-1 MB		LF						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	13-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	13-MAY-19



Workorder: L2269908 Report Date: 16-MAY-19 Page 4 of 11

Test Matrix	Reference	Result Q	ualifier Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water						
Batch R4633493						
WG3047666-1 MB	LF		,			
Barium (Ba)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Bismuth (Bi)-Dissolved		<0.000050	mg/L		0.00005	13-MAY-19
Boron (B)-Dissolved		<0.010	mg/L		0.01	13-MAY-19
Cadmium (Cd)-Dissolved		<0.0000050	mg/L		0.000005	13-MAY-19
Calcium (Ca)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Chromium (Cr)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Cobalt (Co)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Copper (Cu)-Dissolved		<0.00020	mg/L		0.0002	13-MAY-19
Iron (Fe)-Dissolved		<0.010	mg/L		0.01	13-MAY-19
Lead (Pb)-Dissolved		<0.000050	mg/L		0.00005	13-MAY-19
Lithium (Li)-Dissolved		<0.0010	mg/L		0.001	13-MAY-19
Magnesium (Mg)-Dissolved		<0.0050	mg/L		0.005	13-MAY-19
Manganese (Mn)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Molybdenum (Mo)-Dissolved		<0.000050	mg/L		0.00005	13-MAY-19
Nickel (Ni)-Dissolved		<0.00050	mg/L		0.0005	13-MAY-19
Potassium (K)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Selenium (Se)-Dissolved		<0.000050	mg/L		0.00005	13-MAY-19
Silicon (Si)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Silver (Ag)-Dissolved		<0.000010	mg/L		0.00001	13-MAY-19
Sodium (Na)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Strontium (Sr)-Dissolved		<0.00020	mg/L		0.0002	13-MAY-19
Thallium (Tl)-Dissolved		<0.000010	mg/L		0.00001	13-MAY-19
Tin (Sn)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Titanium (Ti)-Dissolved		<0.00030	mg/L		0.0003	13-MAY-19
Uranium (U)-Dissolved		<0.000010	mg/L		0.00001	13-MAY-19
Vanadium (V)-Dissolved		< 0.00050	mg/L		0.0005	13-MAY-19
Zinc (Zn)-Dissolved		<0.0010	mg/L		0.001	13-MAY-19
MET-T-CCMS-VA Water						
Batch R4633555						
WG3047590-2 LCS Aluminum (Al)-Total		95.9	%		80-120	13-MAY-19
Antimony (Sb)-Total		98.2	%		80-120	13-MAY-19
Arsenic (As)-Total		94.7	%		80-120	13-MAY-19
Barium (Ba)-Total			, •		00 120	10 10// (1-10



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4633555								
WG3047590-2 LCS			05.0		0/			
Bismuth (Bi)-Total			95.0		%		80-120	13-MAY-19
Boron (B)-Total			90.4		%		80-120	13-MAY-19
Cadmium (Cd)-Total			97.5		%		80-120	13-MAY-19
Calcium (Ca)-Total			91.6		%		80-120	13-MAY-19
Chromium (Cr)-Total			97.8		%		80-120	13-MAY-19
Cobalt (Co)-Total			93.9		%		80-120	13-MAY-19
Copper (Cu)-Total			94.5		%		80-120	13-MAY-19
Iron (Fe)-Total			95.0		%		80-120	13-MAY-19
Lead (Pb)-Total			97.1		%		80-120	13-MAY-19
Lithium (Li)-Total			89.3		%		80-120	13-MAY-19
Magnesium (Mg)-Total			96.8		%		80-120	13-MAY-19
Manganese (Mn)-Total			97.3		%		80-120	13-MAY-19
Molybdenum (Mo)-Total			95.1		%		80-120	13-MAY-19
Nickel (Ni)-Total			91.8		%		80-120	13-MAY-19
Potassium (K)-Total			95.2		%		80-120	13-MAY-19
Selenium (Se)-Total			94.5		%		80-120	13-MAY-19
Silicon (Si)-Total			96.7		%		80-120	13-MAY-19
Silver (Ag)-Total			96.9		%		80-120	13-MAY-19
Sodium (Na)-Total			100.6		%		80-120	13-MAY-19
Strontium (Sr)-Total			96.4		%		80-120	13-MAY-19
Thallium (TI)-Total			93.9		%		80-120	13-MAY-19
Tin (Sn)-Total			96.8		%		80-120	13-MAY-19
Titanium (Ti)-Total			96.1		%		80-120	13-MAY-19
Uranium (U)-Total			98.5		%		80-120	13-MAY-19
Vanadium (V)-Total			98.4		%		80-120	13-MAY-19
Zinc (Zn)-Total			95.4		%		80-120	13-MAY-19
WG3047590-1 MB							00 120	10 11/1/11
Aluminum (Al)-Total			< 0.0030		mg/L		0.003	13-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	13-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	13-MAY-19
Cadmium (Cd)-Total			<0.00000	50	mg/L		0.000005	13-MAY-19



Workorder: L2269908

Report Date: 16-MAY-19

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Test	Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water						
Batch R4633555							
WG3047590-1 MB							
Calcium (Ca)-Total			<0.050	mg/L		0.05	13-MAY-19
Chromium (Cr)-Total			<0.00010	mg/L		0.0001	13-MAY-19
Cobalt (Co)-Total			<0.00010	mg/L		0.0001	13-MAY-19
Copper (Cu)-Total			<0.00050	mg/L		0.0005	13-MAY-19
Iron (Fe)-Total			<0.010	mg/L		0.01	13-MAY-19
Lead (Pb)-Total			<0.000050	mg/L		0.00005	13-MAY-19
Lithium (Li)-Total			<0.0010	mg/L		0.001	13-MAY-19
Magnesium (Mg)-Total			<0.0050	mg/L		0.005	13-MAY-19
Manganese (Mn)-Total			<0.00010	mg/L		0.0001	13-MAY-19
Molybdenum (Mo)-Total			<0.000050	mg/L		0.00005	13-MAY-19
Nickel (Ni)-Total			<0.00050	mg/L		0.0005	13-MAY-19
Potassium (K)-Total			<0.050	mg/L		0.05	13-MAY-19
Selenium (Se)-Total			<0.000050	mg/L		0.00005	13-MAY-19
Silicon (Si)-Total			<0.10	mg/L		0.1	13-MAY-19
Silver (Ag)-Total			<0.000010	mg/L		0.00001	13-MAY-19
Sodium (Na)-Total			<0.050	mg/L		0.05	13-MAY-19
Strontium (Sr)-Total			<0.00020	mg/L		0.0002	13-MAY-19
Thallium (TI)-Total			<0.000010	mg/L		0.00001	13-MAY-19
Tin (Sn)-Total			<0.00010	mg/L		0.0001	13-MAY-19
Titanium (Ti)-Total			<0.00030	mg/L		0.0003	13-MAY-19
Uranium (U)-Total			<0.000010	mg/L		0.00001	13-MAY-19
Vanadium (V)-Total			<0.00050	mg/L		0.0005	13-MAY-19
Zinc (Zn)-Total			<0.0030	mg/L		0.003	13-MAY-19
NH3-L-F-CL	Water						
Batch R4635246							
WG3050192-6 LCS							
Ammonia as N			99.1	%		85-115	14-MAY-19
WG3050192-5 MB Ammonia as N			<0.0050	mg/L		0.005	14-MAY-19
NO2-L-IC-N-CL	Water						
Batch R4630449							
WG3046497-6 LCS Nitrite (as N)			103.3	%		90-110	09-MAY-19
WG3046497-5 MB Nitrite (as N)			<0.0010	mg/L		0.001	09-MAY-19



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Test	Matrix	Reference	Result Qu	ualifier U	nits	RPD	Limit	Analyzed
NO3-L-IC-N-CL	Water							
Batch R4630449 WG3046497-6 LCS Nitrate (as N)			100.6	9	6		90-110	09-MAY-19
WG3046497-5 MB Nitrate (as N)			<0.0050	n	ng/L		0.005	09-MAY-19
ORP-CL	Water							
Batch R4634296 WG3048846-15 CRM ORP		CL-ORP	223	n	nV		210-230	13-MAY-19
P-T-L-COL-CL	Water							
Batch R4634884 WG3049594-14 LCS Phosphorus (P)-Total			105.5	9	6		80-120	14-MAY-19
WG3049594-13 MB Phosphorus (P)-Total			<0.0020		ng/L		0.002	14-MAY-19
PH-CL	Water							
Batch R4634423 WG3049092-11 LCS pH			6.98	р	h		6.9-7.1	13-MAY-19
PO4-DO-L-COL-CL	Water							
Batch R4629111								
WG3044829-38 LCS Orthophosphate-Dissolved	d (as P)		101.6	9/	6		80-120	08-MAY-19
WG3044829-37 MB Orthophosphate-Dissolved	d (as P)		<0.0010	n	ng/L		0.001	08-MAY-19
SO4-IC-N-CL	Water							
Batch R4630449 WG3046497-6 LCS Sulfate (SO4)			101.1	%	,		00.440	00 MAY 40
WG3046497-5 MB			101.1	7	'U		90-110	09-MAY-19
Sulfate (SO4)			<0.30	n	ng/L		0.3	09-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4630819								
WG3045301-18 DUP Total Dissolved Solids		L2269908-1 323	322	n	ng/L	0.3	20	09-MAY-19
WG3045301-17 LCS								



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Report Date: 16-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	Water							
Batch R4630819 WG3045301-17 LCS Total Dissolved Solids			96.1		%		85-115	09-MAY-19
WG3045301-16 MB Total Dissolved Solids			<10		mg/L		10	09-MAY-19
TKN-L-F-CL	Water							
Batch R4635304								
WG3050063-10 LCS Total Kjeldahl Nitrogen			95.1		%		75-125	13-MAY-19
WG3050063-13 LCS Total Kjeldahl Nitrogen			97.7		%		75-125	13-MAY-19
WG3050063-16 LCS Total Kjeldahl Nitrogen			97.2		%		75-125	13-MAY-19
WG3050063-2 LCS Total Kjeldahl Nitrogen			95.6		%		75-125	13-MAY-19
WG3050063-20 LCS Total Kjeldahl Nitrogen			94.8		%		75-125	13-MAY-19
WG3050063-6 LCS Total Kjeldahl Nitrogen			94.7		%		75-125	13-MAY-19
WG3050063-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
WG3050063-12 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
WG3050063-15 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
WG3050063-19 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
WG3050063-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
WG3050063-9 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	13-MAY-19
TSS-L-CL	Water				<i>3</i> –		3.30	10 10011 10
Batch R4631259								
WG3046330-2 LCS Total Suspended Solids			89.4		%		85-115	10-MAY-19
WG3046330-1 MB Total Suspended Solids			<1.0		mg/L		1	10-MAY-19
TURBIDITY-CL	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	Water							
Batch R4630303 WG3046239-17 LCS Turbidity	1		95.5		%		85-115	09-MAY-19
WG3046239-16 MB Turbidity			<0.10		NTU		0.1	09-MAY-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard

Sample Parameter Qualifier Definitions:

LCSD Laboratory Control Sample Duplicate

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Workorder: L2269908 Report Date: 16-MAY-19 Page 11 of 11

Hold Time Exceedances:

	Sample						
ALS Product Description	ID [.]	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential	by elect.						
	1	06-MAY-19 14:52	13-MAY-19 13:00	0.25	166	hours	EHTR-FM
рН							
	1	06-MAY-19 14:52	13-MAY-19 09:00	0.25	162	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2269908 were received on 08-MAY-19 09:00.

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

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

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

Teck COC ID: REP-Lentic 19-10 TURNAROUND TIME: PROJECT/CLIENT INFO LABORATORY The same of the sa Facility Name / Joh# Regional Effects Program (REP) Excel PDF Lab Name ALS Calgary Lab Contact Lyudmyla Shvets Project Manager Cait Good et good@teck.com Email calt.good@teck.com Email lyudmyla.shvets@alsglobal.com <u>echcael@equironline.co</u>a Address 2559 29 Street NE Address 421 Pine Avenue - 147: orde meyer@ceck.com BC City Calgary Province ΑÐ City Sparwood Province Corada Postal Code TTY 7B5 V0B 2G0 Country Canada Postal Code Country Phone Number | 1 403 407 1794 Phone Number 250-425-8202 THE PROPERTY OF ANALYSIS REQUESTED OF THE PROPERTY OF THE PROP PROPERTY OF THE PROPERTY OF TH H2S04 HNO3 Hazardous Material (Yes/No) ECKCOAL-MET-T-VA L2269908-COFC reckcoal-met-d ALS_Package-DOC HG-T-U-CVAF-VA HG-D-CVAF-VA Field G=Grab # Of Time Matrix (24hr) C=Comp Cont. Sample ID Sample Location Date RG_ELWDGC RG_ELWDGC_WS_20190506-1452 WS Nα 6-May-19 1452 G х RG_ELWDGC RG_ELWDCC_WS_20190506-1452 FB-HG 1452 G WS Νσ 6-May-19 Х ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS TO SHARE THE PROPERTY OF THE PROPERTY NB OF HOTTLES RETURNED/DESCRIPTION AND ADDRESS OF THE PROPERTY
Sampler's Name

Sampler's Signature

Mobile#

Date/Time

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



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

Date Received: 09-MAY-19

Report Date: 17-MAY-19 10:50 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2270399
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-12

Legal Site Desc:

Lyudmyla Shvets, B.Sc. Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298 ALS CANADA LTD Part of the ALS Group An ALS Limited Company



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FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

L2270399-1 L2270399-2 L2270399-3 L2270399-4 L2270399-5 Sample ID Description WS WS WS WS WS 07-MAY-19 07-MAY-19 07-MAY-19 07-MAY-19 Sampled Date 07-MAY-19 09:25 Sampled Time 09:25 13:00 13:00 13:00 RG GO13 WS 20 RG GO13 WS 20 RG GRLK WS 20 RG GRLK WS 20 RG DUP WS 201 Client ID 190507-0925 190507-0925 FB-190507-1300 190507-1300 FB-90507-1300 HG HG Grouping **Analyte WATER Physical Tests** Conductivity (@ 25C) (uS/cm) 1050 315 314 Hardness (as CaCO3) (mg/L) 603 162 176 pH (pH) 8.31 8.39 8.39 ORP (mV) 391 452 446 Total Suspended Solids (mg/L) 15.0 9.3 3.4 DLHC DLHC DLHC Total Dissolved Solids (mg/L) 178 754 176 Turbidity (NTU) 5.30 2.46 2.78 Acidity (as CaCO3) (mg/L) Anions and <1.0 <1.0 < 1.0 **Nutrients** Alkalinity, Bicarbonate (as CaCO3) (mg/L) 234 146 143 Alkalinity, Carbonate (as CaCO3) (mg/L) 2.4 3.4 3.4 Alkalinity, Hydroxide (as CaCO3) (mg/L) <1.0 <1.0 <1.0 Alkalinity, Total (as CaCO3) (mg/L) 236 149 146 Ammonia as N (mg/L) 0.0426 0.0068 < 0.0050 Bromide (Br) (mg/L) <0.25 < 0.050 < 0.050 DLHC Chloride (CI) (mg/L) 0.55 0.51 Fluoride (F) (mg/L) 0.19 0.598 0.565 Ion Balance (%) 98.1 96.6 106 DLHC Nitrate (as N) (mg/L) 1.03 < 0.0050 < 0.0050 Nitrite (as N) (mg/L) <0.0050 < 0.0010 < 0.0010 Total Kjeldahl Nitrogen (mg/L) 0.250 0.242 0.234 Orthophosphate-Dissolved (as P) (mg/L) < 0.0010 < 0.0010 < 0.0010 RRV Phosphorus (P)-Total (mg/L) 0.017 0.0193 0.0068 Sulfate (SO4) (mg/L) 347 20.9 20.9 Anion Sum (meq/L) 12.7 3.46 3.40 Cation Sum (meg/L) 12.5 3.34 3.61 Cation - Anion Balance (%) -1.0 3.0 -1.7 Dissolved Organic Carbon (mg/L) Organic / 2.44 3.04 3.93 **Inorganic Carbon** Total Organic Carbon (mg/L) 2.51 4.00 5.37 **Total Metals** Aluminum (Al)-Total (mg/L) 0.0573 0.0337 0.0265 Antimony (Sb)-Total (mg/L) < 0.00010 0.00036 < 0.00010 Arsenic (As)-Total (mg/L) 0.00018 0.00043 0.00039 Barium (Ba)-Total (mg/L) 0.0559 0.0964 0.0561 Beryllium (Be)-Total (ug/L) < 0.020 < 0.020 < 0.020 Bismuth (Bi)-Total (mg/L) < 0.000050 < 0.000050 < 0.000050 Boron (B)-Total (mg/L) 0.022 < 0.010 < 0.010

0.0110

0.0081

0.0057

Cadmium (Cd)-Total (ug/L)

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

L2270399 CONTD....

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	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-6 WS 07-MAY-19 13:00 RG_DUP_WS_201 90507-1300 FB-HG	L2270399-7 WS 07-MAY-19 12:00 RG_TRIP_WS_201 90507-0000	L2270399-8 WS 07-MAY-19 13:00 RG_FBLANK_2019 0507-1300	L2270399-9 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345	L2270399-10 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345 FB- HG
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)		<2.0	<2.0	424	
	Hardness (as CaCO3) (mg/L)		<0.50	<0.50	223	
	pH (pH)		5.68	5.13	8.34	
	ORP (mV)		429	465	476	
	Total Suspended Solids (mg/L)		<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)		<10	<10	DLHC 245	
	Turbidity (NTU)		<0.10	<0.10	0.54	
Anions and	Acidity (as CaCO3) (mg/L)		2.4	1.9	<1.0	
Nutrients	Alkalinity Ricarboneto (as CaCO2) (ma/l.)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		<1.0	<1.0	194	
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0	<1.0	3.2	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)		<1.0	<1.0	198	
	Ammonia as N (mg/L)		<0.0050	<0.0050	<0.0050	
	Bromide (Br) (mg/L)		<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)		<0.50	<0.50	4.48	
	Fluoride (F) (mg/L)		<0.020	<0.020	0.131	
	Ion Balance (%)		0.0	0.0	99.0	
	Nitrate (as N) (mg/L)		<0.0050	<0.0050	0.269	
	Nitrite (as N) (mg/L)		<0.0010	<0.0010	0.0010	
	Total Kjeldahl Nitrogen (mg/L)		<0.050	<0.050	0.127	
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010	<0.0010	0.0010	
	Phosphorus (P)-Total (mg/L)		<0.0020	<0.0020	0.0021	
	Sulfate (SO4) (mg/L)		<0.30	<0.30	27.2	
	Anion Sum (meq/L)		<0.10	<0.10	4.67	
	Cation Sum (meq/L)		<0.10	<0.10	4.62	
	Cation - Anion Balance (%)		0.0	0.0	-0.5	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)			<0.50	1.57	
T-4-185 4 1	Total Organic Carbon (mg/L)		<0.50	<0.50	1.66	
Total Metals	Aluminum (Al)-Total (mg/L)		<0.0030	<0.0030	0.0036	
	Antimony (Sb)-Total (mg/L)		<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)		<0.00010	<0.00010	0.00016	
	Barium (Ba)-Total (mg/L)		<0.00010	<0.00010	0.116	
	Beryllium (Be)-Total (ug/L)		<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)		<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)		<0.0050	<0.0050	0.0086	

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-11 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436	L2270399-12 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436 FB- HG	L2270399-13 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155	L2270399-14 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155 FB-HG	L2270399-15 WS 07-MAY-19 11:55 RG_DUP_WS_201 90507-1155
Grouping	Analyte		110			
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	414		293		293
	Hardness (as CaCO3) (mg/L)	210		138		139
	pH (pH)	8.35		8.28		8.21
	ORP (mV)	453		474		439
	Total Suspended Solids (mg/L)	1.8		11.1		17.0
	Total Dissolved Solids (mg/L)	DLHC 243		DLHC 175		DLHC 175
	Turbidity (NTU)	3.43		11.2		10.3
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0		<1.0		4.3
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	149		109		111
	Alkalinity, Carbonate (as CaCO3) (mg/L)	2.6		<1.0		<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	152		109		111
	Ammonia as N (mg/L)	0.0178		<0.0050		0.0083
	Bromide (Br) (mg/L)	<0.050		<0.050		<0.050
	Chloride (CI) (mg/L)	7.44		4.15		4.15
	Fluoride (F) (mg/L)	0.131		0.087		0.096
	Ion Balance (%)	101		99.3		98.9
	Nitrate (as N) (mg/L)	0.303		0.184		0.181
	Nitrite (as N) (mg/L)	0.0055		<0.0010		0.0013
	Total Kjeldahl Nitrogen (mg/L)	0.206		0.113		0.147
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010		<0.0010		0.0015
	Phosphorus (P)-Total (mg/L)	0.0116		0.0163		0.0177
	Sulfate (SO4) (mg/L)	53.6		33.1		33.0
	Anion Sum (meq/L)	4.39		3.00		3.05
	Cation Sum (meq/L)	4.44		2.98		3.01
	Cation - Anion Balance (%)	0.5		-0.4		-0.5
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.32		2.05		2.33
	Total Organic Carbon (mg/L)	2.56		2.65		2.54
Total Metals	Aluminum (Al)-Total (mg/L)	0.0258		0.192		0.143
	Antimony (Sb)-Total (mg/L)	0.00013		<0.00010		<0.00010
	Arsenic (As)-Total (mg/L)	0.00022		0.00050		0.00048
	Barium (Ba)-Total (mg/L)	0.103		0.0433		0.0441
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Total (mg/L)	<0.010		<0.010		<0.010
	Cadmium (Cd)-Total (ug/L)	0.0084		0.0141		0.0110

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

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17-MAY-19 10:50 (MT)

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-16 WS 07-MAY-19 11:55 RG_DUP_WS_201 90507-1155 FB-HG	L2270399-17 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802	L2270399-18 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802 FB- HG	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)		412		
	Hardness (as CaCO3) (mg/L)		198		
	pH (pH)		8.32		
	ORP (mV)		449		
	Total Suspended Solids (mg/L)		6.6		
	Total Dissolved Solids (mg/L)		228 DLHC		
	Turbidity (NTU)		5.90		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		183		
	Alkalinity, Carbonate (as CaCO3) (mg/L)		2.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)		185		
	Ammonia as N (mg/L)		<0.0050		
	Bromide (Br) (mg/L)		<0.050		
	Chloride (CI) (mg/L)		13.6		
	Fluoride (F) (mg/L)		0.081		
	Ion Balance (%)		104		
	Nitrate (as N) (mg/L)		<0.0050		
	Nitrite (as N) (mg/L)		<0.0010		
	Total Kjeldahl Nitrogen (mg/L)		0.234		
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010		
	Phosphorus (P)-Total (mg/L)		0.0214		
	Sulfate (SO4) (mg/L)		7.02		
	Anion Sum (meq/L)		4.23		
	Cation Sum (meq/L)		4.39		
	Cation - Anion Balance (%)		1.9		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		3.45		
	Total Organic Carbon (mg/L)		3.10		
Total Metals	Aluminum (Al)-Total (mg/L)		0.0689		
	Antimony (Sb)-Total (mg/L)		0.00018		
	Arsenic (As)-Total (mg/L)		0.00042		
	Barium (Ba)-Total (mg/L)		0.164		
	Beryllium (Be)-Total (ug/L)		<0.020		
	Bismuth (Bi)-Total (mg/L)		<0.000050		
	Boron (B)-Total (mg/L)		<0.010		
	Cadmium (Cd)-Total (ug/L)		0.0122		

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

17-MAY-19 10:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-1 WS 07-MAY-19 09:25 RG_G013_WS_20 190507-0925	L2270399-2 WS 07-MAY-19 09:25 RG_GO13_WS_20 190507-0925 FB- HG	L2270399-3 WS 07-MAY-19 13:00 RG_GRLK_WS_20 190507-1300	L2270399-4 WS 07-MAY-19 13:00 RG_GRLK_WS_20 190507-1300 FB- HG	L2270399-5 WS 07-MAY-19 13:00 RG_DUP_WS_201 90507-1300
Grouping	Analyte		110		110	
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	126		37.9		37.8
	Chromium (Cr)-Total (mg/L)	0.00013		0.00012		<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10		<0.10		<0.10
	Copper (Cu)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Total (mg/L)	0.080		0.053		0.043
	Lead (Pb)-Total (mg/L)	<0.000050		0.000088		0.000070
	Lithium (Li)-Total (mg/L)	0.0283		0.0030		0.0029
	Magnesium (Mg)-Total (mg/L)	72.6		19.1		18.9
	Manganese (Mn)-Total (mg/L)	0.0149		0.00475		0.00420
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00215		0.00124		0.00126
	Nickel (Ni)-Total (mg/L)	0.00100		<0.00050		<0.00050
	Potassium (K)-Total (mg/L)	1.70		0.954		0.947
	Selenium (Se)-Total (ug/L)	73.7		0.263		0.328
	Silicon (Si)-Total (mg/L)	2.61		2.50		2.48
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Total (mg/L)	8.81		1.82		1.77
	Strontium (Sr)-Total (mg/L)	0.399		0.132		0.131
	Thallium (TI)-Total (mg/L)	0.000013		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Total (mg/L)	0.00309		0.000783		0.000800
	Vanadium (V)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Total (mg/L)	0.0030		<0.0030		<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB		LAB
	Dissolved Metals Filtration Location	LAB		LAB		LAB
	Aluminum (Al)-Dissolved (mg/L)	0.0055		<0.0030		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00036		<0.00010		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00017		0.00042		0.00045
	Barium (Ba)-Dissolved (mg/L)	0.0999		0.0569		0.0586
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	0.023		<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0067		<0.0050		<0.0050
	Calcium (Ca)-Dissolved (mg/L)	129		35.6		38.4
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10		<0.10

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

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17-MAY-19 10:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-6 WS 07-MAY-19 13:00 RG_DUP_WS_201 90507-1300 FB-HG	L2270399-7 WS 07-MAY-19 12:00 RG_TRIP_WS_201 90507-0000	L2270399-8 WS 07-MAY-19 13:00 RG_FBLANK_2019 0507-1300	L2270399-9 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345	L2270399-10 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345 FB- HG
Grouping	Analyte					0
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)		<0.050	<0.050	64.5	
	Chromium (Cr)-Total (mg/L)		<0.00010	<0.00010	0.00017	
	Cobalt (Co)-Total (ug/L)		<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)		<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)		<0.010	<0.010	0.017	
	Lead (Pb)-Total (mg/L)		<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)		<0.0010	<0.0010	0.0049	
	Magnesium (Mg)-Total (mg/L)		<0.10	<0.10	16.0	
	Manganese (Mn)-Total (mg/L)		<0.00010	<0.00010	0.00389	
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)		<0.000050	<0.000050	0.000758	
	Nickel (Ni)-Total (mg/L)		<0.00050	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)		<0.050	<0.050	0.549	
	Selenium (Se)-Total (ug/L)		<0.050	<0.050	2.75	
	Silicon (Si)-Total (mg/L)		<0.10	<0.10	2.11	
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)		0.086	<0.050	3.70	
	Strontium (Sr)-Total (mg/L)		<0.00020	<0.00020	0.179	
	Thallium (TI)-Total (mg/L)		<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)		<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)		<0.000010	<0.000010	0.000669	
	Vanadium (V)-Total (mg/L)		<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)		<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location			LAB	LAB	
	Dissolved Metals Filtration Location		LAB	LAB	LAB	
	Aluminum (Al)-Dissolved (mg/L)			<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)			<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)			<0.00010	0.00016	
	Barium (Ba)-Dissolved (mg/L)			<0.00010	0.118	
	Beryllium (Be)-Dissolved (ug/L)			<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)			<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)			<0.010	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)			<0.0050	0.0078	
	Calcium (Ca)-Dissolved (mg/L)		<0.050	<0.050	64.2	
	Chromium (Cr)-Dissolved (mg/L)			<0.00010	0.00013	
	Cobalt (Co)-Dissolved (ug/L)			<0.10	<0.10	

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

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17-MAY-19 10:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-11 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436	L2270399-12 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436 FB- HG	L2270399-13 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155	L2270399-14 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155 FB-HG	L2270399-15 WS 07-MAY-19 11:55 RG_DUP_WS_201 90507-1155
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	54.0		38.6		38.3
	Chromium (Cr)-Total (mg/L)	0.00025		0.00036		0.00029
	Cobalt (Co)-Total (ug/L)	<0.10		0.18		0.15
	Copper (Cu)-Total (mg/L)	<0.00050		0.00062		0.00055
	Iron (Fe)-Total (mg/L)	0.058		0.292		0.228
	Lead (Pb)-Total (mg/L)	<0.00050		0.000352		0.000298
	Lithium (Li)-Total (mg/L)	0.0053		0.0021		0.0021
	Magnesium (Mg)-Total (mg/L)	18.4		11.9		12.4
	Manganese (Mn)-Total (mg/L)	0.00487		0.0187		0.0177
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	0.00101	<0.00050	0.00094
	Molybdenum (Mo)-Total (mg/L)	0.000884		0.000599		0.000608
	Nickel (Ni)-Total (mg/L)	0.00051		<0.00050		<0.00050
	Potassium (K)-Total (mg/L)	0.620		0.620		0.634
	Selenium (Se)-Total (ug/L)	5.44		0.631		0.631
	Silicon (Si)-Total (mg/L)	0.54		2.63		2.55
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Total (mg/L)	5.52		4.98		4.98
	Strontium (Sr)-Total (mg/L)	0.177		0.147		0.147
	Thallium (TI)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Total (mg/L)	0.000929		0.000707		0.000718
	Vanadium (V)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030		0.0124		<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB		LAB
	Dissolved Metals Filtration Location	LAB		LAB		LAB
	Aluminum (Al)-Dissolved (mg/L)	<0.0030		0.0052		0.0053
	Antimony (Sb)-Dissolved (mg/L)	0.00013		<0.00010		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00021		0.00040		0.00043
	Barium (Ba)-Dissolved (mg/L)	0.103		0.0414		0.0423
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0060		<0.0050		<0.0050
	Calcium (Ca)-Dissolved (mg/L)	54.8		37.2		36.6
	Chromium (Cr)-Dissolved (mg/L)	0.00016		0.00010		0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10		<0.10

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-16 WS 07-MAY-19 11:55 RG_DUP_WS_201 90507-1155 FB-HG	L2270399-17 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802	L2270399-18 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802 FB- HG	
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)		62.1		
	Chromium (Cr)-Total (mg/L)		0.00030		
	Cobalt (Co)-Total (ug/L)		0.14		
	Copper (Cu)-Total (mg/L)		0.00055		
	Iron (Fe)-Total (mg/L)		0.138		
	Lead (Pb)-Total (mg/L)		0.000169		
	Lithium (Li)-Total (mg/L)		0.0044		
	Magnesium (Mg)-Total (mg/L)		11.0		
	Manganese (Mn)-Total (mg/L)		0.0404		
	Mercury (Hg)-Total (ug/L)	<0.00050	0.00057	<0.00050	
	Molybdenum (Mo)-Total (mg/L)		0.00129		
	Nickel (Ni)-Total (mg/L)		0.00105		
	Potassium (K)-Total (mg/L)		1.40		
	Selenium (Se)-Total (ug/L)		0.063		
	Silicon (Si)-Total (mg/L)		1.90		
	Silver (Ag)-Total (mg/L)		<0.000010		
	Sodium (Na)-Total (mg/L)		9.98		
	Strontium (Sr)-Total (mg/L)		0.169		
	Thallium (TI)-Total (mg/L)		<0.000010		
	Tin (Sn)-Total (mg/L)		<0.00010		
	Titanium (Ti)-Total (mg/L)		<0.010		
	Uranium (U)-Total (mg/L)		0.000356		
	Vanadium (V)-Total (mg/L)		<0.00050		
	Zinc (Zn)-Total (mg/L)		0.0087		
Dissolved Metals	Dissolved Mercury Filtration Location		LAB		
	Dissolved Metals Filtration Location		LAB		
	Aluminum (Al)-Dissolved (mg/L)		0.0036		
	Antimony (Sb)-Dissolved (mg/L)		0.00017		
	Arsenic (As)-Dissolved (mg/L)		0.00031		
	Barium (Ba)-Dissolved (mg/L)		0.155		
	Beryllium (Be)-Dissolved (ug/L)		<0.020		
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050		
	Boron (B)-Dissolved (mg/L)		<0.010		
	Cadmium (Cd)-Dissolved (ug/L)		<0.0050		
	Calcium (Ca)-Dissolved (mg/L)		62.4		
	Chromium (Cr)-Dissolved (mg/L)		0.00022		
	Cobalt (Co)-Dissolved (ug/L)		<0.10		

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

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17-MAY-19 10:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-1 WS 07-MAY-19 09:25 RG_G013_WS_20 190507-0925	L2270399-2 WS 07-MAY-19 09:25 RG_G013_WS_20 190507-0925 FB- HG	L2270399-3 WS 07-MAY-19 13:00 RG_GRLK_WS_20 190507-1300	U2270399-4 WS 07-MAY-19 13:00 RG_GRLK_WS_20 190507-1300 FB-HG	L2270399-5 WS 07-MAY-19 13:00 RG_DUP_WS_201 90507-1300
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0284		0.0030		0.0031
	Magnesium (Mg)-Dissolved (mg/L)	68.3		17.8		19.3
	Manganese (Mn)-Dissolved (mg/L)	0.00896		<0.00010		<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00229		0.00136		0.00130
	Nickel (Ni)-Dissolved (mg/L)	0.00093		<0.00050		<0.00050
	Potassium (K)-Dissolved (mg/L)	1.68		0.930		0.979
	Selenium (Se)-Dissolved (ug/L)	86.6		0.264		0.262
	Silicon (Si)-Dissolved (mg/L)	2.54		2.41		2.50
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	8.51		1.71		1.81
	Strontium (Sr)-Dissolved (mg/L)	0.395		0.132		0.131
	Thallium (TI)-Dissolved (mg/L)	0.000011		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00329		0.000814		0.000807
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010

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

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Version: FINAL

17-MAY-19 10:50 (MT)

	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-6 WS 07-MAY-19 13:00 RG_DUP_WS_201 90507-1300 FB-HG	L2270399-7 WS 07-MAY-19 12:00 RG_TRIP_WS_201 90507-0000	L2270399-8 WS 07-MAY-19 13:00 RG_FBLANK_2019 0507-1300	L2270399-9 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345	L2270399-10 WS 07-MAY-19 13:45 RG_EROL_WS_20 190507-1345 FB- HG
Grouping	Analyte	-				110
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)			<0.00050	<0.00050	
	Iron (Fe)-Dissolved (mg/L)			<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)			<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)			<0.0010	0.0051	
	Magnesium (Mg)-Dissolved (mg/L)		<0.0050	<0.10	15.2	
	Manganese (Mn)-Dissolved (mg/L)			<0.00010	0.00151	
	Mercury (Hg)-Dissolved (mg/L)			<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)			<0.000050	0.000735	
	Nickel (Ni)-Dissolved (mg/L)			<0.00050	<0.00050	
	Potassium (K)-Dissolved (mg/L)		<0.050	<0.050	0.537	
	Selenium (Se)-Dissolved (ug/L)			<0.050	3.55	
	Silicon (Si)-Dissolved (mg/L)			<0.050	2.11	
	Silver (Ag)-Dissolved (mg/L)			<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)		<0.050	<0.050	3.53	
	Strontium (Sr)-Dissolved (mg/L)			<0.00020	0.176	
	Thallium (TI)-Dissolved (mg/L)			<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)			<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)			<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)			<0.000010	0.000680	
	Vanadium (V)-Dissolved (mg/L)			<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)			<0.0010	<0.0010	

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

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	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-11 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436	L2270399-12 WS 07-MAY-19 14:36 RG_STPD_WS_20 190507-1436 FB- HG	L2270399-13 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155	L2270399-14 WS 07-MAY-19 11:55 RG_ER_WS_2019 0507-1155 FB-HG	L2270399-15 WS 07-MAY-19 11:55 RG_DUP_WS_20 90507-1155
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0054		0.0019		0.0020
	Magnesium (Mg)-Dissolved (mg/L)	17.6		11.0		11.7
	Manganese (Mn)-Dissolved (mg/L)	0.00015		0.00019		0.00024
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000884		0.000623		0.000657
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Potassium (K)-Dissolved (mg/L)	0.618		0.556		0.595
	Selenium (Se)-Dissolved (ug/L)	6.54		0.709		0.671
	Silicon (Si)-Dissolved (mg/L)	0.472		2.25		2.31
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.31		4.57		4.84
	Strontium (Sr)-Dissolved (mg/L)	0.174		0.141		0.146
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.000946		0.000721		0.000756
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2270399-16 WS 07-MAY-19 11:55 RG_DUP_WS_201 90507-1155 FB-HG	L2270399-17 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802	L2270399-18 WS 08-MAY-19 08:02 RG_ERIMF_WS_2 0190509-0802 FB- HG	
Grouping	Analyte				
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		<0.00050		
	Iron (Fe)-Dissolved (mg/L)		<0.010		
	Lead (Pb)-Dissolved (mg/L)		<0.000050		
	Lithium (Li)-Dissolved (mg/L)		0.0045		
	Magnesium (Mg)-Dissolved (mg/L)		10.1		
	Manganese (Mn)-Dissolved (mg/L)		<0.00010		
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)		0.00135		
	Nickel (Ni)-Dissolved (mg/L)		0.00082		
	Potassium (K)-Dissolved (mg/L)		1.35		
	Selenium (Se)-Dissolved (ug/L)		0.063		
	Silicon (Si)-Dissolved (mg/L)		1.74		
	Silver (Ag)-Dissolved (mg/L)		<0.000010		
	Sodium (Na)-Dissolved (mg/L)		9.41		
	Strontium (Sr)-Dissolved (mg/L)		0.165		
	Thallium (TI)-Dissolved (mg/L)		<0.000010		
	Tin (Sn)-Dissolved (mg/L)		<0.00010		
	Titanium (Ti)-Dissolved (mg/L)		<0.010		
	Uranium (U)-Dissolved (mg/L)		0.000363		
	Vanadium (V)-Dissolved (mg/L)		<0.00050		
	Zinc (Zn)-Dissolved (mg/L)		0.0036		

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

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Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - DOC/D-METAL/D-HG FILTERED AND PRESERVED AT THE LAB

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -7, -8, -9
Matrix Spike	Ammonia as N	MS-B	L2270399-1, -11, -13, -15, -17, -3, -5, -7, -8, -9

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a

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halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

P-T-L-COL-CL

Water

Phosphorus (P)-Total

APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically

after persulphate digestion of the sample.

PH-CL Water p

APHA 4500 H-Electrode

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

PO4-DO-L-COL-CL

Water

Orthophosphate-Dissolved (as P)

APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined

colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL

Water

Sulfate in Water by IC

EPA 300.1 (mod)

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

SOLIDS-TDS-CL

Water

Total Dissolved Solids

APHA 2540 C

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

TECKCOAL-IONBAL-CL

Water

Ion Balance Calculation

APHA 1030E

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

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

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

TKN-L-F-CL

Water

Total Kjeldahl Nitrogen

APHA 4500-NORG (TKN)

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

TSS-L-CL

Water

Total Suspended Solids

APHA 2540 D-Gravimetric

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

TURBIDITY-CL

Water

Turbidity

APHA 2130 B-Nephelometer

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

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

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

Laboratory Definition Code Laboratory Location

CL ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

REP-Lentic 19-12

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Workorder: L2270399 Report Date: 17-MAY-19 Page 1 of 18

Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water							
Batch R4635463								
WG3050093-17 LCS Acidity (as CaCO3)			102.4		%		85-115	14-MAY-19
WG3050093-16 MB								
Acidity (as CaCO3)			<1.0		mg/L		2	14-MAY-19
ALK-MAN-CL	Water							
Batch R4635450								
WG3050091-14 LCS Alkalinity, Total (as CaCO	93)		97.5		%		85-115	14-MAY-19
WG3050091-17 LCS								
Alkalinity, Total (as CaCO	93)		99.7		%		85-115	14-MAY-19
WG3050091-13 MB Alkalinity, Total (as CaCO	93)		<1.0		mg/L		1	14-MAY-19
WG3050091-16 MB								
Alkalinity, Total (as CaCO	93)		<1.0		mg/L		1	14-MAY-19
BE-D-L-CCMS-VA	Water							
Batch R4633446 WG3048178-3 DUP		L2270399-3						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	13-MAY-19
WG3048178-2 LCS								
Beryllium (Be)-Dissolved			94.3		%		80-120	13-MAY-19
WG3048178-1 MB Beryllium (Be)-Dissolved		LF	<0.000020	l	mg/L		0.00002	13-MAY-19
WG3048178-4 MS		L2270399-1						
Beryllium (Be)-Dissolved			97.2		%		70-130	13-MAY-19
BE-T-L-CCMS-VA	Water							
Batch R4633446 WG3047572-3 DUP		L2270399-1						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	13-MAY-19
WG3047572-2 LCS			07.4		0/			
Beryllium (Be)-Total WG3047572-1 MB			97.1		%		80-120	13-MAY-19
WG3047572-1 MB Beryllium (Be)-Total			<0.000020	1	mg/L		0.00002	13-MAY-19
WG3047572-4 MS		L2270399-3						
Beryllium (Be)-Total			94.1		%		70-130	13-MAY-19
BR-L-IC-N-CL	Water							



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est Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL Water							
Batch R4630541							
WG3046588-7 DUP Bromide (Br)	L2270399-7 <0.050	<0.050	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 LCS Bromide (Br)		101.4		%		85-115	09-MAY-19
WG3046588-5 MB Bromide (Br)		<0.050		mg/L		0.05	09-MAY-19
WG3046588-8 MS Bromide (Br)	L2270399-7	111.8		%		75-125	09-MAY-19
C-DIS-ORG-LOW-CL Water							
Batch R4636743							
WG3051957-3 DUP Dissolved Organic Carbon	L2270399-1 2.44	1.67	J	mg/L	0.77	1	16-MAY-19
WG3051957-2 LCS Dissolved Organic Carbon		108.4		%		80-120	16-MAY-19
WG3051957-1 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	16-MAY-19
WG3051957-4 MS Dissolved Organic Carbon	L2270399-3	105.5		%		70-130	16-MAY-19
C-TOT-ORG-LOW-CL Water							
Batch R4636743							
WG3051957-3 DUP Total Organic Carbon	L2270399-1 2.51	2.46		mg/L	2.4	20	16-MAY-19
WG3051957-2 LCS Total Organic Carbon		113.6		%		80-120	16-MAY-19
WG3051957-1 MB Total Organic Carbon		<0.50		mg/L		0.5	16-MAY-19
WG3051957-4 MS Total Organic Carbon	L2270399-3	103.1		%		70-130	16-MAY-19
CL-IC-N-CL Water							
Batch R4630541							
WG3046588-7 DUP Chloride (CI)	L2270399-7 <0.50	<0.50	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 LCS Chloride (CI)		98.6		%		90-110	09-MAY-19
WG3046588-5 MB Chloride (Cl)		<0.50		mg/L		0.5	09-MAY-19
WG3046588-8 MS	L2270399-7			%			



Workorder: L2270399

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Test	Matrix	Reference	Result Qu	ıalifier	Units	RPD	Limit	Analyzed
EC-L-PCT-CL	Water							
Batch R4635450 WG3050091-14 LCS Conductivity (@ 25C)			104.4		%		90-110	14-MAY-19
WG3050091-17 LCS Conductivity (@ 25C)			104.2		%		90-110	14-MAY-19
WG3050091-13 MB Conductivity (@ 25C)			<2.0		uS/cm		2	14-MAY-19
WG3050091-16 MB Conductivity (@ 25C)			<2.0		uS/cm		2	14-MAY-19
F-IC-N-CL	Water							
Batch R4630541 WG3046588-7 DUP Fluoride (F)		L2270399-7 <0.020	<0.020	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 LCS Fluoride (F)			104.0		%		90-110	09-MAY-19
WG3046588-5 MB Fluoride (F)			<0.020		mg/L		0.02	09-MAY-19
WG3046588-8 MS Fluoride (F)		L2270399-7	116.3		%		75-125	09-MAY-19
HG-D-CVAA-VA	Water							
Batch R4636746 WG3051004-6 LCS Mercury (Hg)-Dissolved			99.5		%		80-120	16-MAY-19
WG3051004-5 MB Mercury (Hg)-Dissolved		LF	<0.0000050		mg/L		0.000005	16-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4636498 WG3051321-7 DUP		L2270399-15	0.00000		ua/l	4.0	20	40 MAY 40
Mercury (Hg)-Total WG3051321-2 LCS Mercury (Hg)-Total		0.00094	0.00090		ug/L %	4.6	20 80-120	16-MAY-19 16-MAY-19
WG3051321-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	16-MAY-19
WG3051321-8 MS Mercury (Hg)-Total		L2270399-17	83.0		%		70-130	16-MAY-19
MET-D-CCMS-CL	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	Water							
Batch R4636652								
WG3051795-2 LCS		TMRM						
Calcium (Ca)-Dissolved			99.3		%		80-120	16-MAY-19
Magnesium (Mg)-Disso			107.3		%		80-120	16-MAY-19
Potassium (K)-Dissolve			107.3		%		80-120	16-MAY-19
Sodium (Na)-Dissolved			99.0		%		80-120	16-MAY-19
WG3051795-1 MB Calcium (Ca)-Dissolved	I		<0.050		mg/L		0.05	16-MAY-19
Magnesium (Mg)-Disso	lved		<0.0050		mg/L		0.005	16-MAY-19
Potassium (K)-Dissolve	d		<0.050		mg/L		0.05	16-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	16-MAY-19
MET-D-CCMS-VA	Water							
Batch R4633446								
WG3048178-3 DUP		L2270399-3						
Aluminum (Al)-Dissolve		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	13-MAY-19
Antimony (Sb)-Dissolve	d	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Arsenic (As)-Dissolved		0.00042	0.00042		mg/L	0.3	20	13-MAY-19
Barium (Ba)-Dissolved		0.0569	0.0549		mg/L	3.5	20	13-MAY-19
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-19
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-19
Cadmium (Cd)-Dissolve	ed	<0.000050	<0.0000050	RPD-NA	mg/L	N/A	20	13-MAY-19
Calcium (Ca)-Dissolved	I	35.6	36.1		mg/L	1.2	20	13-MAY-19
Chromium (Cr)-Dissolve	ed	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Copper (Cu)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-19
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-19
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-19
Lithium (Li)-Dissolved		0.0030	0.0030		mg/L	0.6	20	13-MAY-19
Magnesium (Mg)-Disso	lved	17.8	18.2		mg/L	2.1	20	13-MAY-19
Manganese (Mn)-Disso	lved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Molybdenum (Mo)-Disse	olved	0.00136	0.00131		mg/L	3.9	20	13-MAY-19
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-19
Potassium (K)-Dissolve	d	0.930	0.926		mg/L	0.4	20	13-MAY-19
Selenium (Se)-Dissolve	d	0.000264	0.000299		mg/L	13	20	13-MAY-19
Silicon (Si)-Dissolved		2.41	2.51		mg/L	3.9	20	13-MAY-19
Silver (Ag)-Dissolved		< 0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4633446								
WG3048178-3 DUP		L2270399-3						
Sodium (Na)-Dissolved		1.71	1.77		mg/L	3.6	20	13-MAY-19
Strontium (Sr)-Dissolved		0.132	0.128		mg/L	3.1	20	13-MAY-19
Thallium (TI)-Dissolved		<0.000010	<0.000010		mg/L	N/A	20	13-MAY-19
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-19
Uranium (U)-Dissolved		0.000814	0.000820		mg/L	0.7	20	13-MAY-19
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-19
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	13-MAY-19
WG3048178-2 LCS Aluminum (Al)-Dissolved	I		102.7		%		80-120	13-MAY-19
Antimony (Sb)-Dissolved			103.0		%		80-120	13-MAY-19
Arsenic (As)-Dissolved			100.2		%		80-120	13-MAY-19
Barium (Ba)-Dissolved			96.9		%		80-120	13-MAY-19
Bismuth (Bi)-Dissolved			101.8		%		80-120	13-MAY-19
Boron (B)-Dissolved			97.0		%		80-120	13-MAY-19
Cadmium (Cd)-Dissolved	d		100.7		%		80-120	13-MAY-19
Calcium (Ca)-Dissolved			97.3		%		80-120	13-MAY-19
Chromium (Cr)-Dissolve	d		103.1		%		80-120	13-MAY-19
Cobalt (Co)-Dissolved			98.9		%		80-120	13-MAY-19
Copper (Cu)-Dissolved			99.9		%		80-120	13-MAY-19
Iron (Fe)-Dissolved			92.6		%		80-120	13-MAY-19
Lead (Pb)-Dissolved			97.5		%		80-120	13-MAY-19
Lithium (Li)-Dissolved			92.8		%		80-120	13-MAY-19
Magnesium (Mg)-Dissolv	/ed		106.6		%		80-120	13-MAY-19
Manganese (Mn)-Dissolv			101.7		%		80-120	13-MAY-19
Molybdenum (Mo)-Disso			98.0		%		80-120	13-MAY-19
Nickel (Ni)-Dissolved			100.7		%		80-120	13-MAY-19
Potassium (K)-Dissolved	l		102.1		%		80-120	13-MAY-19
Selenium (Se)-Dissolved			98.5		%		80-120	13-MAY-19
Silicon (Si)-Dissolved			98.4		%		60-140	13-MAY-19
Silver (Ag)-Dissolved			91.5		%		80-120	13-MAY-19
Sodium (Na)-Dissolved			101.8		%		80-120	13-MAY-19
Strontium (Sr)-Dissolved			96.5		%		80-120	13-MAY-19
Thallium (TI)-Dissolved			101.2		%		80-120	13-MAY-19



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Test Matrix	x Reference	Result Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Wate	r					
Batch R4633446						
WG3048178-2 LCS		04.0	0/			
Tin (Sn)-Dissolved		94.3	%		80-120	13-MAY-19
Titanium (Ti)-Dissolved		99.2	%		80-120	13-MAY-19
Uranium (U)-Dissolved		96.9	%		80-120	13-MAY-19
Vanadium (V)-Dissolved		102.8	%		80-120	13-MAY-19
Zinc (Zn)-Dissolved		101.1	%		80-120	13-MAY-19
WG3048178-1 MB Aluminum (Al)-Dissolved	LF	<0.0010	mg/L		0.001	13-MAY-19
Antimony (Sb)-Dissolved		<0.0010	mg/L		0.001	13-MAY-19
Arsenic (As)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Barium (Ba)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Bismuth (Bi)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Boron (B)-Dissolved		<0.010	mg/L		0.00003	13-MAY-19
Cadmium (Cd)-Dissolved		<0.00005C	mg/L		0.000005	13-MAY-19
Calcium (Ca)-Dissolved		<0.050	mg/L		0.000003	13-MAY-19
Chromium (Cr)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Cobalt (Co)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Copper (Cu)-Dissolved		<0.00020	mg/L		0.0001	13-MAY-19
Iron (Fe)-Dissolved		<0.010	mg/L		0.0002	13-MAY-19
Lead (Pb)-Dissolved		<0.00050	mg/L		0.00005	13-MAY-19
Lithium (Li)-Dissolved		<0.0010	mg/L		0.00003	13-MAY-19
Magnesium (Mg)-Dissolved		<0.0050	mg/L		0.001	13-MAY-19
Manganese (Mn)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Molybdenum (Mo)-Dissolved		<0.000050	mg/L		0.0001	13-MAY-19
Nickel (Ni)-Dissolved		<0.00050	mg/L		0.0005	13-MAY-19
Potassium (K)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Selenium (Se)-Dissolved		<0.00050	mg/L		0.00005	13-MAY-19
Silicon (Si)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Silver (Ag)-Dissolved		<0.000010	mg/L		0.00001	13-MAY-19
Sodium (Na)-Dissolved		<0.050	mg/L		0.05	13-MAY-19
Strontium (Sr)-Dissolved		<0.00020	mg/L		0.0002	13-MAY-19
Thallium (TI)-Dissolved		<0.000010	mg/L		0.0002	13-MAY-19
Tin (Sn)-Dissolved		<0.00010	mg/L		0.0001	13-MAY-19
Titanium (Ti)-Dissolved		<0.00030	mg/L		0.0001	13-MAY-19
					0.0000	10 WA 1-19



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4633446								
WG3048178-1 MB		LF						
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	13-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	13-MAY-19
WG3048178-4 MS Aluminum (Al)-Dissolved		L2270399-1	98.8		%		70-130	13-MAY-19
Antimony (Sb)-Dissolved			103.6		%		70-130	13-MAY-19
Arsenic (As)-Dissolved			112.2		%		70-130	13-MAY-19
Barium (Ba)-Dissolved			N/A	MS-B	%		=	13-MAY-19
Bismuth (Bi)-Dissolved			91.4		%		70-130	13-MAY-19
Boron (B)-Dissolved			105.3		%		70-130	13-MAY-19
Cadmium (Cd)-Dissolved			103.9		%		70-130	13-MAY-19
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	13-MAY-19
Chromium (Cr)-Dissolved	Į		98.1		%		70-130	13-MAY-19
Cobalt (Co)-Dissolved			91.9		%		70-130	13-MAY-19
Copper (Cu)-Dissolved			91.4		%		70-130	13-MAY-19
Iron (Fe)-Dissolved			93.2		%		70-130	13-MAY-19
Lead (Pb)-Dissolved			92.8		%		70-130	13-MAY-19
Lithium (Li)-Dissolved			93.5		%		70-130	13-MAY-19
Magnesium (Mg)-Dissolv	ed		N/A	MS-B	%		-	13-MAY-19
Manganese (Mn)-Dissolv	ed		93.7		%		70-130	13-MAY-19
Molybdenum (Mo)-Dissol	ved		104.0		%		70-130	13-MAY-19
Nickel (Ni)-Dissolved			91.2		%		70-130	13-MAY-19
Potassium (K)-Dissolved			95.2		%		70-130	13-MAY-19
Selenium (Se)-Dissolved			N/A	MS-B	%		-	13-MAY-19
Silicon (Si)-Dissolved			91.1		%		70-130	13-MAY-19
Silver (Ag)-Dissolved			94.5		%		70-130	13-MAY-19
Sodium (Na)-Dissolved			N/A	MS-B	%		-	13-MAY-19
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	13-MAY-19
Thallium (TI)-Dissolved			92.4		%		70-130	13-MAY-19
Tin (Sn)-Dissolved			99.8		%		70-130	13-MAY-19
Titanium (Ti)-Dissolved			98.3		%		70-130	13-MAY-19
Uranium (U)-Dissolved			97.8		%		70-130	13-MAY-19
Vanadium (V)-Dissolved			99.7		%		70-130	13-MAY-19
Zinc (Zn)-Dissolved			96.0		%		70-130	13-MAY-19

MET-T-CCMS-VA

Water



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Test .	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4633446								
WG3047572-3 DUP		L2270399-1	0.0506			4.4	00	40.141./ 40
Aluminum (Al)-Total		0.0573	0.0596		mg/L	4.1	20	13-MAY-19
Antimony (Sb)-Total		0.00036	0.00037		mg/L	1.0	20	13-MAY-19
Arsenic (As)-Total		0.00018	0.00022		mg/L	18	20	13-MAY-19
Barium (Ba)-Total		0.0964	0.0950		mg/L	1.5	20	13-MAY-19
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-19
Boron (B)-Total		0.022	0.022		mg/L	0.3	20	13-MAY-19
Cadmium (Cd)-Total		0.0000110	0.0000116		mg/L	5.0	20	13-MAY-19
Calcium (Ca)-Total		126	122		mg/L	3.5	20	13-MAY-19
Chromium (Cr)-Total		0.00013	0.00013		mg/L	5.5	20	13-MAY-19
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-19
Iron (Fe)-Total		0.080	0.083		mg/L	3.8	20	13-MAY-19
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	13-MAY-19
Lithium (Li)-Total		0.0283	0.0279		mg/L	1.4	20	13-MAY-19
Magnesium (Mg)-Total		72.6	72.2		mg/L	0.5	20	13-MAY-19
Manganese (Mn)-Total		0.0149	0.0149		mg/L	0.5	20	13-MAY-19
Molybdenum (Mo)-Total		0.00215	0.00222		mg/L	3.0	20	13-MAY-19
Nickel (Ni)-Total		0.00100	0.00103		mg/L	3.0	20	13-MAY-19
Potassium (K)-Total		1.70	1.71		mg/L	0.2	20	13-MAY-19
Selenium (Se)-Total		0.0737	0.0726		mg/L	1.6	20	13-MAY-19
Silicon (Si)-Total		2.61	2.60		mg/L	0.0	20	13-MAY-19
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	13-MAY-19
Sodium (Na)-Total		8.81	8.88		mg/L	0.8	20	13-MAY-19
Strontium (Sr)-Total		0.399	0.396		mg/L	0.8	20	13-MAY-19
Thallium (Tl)-Total		0.000013	0.000013		mg/L	0.3	20	13-MAY-19
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	13-MAY-19
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	13-MAY-19
Uranium (U)-Total		0.00309	0.00322		mg/L	4.1	20	13-MAY-19
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	13-MAY-19
Zinc (Zn)-Total		0.0030	0.0030	· = · · ·	mg/L	0.5	20	13-MAY-19
WG3047572-2 LCS					J	0.0		10 10,711 10
Aluminum (Al)-Total			103.9		%		80-120	13-MAY-19
Antimony (Sb)-Total			102.7		%		80-120	13-MAY-19
Arsenic (As)-Total			97.9		%		80-120	13-MAY-19



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MET.T-CCMS-VA Water	Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
WG304757-2 LCS Barium (Ba)-Total 97.1 % 80-120 13-MAY-19 Bismuth (Bu)-Total 98.7 % 80-120 13-MAY-19 Boron (B)-Total 98.7 % 80-120 13-MAY-19 Boron (B)-Total 97.1 % 80-120 13-MAY-19 Cadmium (Cd)-Total 97.1 % 80-120 13-MAY-19 Calcium (Ca)-Total 95.9 % 80-120 13-MAY-19 Calcium (Ca)-Total 100.5 % 80-120 13-MAY-19 Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Coper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Lithium (Li)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnasses (Mh)-Total 107.5 % 80-120 13-MAY-19 Magnasses (Mh)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.1 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.1 % 80-120 13-MAY-19 Nickel (Ni)-Total 99.5 % 80-120	MET-T-CCMS-VA	Water							
Barium (Ba)-Total 97.1 % 80.120 13-MAY-19	Batch R4633446								
Bismuth (Bi)-Total 101.4 % 80.120 13-MAY-19				07.4		0/			
Boron (B)-Total 98.7									
Cadmium (Cd)-Total 97.1 % 80-120 13-MAY-19 Calcium (Ca)-Total 95.9 % 80-120 13-MAY-19 Chotalt (Co)-Total 100.5 % 80-120 13-MAY-19 Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Copper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Icon (Fe)-Total 97.4 % 80-120 13-MAY-19 Magnesium (Mg)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Manganese (Mn)-Total 97.8 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Mickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 97.6 % 80-120 13-MA									
Calcium (Ca)-Total 95.9 % 80-120 13-MAY-19 Chromium (Cr)-Total 100.5 % 80-120 13-MAY-19 Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Copper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Lead (Pb)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Manganese (Mn)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybedenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Selenium (S-)-Total 97.1 % 80-120 13-MAY-19 Selicon (Si)-Total 90.6 % 80-120 13-MAY-1									
Chromium (Cr)-Total 100.5 % 80-120 13-MAY-19 Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Copper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Lead (Pb)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molyddenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 90.6 % 80-120 13-MA									
Cobalt (Co)-Total 97.2 % 80-120 13-MAY-19 Copper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Lead (Pb)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Selenium (Se)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 90.6 % 80-120 13-MAY-19 Silver (Ag)-Total 99.5 % 80-120 13-MAY-19<									
Copper (Cu)-Total 97.6 % 80-120 13-MAY-19 Iron (Fe)-Total 92.1 % 80-120 13-MAY-19 Lead (Pb)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 97.8 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 100.9 % 80-120 13-MAY-19 Silicon (Si)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY									
Iron (Fe)-Total								80-120	13-MAY-19
Lead (Pb)-Total 97.4 % 80-120 13-MAY-19 Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (Kr)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silicon (Si)-Total 90.6 % 80-120 13-MAY-19 Silver (Ag)-Total 99.5 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 95.4 % 80-120 13-MAY-19 Tin (Sn)-Total 97.4 % 80-120 <								80-120	
Lithium (Li)-Total 96.9 % 80-120 13-MAY-19 Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Silver (Ag)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 99.4 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Tin (Sn)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 <td< td=""><td>,</td><td></td><td></td><td></td><td></td><td></td><td></td><td>80-120</td><td>13-MAY-19</td></td<>	,							80-120	13-MAY-19
Magnesium (Mg)-Total 107.5 % 80-120 13-MAY-19 Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silicon (Si)-Total 90.6 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Silver (Ag)-Total 99.5 % 80-120 13-MAY-19 Sitrontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Sitrontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Tl)-Total 100.1 % 80-120 13-MAY-19 Titanium (Tl)-Total 97.4 % 80-120	, ,							80-120	13-MAY-19
Manganese (Mn)-Total 101.0 % 80-120 13-MAY-19 Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Vanadium (V)-Total 95.6 % 80-120 1	Lithium (Li)-Total			96.9		%		80-120	13-MAY-19
Molybdenum (Mo)-Total 97.8 % 80-120 13-MAY-19 Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 99.7 % 80-120 13-MAY-19 </td <td>Magnesium (Mg)-Total</td> <td></td> <td></td> <td>107.5</td> <td></td> <td>%</td> <td></td> <td>80-120</td> <td>13-MAY-19</td>	Magnesium (Mg)-Total			107.5		%		80-120	13-MAY-19
Nickel (Ni)-Total 97.6 % 80-120 13-MAY-19 Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Sotium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total 90.0000 mg/L 0.0001 13-MAY-19 Arsenic (As)-Total 90.0001 mg/L 0.0001 13-MAY-19 Barium (Ba)-Total 90.00010 mg/L 0.0001 13-MAY-19 Barium (Ba)-Total 90.00010 mg/L 0.0001 13-MAY-19 Bismuth (Bi)-Total 90.000050 mg/L 0.00005 13-MAY-19	Manganese (Mn)-Total			101.0		%		80-120	13-MAY-19
Potassium (K)-Total 100.9 % 80-120 13-MAY-19 Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Tl)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 WG3047572-1 MB 80-120 13-MAY-19 Aluminum (Al)-Total <0.0030	Molybdenum (Mo)-Total			97.8		%		80-120	13-MAY-19
Selenium (Se)-Total 97.1 % 80-120 13-MAY-19 Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB No.0030 mg/L 0.003 13-MAY-19 Antimony (Sb)-Total <0.00010	Nickel (Ni)-Total			97.6		%		80-120	13-MAY-19
Silicon (Si)-Total 100.4 % 80-120 13-MAY-19 Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030	Potassium (K)-Total			100.9		%		80-120	13-MAY-19
Silver (Ag)-Total 90.6 % 80-120 13-MAY-19 Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Ti)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 95.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030	Selenium (Se)-Total			97.1		%		80-120	13-MAY-19
Sodium (Na)-Total 99.5 % 80-120 13-MAY-19 Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (Tl)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 99.7 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030	Silicon (Si)-Total			100.4		%		80-120	13-MAY-19
Strontium (Sr)-Total 95.4 % 80-120 13-MAY-19 Thallium (TI)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030	Silver (Ag)-Total			90.6		%		80-120	13-MAY-19
Thallium (TI)-Total 100.1 % 80-120 13-MAY-19 Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB MB MB MB Aluminum (Al)-Total <0.0030	Sodium (Na)-Total			99.5		%		80-120	13-MAY-19
Tin (Sn)-Total 93.4 % 80-120 13-MAY-19 Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030 mg/L 0.003 13-MAY-19 Antimony (Sb)-Total <0.00010 mg/L 0.0001 13-MAY-19 Arsenic (As)-Total <0.00010 mg/L 0.0001 13-MAY-19 Barium (Ba)-Total <0.00010 mg/L 0.0001 13-MAY-19 Bismuth (Bi)-Total <0.000050 mg/L 0.0005 13-MAY-19	Strontium (Sr)-Total			95.4		%		80-120	13-MAY-19
Titanium (Ti)-Total 97.4 % 80-120 13-MAY-19 Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB	Thallium (TI)-Total			100.1		%		80-120	13-MAY-19
Uranium (U)-Total 95.6 % 80-120 13-MAY-19 Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030	Tin (Sn)-Total			93.4		%		80-120	13-MAY-19
Vanadium (V)-Total 100.6 % 80-120 13-MAY-19 Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB Aluminum (Al)-Total <0.0030 mg/L 0.003 13-MAY-19 Antimony (Sb)-Total <0.00010 mg/L 0.0001 13-MAY-19 Arsenic (As)-Total <0.00010 mg/L 0.0001 13-MAY-19 Barium (Ba)-Total <0.00010 mg/L 0.0001 13-MAY-19 Bismuth (Bi)-Total <0.000050 mg/L 0.00005 13-MAY-19	Titanium (Ti)-Total			97.4		%		80-120	13-MAY-19
Zinc (Zn)-Total 99.7 % 80-120 13-MAY-19 WG3047572-1 MB	Uranium (U)-Total			95.6		%		80-120	13-MAY-19
WG3047572-1 MB Aluminum (Al)-Total <0.0030	Vanadium (V)-Total			100.6		%		80-120	13-MAY-19
Aluminum (Al)-Total <0.0030	Zinc (Zn)-Total			99.7		%		80-120	13-MAY-19
Aluminum (Al)-Total <0.0030	WG3047572-1 MB								
Arsenic (As)-Total				<0.0030		mg/L		0.003	13-MAY-19
Barium (Ba)-Total <0.00010	Antimony (Sb)-Total			<0.00010)	mg/L		0.0001	13-MAY-19
Bismuth (Bi)-Total <0.000050 mg/L 0.00005 13-MAY-19	Arsenic (As)-Total			<0.00010)	mg/L		0.0001	13-MAY-19
	Barium (Ba)-Total			<0.00010)	mg/L		0.0001	13-MAY-19
Boron (B)-Total <0.010 mg/L 0.01 13-MAY-19	Bismuth (Bi)-Total			< 0.00005	50	mg/L		0.00005	13-MAY-19
	Boron (B)-Total			<0.010		mg/L		0.01	13-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4633446								
WG3047572-1 MB			.0.0000	F.C.	/I		2 222225	
Cadmium (Cd)-Total			<0.00000	OL .	mg/L		0.000005	13-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	13-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	13-MAY-19
Lead (Pb)-Total			<0.00005	0	mg/L		0.00005	13-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Molybdenum (Mo)-Total			< 0.00005	0	mg/L		0.00005	13-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	13-MAY-19
Selenium (Se)-Total			<0.00005	0	mg/L		0.00005	13-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	13-MAY-19
Silver (Ag)-Total			<0.00001	0	mg/L		0.00001	13-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	13-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	13-MAY-19
Thallium (TI)-Total			<0.00001	0	mg/L		0.00001	13-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-MAY-19
Uranium (U)-Total			<0.00001	0	mg/L		0.00001	13-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-MAY-19
WG3047572-4 MS		L2270399-3			-			
Aluminum (Al)-Total			92.9		%		70-130	13-MAY-19
Antimony (Sb)-Total			97.1		%		70-130	13-MAY-19
Arsenic (As)-Total			99.7		%		70-130	13-MAY-19
Barium (Ba)-Total			N/A	MS-B	%		-	13-MAY-19
Bismuth (Bi)-Total			95.1		%		70-130	13-MAY-19
Boron (B)-Total			104.3		%		70-130	13-MAY-19
Cadmium (Cd)-Total			97.5		%		70-130	13-MAY-19
Calcium (Ca)-Total			N/A	MS-B	%		-	13-MAY-19
Chromium (Cr)-Total			98.6		%		70-130	13-MAY-19
			55.5		,,		70-130	10-WA1-13



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4633446								
WG3047572-4 MS		L2270399-3						
Cobalt (Co)-Total			93.6		%		70-130	13-MAY-19
Copper (Cu)-Total			94.2		%		70-130	13-MAY-19
Iron (Fe)-Total			97.2		%		70-130	13-MAY-19
Lead (Pb)-Total			94.0		%		70-130	13-MAY-19
Lithium (Li)-Total			93.8		%		70-130	13-MAY-19
Magnesium (Mg)-Total			N/A	MS-B	%		-	13-MAY-19
Manganese (Mn)-Total			95.6		%		70-130	13-MAY-19
Molybdenum (Mo)-Total			99.8		%		70-130	13-MAY-19
Nickel (Ni)-Total			93.4		%		70-130	13-MAY-19
Potassium (K)-Total			99.3		%		70-130	13-MAY-19
Selenium (Se)-Total			101.5		%		70-130	13-MAY-19
Silicon (Si)-Total			89.3		%		70-130	13-MAY-19
Silver (Ag)-Total			96.5		%		70-130	13-MAY-19
Sodium (Na)-Total			91.2		%		70-130	13-MAY-19
Strontium (Sr)-Total			N/A	MS-B	%		-	13-MAY-19
Thallium (TI)-Total			93.2		%		70-130	13-MAY-19
Tin (Sn)-Total			96.7		%		70-130	13-MAY-19
Titanium (Ti)-Total			92.4		%		70-130	13-MAY-19
Uranium (U)-Total			96.0		%		70-130	13-MAY-19
Vanadium (V)-Total			99.4		%		70-130	13-MAY-19
Zinc (Zn)-Total			97.3		%		70-130	13-MAY-19
Batch R4634642								
WG3048697-2 LCS								
Aluminum (Al)-Total			100.2		%		80-120	14-MAY-19
Antimony (Sb)-Total			100.3		%		80-120	14-MAY-19
Arsenic (As)-Total			96.1		%		80-120	14-MAY-19
Barium (Ba)-Total			100.4		%		80-120	14-MAY-19
Bismuth (Bi)-Total			104.0		%		80-120	14-MAY-19
Boron (B)-Total			96.1		%		80-120	14-MAY-19
Cadmium (Cd)-Total			96.8		%		80-120	14-MAY-19
Calcium (Ca)-Total			98.2		%		80-120	14-MAY-19
Chromium (Cr)-Total			99.7		%		80-120	14-MAY-19
Cobalt (Co)-Total			97.3		%		80-120	14-MAY-19
Copper (Cu)-Total			97.2		%		80-120	14-MAY-19



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MET.T-CCMS-VA	Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
WG3048697-2 LCS Iron (Fe)-Total 97.6 % 80-120 14-MAY-19 Lead (Pb)-Total 98.0 % 80-120 14-MAY-19 Lead (Pb)-Total 94.0 % 80-120 14-MAY-19 Magnesium (Mg)-Total 102.5 % 80-120 14-MAY-19 Magnesium (Mg)-Total 98.0 % 80-120 14-MAY-19 Manganese (Mn)-Total 98.0 % 80-120 14-MAY-19 Molybdonum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.8 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.8 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.2 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.2 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.2 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.1 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.1 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.0 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.0 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.5 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.5 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.5 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.3 % 80-120 14-MAY-19 Nickel (Ni)-Total 99.0 MigL 0.0001 14-MAY-19 Nickel (Ni)-Total 99.0 MigL 0.0001 14-MAY-19 Nickel (Ni)-Total 0.00010 mgL 0.0001 14-MAY-19 Nickel (Ni)-Total 0.00010 mgL 0.0001 14-MAY-19 Nickel (Ni)-Total 0.000050 mgL 0.000050 14-MAY-19 Nickel (Nickel Nickel Nicke	MET-T-CCMS-VA	Water							
Iron (Fe)-Total	Batch R4634642	!							
Lead (Pb)-Total 98.0 % 80-120 14-MAY-19 Lithium (Li)-Total 94.0 % 80-120 14-MAY-19 Magnesium (Mg)-Total 102.5 % 80-120 14-MAY-19 Manganese (Mn)-Total 99.0 % 80-120 14-MAY-19 Molybdenum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Potassium (Sp)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silicon (Si)-Total 102.6 % 80-120 14-MAY-19 Silicon (Si)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sp)-Total 102.6 % 80-120 14-MAY-19 Tin (Sn)-Total 104.2 % 80-120 14-MAY-19 Tin (Sn)-Total 104.2 % 80-120 14-MAY-19 Tin (Sn)-Total 104.6 % 80-120 14-MAY-19 Tin (Sn)-Total 104.6 % 80-120 14-MAY-19 Tin (Sn)-Total 104.7 % 80-120 14-MAY-19 Tin (Sn)-Total 104.1 % 80-120 14-MAY-19 Vanadium (V)-Total 104.1 % 80-120 14-MAY-19 Artenic (Zn)-Total 104.0 % 90.0 mg/L				07.0		0.4			
Lithium (L)-Total 94.0 % 80-120 14-MAY-19 Magnesium (Mg)-Total 102.5 % 80-120 14-MAY-19 Manganese (Mn)-Total 98.0 % 80-120 14-MAY-19 Molydenum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicor (Si)-Total 99.2 % 80-120 14-MAY-19 Silicor (Si)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 94.1 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Strontium (Sr)-Total 98.5 % 80-120 14-MAY-19 Titac (Zn)-Total 97.4 % 80-120 14-MAY-19 Titac (Zn)-Total 94.5 % 80-120 14-MA									
Magnesium (Mg)-Total 102.5 % 80-120 14-MAY-19 Manganese (Mn)-Total 98.0 % 80-120 14-MAY-19 Molybdenum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (N)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Stronium (Sr)-Total 99.0 % 80-120 14-MAY-19 Stronium (Sr)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 94.5 80-120 14-MAY-19 Uranium (U)-Total 94.5 80-120 14-MAY-19 Uranium (V)-Total 99.3 % 80-120 14-MAY-19 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>									
Manganese (Mn)-Total 98.0 % 80-120 14-MAY-19 Molybdenum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (T)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Tintaium (T)-Total 94.5 % 80-120 14-MAY-19 Vanadium (V)-Total 91.1 % 80-120 14-MAY-19 Vanadium (V)-Total 90.3 % 80-120 14-MAY-									
Molybednum (Mo)-Total 96.4 % 80-120 14-MAY-19 Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicor (Sg)-Total 104.2 % 80-120 14-MAY-19 Silvor (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Strontium (Sr)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Tinalium (T)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Vanadium (V)-Total 90.0030 mg/L 0.000 14	\$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								_
Nickel (Ni)-Total 97.7 % 80-120 14-MAY-19 Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Siliver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (TI)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 90-120 14-MAY-19 Titanium (T)-Total 94.5 % 80-120 14-MAY-19 Titanium (T)-Total 97.4 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Arsenic (As)-Total 00.000 mg/L 0.0001 14-MAY-19 Arsenic (As)-Total 0.00010 mg/L 0.0001 14-MAY-19 Barium (Ba)-Total 0.00010 mg/L 0.0001 14-MAY-19 Bismuth (B)-Total 0.00010 mg/L 0.0001 14-MAY-19 Bismuth (B)-Total 0.00010 mg/L 0.0001 14-MAY-19 Cadmium (Cd)-Total 0.00005 mg/L 0.0005 14-MAY-19 Cadmium (Cd)-Total 0.00010 mg/L 0.0001 14-MAY-19 Cadmium (Cf)-Total 0.00010 mg/L 0.0001 14-MAY-19 Cadmium (Cf)-Total 0.00010 mg/L 0.0001 14-MAY-19 Cadei (Co)-Total 0.00010 mg/L 0.0001 14-MAY-19									-
Potassium (K)-Total 96.8 % 80-120 14-MAY-19 Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silicon (Si)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (Ti)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Tin (Sn)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 97.1 % 80-120 14-MAY-19 Vanadium (V)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total <0.0030		al							
Selenium (Se)-Total 99.2 % 80-120 14-MAY-19 Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (Ti)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total <0.0030	` '							80-120	14-MAY-19
Silicon (Si)-Total 104.2 % 80-120 14-MAY-19 Silver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (Ti)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total <0.0030	Potassium (K)-Total			96.8				80-120	14-MAY-19
Silver (Ag)-Total 94.1 % 80-120 14-MAY-19 Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (TI)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (TI)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Nama (Zn)-Total 40.003 mg/L 0.003 14-MAY-19 Antimony (Sb)-Total <0.0030	, ,			99.2				80-120	14-MAY-19
Sodium (Na)-Total 102.6 % 80-120 14-MAY-19 Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (TI)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (TI)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB MB MB MB MB MB MB MB MB MAY-19 MMAY-19	Silicon (Si)-Total			104.2		%		80-120	14-MAY-19
Strontium (Sr)-Total 99.0 % 80-120 14-MAY-19 Thallium (TI)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB 80-120 14-MAY-19 Aluminum (Al)-Total 0.0030 mg/L 0.003 14-MAY-19 Antimony (Sb)-Total <0.00010	Silver (Ag)-Total			94.1		%		80-120	14-MAY-19
Thallium (TI)-Total 98.5 % 80-120 14-MAY-19 Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Uranium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total < 0.0030 mg/L 0.003 14-MAY-19 Antimony (Sb)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Arsenic (As)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Barium (Ba)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Bismuth (Bi)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Bismuth (Bi)-Total < 0.000050 mg/L 0.0005 14-MAY-19 Cadmium (Cd)-Total < 0.010 mg/L 0.00005 14-MAY-19 Cadmium (Cd)-Total < 0.050 mg/L 0.00005 14-MAY-19 Cadmium (Cd)-Total < 0.050 mg/L 0.000 14-MAY-19 Calcium (Ca)-Total < 0.050 mg/L 0.0001 14-MAY-19 Cobalt (Co)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Cobalt (Co)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Cobalt (Co)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Copper (Cu)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Copper (Cu)-Total < 0.00010 mg/L 0.0001 14-MAY-19 Iron (Fe)-Total < 0.00050 mg/L 0.0005 14-MAY-19 Iron (Fe)-Total < 0.00050 mg/L 0.0005 14-MAY-19 Iron (Fe)-Total < 0.00050 mg/L 0.0005 14-MAY-19	Sodium (Na)-Total			102.6		%		80-120	14-MAY-19
Tin (Sn)-Total 97.4 % 80-120 14-MAY-19 Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Ng/L 0.003 14-MAY-19 Aluminum (Al)-Total <0.0030	Strontium (Sr)-Total			99.0		%		80-120	14-MAY-19
Titanium (Ti)-Total 94.5 % 80-120 14-MAY-19 Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total <0.0030 mg/L 0.003 14-MAY-19 Antimony (Sb)-Total <0.00010 mg/L 0.0001 14-MAY-19 Arsenic (As)-Total <0.00010 mg/L 0.0001 14-MAY-19 Barium (Ba)-Total <0.00010 mg/L 0.0001 14-MAY-19 Bismuth (Bi)-Total <0.00010 mg/L 0.0001 14-MAY-19 Bismuth (Bi)-Total <0.000050 mg/L 0.0005 14-MAY-19 Cadmium (Cd)-Total <0.000050 mg/L 0.00005 14-MAY-19 Calcium (Ca)-Total <0.000050 mg/L 0.00005 14-MAY-19 Calcium (Ca)-Total <0.0000 mg/L 0.000 14-MAY-19 Chromium (Cr)-Total <0.0001 mg/L 0.001 14-MAY-19 Cobalt (Co)-Total <0.00010 mg/L 0.0001 14-MAY-19 Copper (Cu)-Total <0.00010 mg/L 0.0001 14-MAY-19 Copper (Cu)-Total <0.00010 mg/L 0.0001 14-MAY-19 Iron (Fe)-Total <0.00050 mg/L 0.0005 14-MAY-19	Thallium (TI)-Total			98.5		%		80-120	14-MAY-19
Uranium (U)-Total 101.1 % 80-120 14-MAY-19 Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB MB MID (MID) MID (MID) 0.0030 mg/L 0.003 14-MAY-19 Antimony (Sb)-Total <0.00010	Tin (Sn)-Total			97.4		%		80-120	14-MAY-19
Vanadium (V)-Total 99.3 % 80-120 14-MAY-19 Zinc (Zn)-Total 97.1 % 80-120 14-MAY-19 WG3048697-1 MB Aluminum (Al)-Total <0.0030	Titanium (Ti)-Total			94.5		%		80-120	14-MAY-19
WG3048697-1 MB MB Aluminum (Al)-Total <0.0030	Uranium (U)-Total			101.1		%		80-120	14-MAY-19
WG3048697-1 MB Aluminum (Al)-Total <0.0030	Vanadium (V)-Total			99.3		%		80-120	14-MAY-19
Aluminum (Al)-Total <0.0030	Zinc (Zn)-Total			97.1		%		80-120	14-MAY-19
Antimony (Sb)-Total <0.00010	WG3048697-1 MB								
Arsenic (As)-Total <0.00010	Aluminum (Al)-Total			< 0.0030		mg/L		0.003	14-MAY-19
Barium (Ba)-Total <0.00010	Antimony (Sb)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Bismuth (Bi)-Total <0.000050	Arsenic (As)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Boron (B)-Total <0.010	Barium (Ba)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Cadmium (Cd)-Total <0.000005C	Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	14-MAY-19
Calcium (Ca)-Total <0.050	Boron (B)-Total			<0.010		mg/L		0.01	14-MAY-19
Chromium (Cr)-Total <0.00010	Cadmium (Cd)-Total			<0.000005	С	mg/L		0.000005	14-MAY-19
Cobalt (Co)-Total <0.00010	Calcium (Ca)-Total			< 0.050		mg/L		0.05	14-MAY-19
Copper (Cu)-Total <0.00050 mg/L 0.0005 14-MAY-19 Iron (Fe)-Total <0.010	Chromium (Cr)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Iron (Fe)-Total <0.010	Cobalt (Co)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Lead (Pb)-Total <0.000050 mg/L 0.00005 14-MAY-19	Copper (Cu)-Total			<0.00050		mg/L		0.0005	14-MAY-19
Lead (Pb)-Total <0.000050 mg/L 0.00005 14-MAY-19	Iron (Fe)-Total			<0.010		mg/L		0.01	14-MAY-19
	Lead (Pb)-Total			<0.000050		mg/L			
Litnium (Li)- i otal <0.001 14-MAY-19	Lithium (Li)-Total			<0.0010		mg/L		0.001	14-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4634642								
WG3048697-1 MB Magnesium (Mg)-Total			<0.0050		mg/L		0.005	14 MAY 10
Manganese (Mn)-Total			<0.00010		mg/L		0.005	14-MAY-19
Molybdenum (Mo)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.00005	14-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.0005 0.05	14-MAY-19
Selenium (Se)-Total			<0.00050		mg/L			14-MAY-19
Silicon (Si)-Total			<0.000		-		0.00005	14-MAY-19
					mg/L		0.1	14-MAY-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	14-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	14-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	14-MAY-19
Thallium (TI)-Total			<0.000010		mg/L		0.00001	14-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	14-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	14-MAY-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	14-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	14-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	14-MAY-19
NH3-L-F-CL	Water							
Batch R4635287								
WG3050204-7 DUP Ammonia as N		L2270399-17 <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050204-10 LCS			0.4.7		0.4			
Ammonia as N			91.7		%		85-115	14-MAY-19
WG3050204-14 LCS Ammonia as N			90.3		%		05.445	44 140 // 40
Allillollia as IN			90.3		/0		85-115	14-MAY-19
14/00050004.0 1.00								
WG3050204-2 LCS Ammonia as N			94.3		%		85-115	14-MAY-19
Ammonia as N			94.3		%		85-115	14-MAY-19
			94.3 91.7		%		85-115 85-115	14-MAY-19 14-MAY-19
Ammonia as N WG3050204-6 LCS								
Ammonia as N WG3050204-6 LCS Ammonia as N								
Ammonia as N WG3050204-6 LCS Ammonia as N WG3050204-1 MB			91.7		%		85-115 0.005	14-MAY-19
Ammonia as N WG3050204-6 Ammonia as N WG3050204-1 Ammonia as N WG3050204-13 Ammonia as N MB			91.7		% mg/L		85-115	14-MAY-19
Ammonia as N WG3050204-6 LCS Ammonia as N WG3050204-1 MB Ammonia as N WG3050204-13 MB			91.7		% mg/L		85-115 0.005	14-MAY-19
Ammonia as N WG3050204-6 Ammonia as N WG3050204-1 Ammonia as N WG3050204-13 Ammonia as N WG3050204-13 MB Ammonia as N			91.7 <0.0050 <0.0050		% mg/L mg/L		85-115 0.005 0.005	14-MAY-19 14-MAY-19 14-MAY-19



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Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL		Water							
Batch R4 WG3050204-8 Ammonia as N	1635287 MS		L2270399-17	92.8		%		75-125	14-MAY-19
NO2-L-IC-N-CL		Water							
Batch R4	630541								
WG3046588-7 Nitrite (as N)	DUP		L2270399-7 <0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 Nitrite (as N)	LCS			100.2		%		90-110	09-MAY-19
WG3046588-5 Nitrite (as N)	МВ			<0.0010		mg/L		0.001	09-MAY-19
WG3046588-8 Nitrite (as N)	MS		L2270399-7	110.5		%		75-125	09-MAY-19
NO3-L-IC-N-CL		Water							
Batch R4	630541								
WG3046588-7 Nitrate (as N)	DUP		L2270399-7 <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 Nitrate (as N)	LCS			99.4		%		90-110	09-MAY-19
WG3046588-5 Nitrate (as N)	MB			<0.0050		mg/L		0.005	09-MAY-19
WG3046588-8 Nitrate (as N)	MS		L2270399-7	109.7		%		75-125	09-MAY-19
ORP-CL		Water							
Batch R4	1634296								
WG3048846-19 ORP	CRM		CL-ORP	225		mV		210-230	13-MAY-19
WG3048846-21 ORP	CRM		CL-ORP	225		mV		210-230	13-MAY-19
P-T-L-COL-CL		Water							
Batch R4 WG3051587-10 Phosphorus (P)				100.8		%		80-120	16-MAY-19
WG3051587-9 Phosphorus (P)	МВ			<0.0020		mg/L		0.002	16-MAY-19
PH-CL		Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	Water		_					
Batch R4635450								
WG3050091-14 LCS pH			7.00		рН		6.9-7.1	14-MAY-19
WG3050091-17 LCS					·			
рН			7.00		рН		6.9-7.1	14-MAY-19
PO4-DO-L-COL-CL	Water							
Batch R4630586								
WG3045960-10 LCS Orthophosphate-Dissolv	red (as P)		102.4		%		80-120	00 MAV 10
WG3045960-9 MB	rcu (as i)		102.4		70		00-120	09-MAY-19
Orthophosphate-Dissolv	ved (as P)		<0.0010		mg/L		0.001	09-MAY-19
SO4-IC-N-CL	Water							
Batch R4630541								
WG3046588-7 DUP		L2270399-7 <0.30	<0.30	DDD MA	ma/l	N1/A	20	00 MAY 40
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	09-MAY-19
WG3046588-6 LCS Sulfate (SO4)			100.1		%		90-110	09-MAY-19
WG3046588-5 MB Sulfate (SO4)			<0.30		mg/L		0.3	09-MAY-19
WG3046588-8 MS Sulfate (SO4)		L2270399-7	110.0		%		75-125	09-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4634892								
WG3047948-14 LCS								
Total Dissolved Solids			95.5		%		85-115	13-MAY-19
WG3047948-13 MB Total Dissolved Solids			<10		mg/L		10	13-MAY-19
TKN-L-F-CL	Water							
Batch R4636142								
WG3051214-7 DUP		L2270399-7						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-MAY-19
WG3051214-10 LCS Total Kjeldahl Nitrogen			89.7		%		75-125	15-MAY-19
WG3051214-14 LCS Total Kjeldahl Nitrogen			89.3		%		75-125	15-MAY-19
WG3051214-18 LCS								
Total Kjeldahl Nitrogen			89.7		%		75-125	15-MAY-19
WG3051214-2 LCS								



Workorder: L2270399 Report Date: 17-MAY-19

Page 16 of 18

Test Matrix Reference Result Qualifier Units **RPD** Limit Analyzed TKN-L-F-CL Water Batch R4636142 WG3051214-2 LCS 92.9 Total Kjeldahl Nitrogen % 75-125 15-MAY-19 WG3051214-6 LCS Total Kjeldahl Nitrogen 90.0 % 75-125 15-MAY-19 WG3051214-1 MB Total Kjeldahl Nitrogen < 0.050 mg/L 0.05 15-MAY-19 WG3051214-13 MB Total Kjeldahl Nitrogen < 0.050 mg/L 0.05 15-MAY-19 WG3051214-17 MB Total Kjeldahl Nitrogen < 0.050 mg/L 0.05 15-MAY-19 WG3051214-5 MB Total Kjeldahl Nitrogen < 0.050 mg/L 0.05 15-MAY-19 WG3051214-8 MS L2270399-7 Total Kjeldahl Nitrogen % 97.5 70-130 15-MAY-19 TSS-L-CL Water Batch R4634811 WG3048017-23 LCS **Total Suspended Solids** 99.8 % 85-115 13-MAY-19 WG3048017-25 LCS 92.9 **Total Suspended Solids** % 85-115 13-MAY-19 WG3048017-22 MB **Total Suspended Solids** <1.0 mg/L 1 13-MAY-19 WG3048017-24 MB Total Suspended Solids <1.0 mg/L 1 13-MAY-19 **TURBIDITY-CL** Water R4630303 Batch WG3046239-21 DUP L2270399-3 Turbidity 2.46 2.81 NTU 13 15 09-MAY-19 WG3046239-17 LCS **Turbidity** 95.5 % 85-115 09-MAY-19 WG3046239-20 LCS Turbidity 95.5 % 85-115 09-MAY-19 WG3046239-16 MB NTU Turbidity < 0.10 0.1 09-MAY-19 WG3046239-19 MB NTU Turbidity <0.10 0.1 09-MAY-19

Workorder: L2270399 Report Date: 17-MAY-19 Page 17 of 18

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

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

Workorder: L2270399 Report Date: 17-MAY-19 Page 18 of 18

Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	al by elect.						
	1	07-MAY-19 09:25	13-MAY-19 16:50	0.25	151	hours	EHTR-FM
	3	07-MAY-19 13:00	13-MAY-19 16:50	0.25	148	hours	EHTR-FM
	5	07-MAY-19 13:00	13-MAY-19 16:50	0.25	148	hours	EHTR-FM
	7	07-MAY-19 12:00	13-MAY-19 16:50	0.25	149	hours	EHTR-FM
	8	07-MAY-19 13:00	13-MAY-19 16:50	0.25	148	hours	EHTR-FM
	9	07-MAY-19 13:45	13-MAY-19 16:50	0.25	147	hours	EHTR-FM
	11	07-MAY-19 14:36	13-MAY-19 16:50	0.25	146	hours	EHTR-FM
	13	07-MAY-19 11:55	13-MAY-19 16:50	0.25	149	hours	EHTR-FM
	15	07-MAY-19 11:55	13-MAY-19 16:50	0.25	149	hours	EHTR-FM
	17	08-MAY-19 08:02	13-MAY-19 16:50	0.25	129	hours	EHTR-FM
рН							
	1	07-MAY-19 09:25	14-MAY-19 09:00	0.25	168	hours	EHTR-FM
	3	07-MAY-19 13:00	14-MAY-19 09:00	0.25	164	hours	EHTR-FM
	5	07-MAY-19 13:00	14-MAY-19 09:00	0.25	164	hours	EHTR-FM
	7	07-MAY-19 12:00	14-MAY-19 09:00	0.25	165	hours	EHTR-FM
	8	07-MAY-19 13:00	14-MAY-19 09:00	0.25	164	hours	EHTR-FM
	9	07-MAY-19 13:45	14-MAY-19 09:00	0.25	163	hours	EHTR-FM
	11	07-MAY-19 14:36	14-MAY-19 09:00	0.25	162	hours	EHTR-FM
	13	07-MAY-19 11:55	14-MAY-19 09:00	0.25	165	hours	EHTR-FM
	15	07-MAY-19 11:55	14-MAY-19 09:00	0.25	165	hours	EHTR-FM
	17	08-MAY-19 08:02	14-MAY-19 09:00	0.25	145	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2270399 were received on 09-MAY-19 10:00.

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

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

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

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RG_GRLK_WS_20190507-1300		RG_GRLK	ws	No	7-May-	19	1300	G	7	x	х	х	x	х	x	х			1	
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RG_DUP_WS_10190507-1300		RG DUP	WS	No	7-May-		1300	G	7	X	+ x ~	 	^_	x	- x	x		_		
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G_ER_WS_20190507-1155 FB-HG	RG_ER	6	ws	No a	7-MAY	17	1155	G		št.		 	Х			ļ		<u> </u>	ļ	
RG_DUP_WS_10190507-1155	1	RG_DUP	ws	No	7-May-	19	1155	G	_ 7	Х	X	X	x	X	Х	X			↓	₩
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Sampler's Name

Sampler's Signature

Mobile#

Date/Time

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Emergency (L Business Day) - 100% surcharge For Emergency < L Day, ASAP or Weekend - Contact ALS

Page 1 of t **Teck** COC ID: REP-Lentic 19-12 TURNAROUND TIME: LABORATORY PROJECT/CLIENT INFO Lab Name ALS Calgary Facility Name / Joh# Regional Effects Program (REP) Excel PDF EDD Lab Contact Lyudmyla Shvets Project Manager Cail Good Email lyudmyta.shvets@alsglobal.com Email calt.good@teck.com Address 421 Pine Avenue Address 2559 29 Street NE City Calgary ΛВ Sparwood Province Province City VOB 2G0 Сапада Postal Code T1Y 7BS Country Canada Postal Code Phone Number 250-425-8202 Phone Number | 403 407 1794 Flored - Fred L. Lab, FL: Pred & Jak, N. No. ANALYSIS REQUESTED H2SO4 HNQJ Material (Yes/No) TECKCOAL-MET-T-VA L2270399-COFC FECKCOAL-MET-D ALS_Package-DOC HG-T-U-CVAF-VA HG-D-CVAF-VA # Of Cont. Hazardous Field Time G=Grab Sample ID Sample Location Matrix Date (24hr) C=Comp RG ERIMF 0802 RC_ERIMF_WS_20190509-0801 ws No 8-May-19 G Х RG_ERIMF_WS_20190509-0802 FB-HG RG ERIMF WS No 8-May-19 0802 G No No No No No r 46 No · - F. 14 No No No Νa No No No No A RELINQUISHED BY/AFFILIATION ASSISTED A TEXTIME SERVED ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS IN THE PROPERTY OF TH ACCEPTED BY/AFFILIATION PROPERTY OF A SECOND PROPERTY OF THE P

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Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge	Sampler's Signature		Date/Time	
For Emergency < 1 Day, ASAP or Weekend + Contact ALS	Sampler's Signature	<u> </u>	Date/11mg	
				,



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

Date Received: 10-MAY-19

Report Date: 17-MAY-19 17:02 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2271140
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-12 - 2

Legal Site Desc:

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Lyudmyla Shvets, B.Sc. Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298 ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L2271140 CONTD.... PAGE 2 of 7

ALS ENVIRONMENTAL ANALYTICAL REPORT

17-MAY-19 17:02 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2271140-1 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702	L2271140-2 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702 FB- HG		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)	257			
	Hardness (as CaCO3) (mg/L)	132			
	pH (pH)	8.31			
	ORP (mV)	476			
	Total Suspended Solids (mg/L)	3.3			
	Total Dissolved Solids (mg/L)	146			
	Turbidity (NTU)	1.91			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	130			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	1.8			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	132			
	Ammonia as N (mg/L)	0.0315			
	Bromide (Br) (mg/L)	<0.050			
	Chloride (CI) (mg/L)	2.62			
	Fluoride (F) (mg/L)	0.062			
	Ion Balance (%)	102			
	Nitrate (as N) (mg/L)	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.938			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0120			
	Sulfate (SO4) (mg/L)	3.21			
	Anion Sum (meq/L)	2.78			
	Cation Sum (meq/L)	2.84			
	Cation - Anion Balance (%)	0.9			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	8.20			
	Total Organic Carbon (mg/L)	8.43			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0049			
	Antimony (Sb)-Total (mg/L)	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00046			
	Barium (Ba)-Total (mg/L)	0.199			
	Beryllium (Be)-Total (ug/L)	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050			
	Boron (B)-Total (mg/L)	<0.010			
	Cadmium (Cd)-Total (ug/L)	<0.0050			

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

L2271140 CONTD.... PAGE 3 of 7 17-MAY-19 17:02 (MT)

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2271140-1 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702	L2271140-2 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702 FB- HG		
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)	25.9			
	Chromium (Cr)-Total (mg/L)	<0.00010			
	Cobalt (Co)-Total (ug/L)	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0014			
	Magnesium (Mg)-Total (mg/L)	15.7			
	Manganese (Mn)-Total (mg/L)	0.00513			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.000337			
	Nickel (Ni)-Total (mg/L)	<0.00050			
	Potassium (K)-Total (mg/L)	1.18			
	Selenium (Se)-Total (ug/L)	<0.050			
	Silicon (Si)-Total (mg/L)	1.15			
	Silver (Ag)-Total (mg/L)	<0.000010			
	Sodium (Na)-Total (mg/L)	4.02			
	Strontium (Sr)-Total (mg/L)	0.0729			
	Thallium (TI)-Total (mg/L)	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010			
	Uranium (U)-Total (mg/L)	0.000232			
	Vanadium (V)-Total (mg/L)	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.0039			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB			
	Dissolved Metals Filtration Location	LAB			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00052			
	Barium (Ba)-Dissolved (mg/L)	0.191			
	Beryllium (Be)-Dissolved (ug/L)	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050			
	Calcium (Ca)-Dissolved (mg/L)	26.9			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10			

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

L2271140 CONTD.... PAGE 4 of 7

17-MAY-19 17:02 (MT) Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2271140-1 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702	L2271140-2 WS 08-MAY-19 17:02 RG_LNLK_WS_20 190508-1702 FB- HG		
Grouping	Analyte		110		
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050			
	Iron (Fe)-Dissolved (mg/L)	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0015			
	Magnesium (Mg)-Dissolved (mg/L)	15.7			
	Manganese (Mn)-Dissolved (mg/L)	0.00011			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000343			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050			
	Potassium (K)-Dissolved (mg/L)	1.26			
	Selenium (Se)-Dissolved (ug/L)	<0.050			
	Silicon (Si)-Dissolved (mg/L)	1.12			
	Silver (Ag)-Dissolved (mg/L)	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	3.95			
	Strontium (Sr)-Dissolved (mg/L)	0.0714			
	Thallium (TI)-Dissolved (mg/L)	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000263			
	Vanadium (V)-Dissolved (mg/L)	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010			

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

Reference Information

L2271140 CONTD....

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17-MAY-19 17:02 (MT)

Version: FINAL

Qualifiers for Sample Submission Listed:

Qualifier Description

SFPL Sample was Filtered and Preserved at the laboratory - DOC/D-METAL/D-HG FILTERED AND PRESERVED AT THE LAB

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2271140-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2271140-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2271140-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2271140-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2271140-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2271140-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2271140-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2271140-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2271140-1

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

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subtracting the TIC from the TC.

F-IC-N-CL

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

Fluoride in Water by IC

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum

electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

EPA 300.1 (mod)

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

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

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction

with stannous chloride, and analyzed by CVAAS or CVAFS.

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

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

reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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APHA 4500-P PHOSPHORUS

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended held time from time of complians (field each vice in recommended for pH where highly except the are product)

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Orthophosphate-Dissolved (as P)

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

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

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

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

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

Water

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

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

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

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

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

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

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

 Laboratory Definition Code
 Laboratory Location

 CL
 ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

PO4-DO-L-COL-CL

REP-Lentic 19-12 - 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test I	Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water						
Batch R4636618 WG3051277-11 LCS Acidity (as CaCO3)			104.7	%		85-115	15-MAY-19
WG3051277-10 MB Acidity (as CaCO3)			1.4	mg/L		2	15-MAY-19
ALK-MAN-CL	Water						
Batch R4636590 WG3051280-8 LCS Alkalinity, Total (as CaCO	3)		96.2	%		85-115	15-MAY-19
WG3051280-7 MB Alkalinity, Total (as CaCO)			<1.0	mg/L		1	15-MAY-19
BE-D-L-CCMS-VA	Water						
Batch R4634858 WG3048893-2 LCS Beryllium (Be)-Dissolved			99.8	%		00.400	44 MANY 40
WG3048893-1 MB Beryllium (Be)-Dissolved		LF	<0.000020	70 mg/L		80-120 0.00002	14-MAY-19 14-MAY-19
BE-T-L-CCMS-VA	Water						
Batch R4632066							
WG3047525-2 LCS Beryllium (Be)-Total			88.4	%		80-120	12-MAY-19
WG3047525-1 MB Beryllium (Be)-Total			<0.000020	mg/L		0.00002	12-MAY-19
BR-L-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS Bromide (Br)			104.0	%		85-115	10-MAY-19
WG3047327-9 MB Bromide (Br)			<0.050	mg/L		0.05	10-MAY-19
C-DIS-ORG-LOW-CL	Water						
Batch R4637537 WG3052922-6 LCS			400.0	0/			
Dissolved Organic Carbon WG3052922-5 MB Dissolved Organic Carbon			100.9 <0.50	% mg/L		80-120	17-MAY-19
_			\0.30	mg/L		0.5	17-MAY-19
C-TOT-ORG-LOW-CL	Water						



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL Batch R4637537 WG3052922-6 LCS	Water							
Total Organic Carbon WG3052922-5 MB			108.0		%		80-120	17-MAY-19
Total Organic Carbon			<0.50		mg/L		0.5	17-MAY-19
CL-IC-N-CL	Water							
Batch R4631153 WG3047327-10 LCS Chloride (CI)			102.5		%		90-110	10-MAY-19
WG3047327-9 MB Chloride (CI)			<0.50		mg/L		0.5	10-MAY-19
EC-L-PCT-CL	Water							
Batch R4636590 WG3051280-8 LCS Conductivity (@ 25C)			103.9		%		90-110	15-MAY-19
WG3051280-7 MB Conductivity (@ 25C)			<2.0		uS/cm		2	15-MAY-19
F-IC-N-CL	Water							
Batch R4631153 WG3047327-10 LCS Fluoride (F)			107.6		%		90-110	10-MAY-19
WG3047327-9 MB Fluoride (F)			<0.020		mg/L		0.02	10-MAY-19
HG-D-CVAA-VA	Water							
Batch R4635213 WG3049627-6 LCS Mercury (Hg)-Dissolved			102.6		%		80-120	15-MAY-19
WG3049627-5 MB Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	15-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4637338 WG3052736-2 LCS Mercury (Hg)-Total			115.0		%		80-120	17-MAY-19
WG3052736-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-MAY-19
MET-D-CCMS-VA	Water							



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4634858								
WG3048893-2 LCS Aluminum (Al)-Dissolved			101.4		%		00.400	44.040./40
Antimony (Sb)-Dissolved			101.4		%		80-120	14-MAY-19
Arsenic (As)-Dissolved			94.9		%		80-120	14-MAY-19
							80-120	14-MAY-19
Barium (Ba)-Dissolved			89.7		%		80-120	14-MAY-19
Bismuth (Bi)-Dissolved			98.0		%		80-120	14-MAY-19
Boron (B)-Dissolved			97.1				80-120	14-MAY-19
Cadmium (Cd)-Dissolved			92.9		%		80-120	14-MAY-19
Calcium (Ca)-Dissolved			99.2		%		80-120	14-MAY-19
Chromium (Cr)-Dissolved			98.7		%		80-120	14-MAY-19
Cobalt (Co)-Dissolved			94.1		%		80-120	14-MAY-19
Copper (Cu)-Dissolved			95.8		%		80-120	14-MAY-19
Iron (Fe)-Dissolved			95.4		%		80-120	14-MAY-19
Lead (Pb)-Dissolved			96.9		%		80-120	14-MAY-19
Lithium (Li)-Dissolved			102.3		%		80-120	14-MAY-19
Magnesium (Mg)-Dissolve			107.3		%		80-120	14-MAY-19
Manganese (Mn)-Dissolve			98.7		%		80-120	14-MAY-19
Molybdenum (Mo)-Dissolv	red .		97.3		%		80-120	14-MAY-19
Nickel (Ni)-Dissolved			97.6		%		80-120	14-MAY-19
Potassium (K)-Dissolved			105.7		%		80-120	14-MAY-19
Selenium (Se)-Dissolved			93.9		%		80-120	14-MAY-19
Silicon (Si)-Dissolved			102.3		%		60-140	14-MAY-19
Silver (Ag)-Dissolved			93.4		%		80-120	14-MAY-19
Sodium (Na)-Dissolved			99.9		%		80-120	14-MAY-19
Strontium (Sr)-Dissolved			96.8		%		80-120	14-MAY-19
Thallium (TI)-Dissolved			96.5		%		80-120	14-MAY-19
Tin (Sn)-Dissolved			93.1		%		80-120	14-MAY-19
Titanium (Ti)-Dissolved			96.9		%		80-120	14-MAY-19
Uranium (U)-Dissolved			99.8		%		80-120	14-MAY-19
Vanadium (V)-Dissolved			100.8		%		80-120	14-MAY-19
Zinc (Zn)-Dissolved			95.1		%		80-120	14-MAY-19
WG3048893-1 MB		LF						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	14-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	14-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	14-MAY-19



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Test Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water						
Batch R4634858						
WG3048893-1 MB	LF	0.00040	a /l		0.0004	
Barium (Ba)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Bismuth (Bi)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Boron (B)-Dissolved		<0.010	mg/L		0.01	14-MAY-19
Cadmium (Cd)-Dissolved		<0.0000050	mg/L		0.000005	14-MAY-19
Calcium (Ca)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Chromium (Cr)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Cobalt (Co)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Copper (Cu)-Dissolved		<0.00020	mg/L		0.0002	14-MAY-19
Iron (Fe)-Dissolved		<0.010	mg/L		0.01	14-MAY-19
Lead (Pb)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Lithium (Li)-Dissolved		<0.0010	mg/L		0.001	14-MAY-19
Magnesium (Mg)-Dissolved		<0.0050	mg/L		0.005	14-MAY-19
Manganese (Mn)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Molybdenum (Mo)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Nickel (Ni)-Dissolved		<0.00050	mg/L		0.0005	14-MAY-19
Potassium (K)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Selenium (Se)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Silicon (Si)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Silver (Ag)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Sodium (Na)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Strontium (Sr)-Dissolved		<0.00020	mg/L		0.0002	14-MAY-19
Thallium (TI)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Tin (Sn)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Titanium (Ti)-Dissolved		<0.00030	mg/L		0.0003	14-MAY-19
Uranium (U)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Vanadium (V)-Dissolved		<0.00050	mg/L		0.0005	14-MAY-19
Zinc (Zn)-Dissolved		<0.0010	mg/L		0.001	14-MAY-19
MET-T-CCMS-VA Water						
Batch R4632066						
WG3047525-2 LCS Aluminum (AI)-Total		96.5	%		80-120	12-MAY-19
Antimony (Sb)-Total		94.5	%		80-120	12-MAY-19
Arsenic (As)-Total		96.0	%			
, ,					80-120	12-MAY-19
Barium (Ba)-Total		98.2	%		80-120	12-MAY-19



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4632066								
WG3047525-2 LCS			00.0		0/			
Bismuth (Bi)-Total			90.2		%		80-120	12-MAY-19
Boron (B)-Total			87.5		%		80-120	12-MAY-19
Cadmium (Cd)-Total			96.4		%		80-120	12-MAY-19
Calcium (Ca)-Total			90.3		%		80-120	12-MAY-19
Chromium (Cr)-Total			95.0		%		80-120	12-MAY-19
Cobalt (Co)-Total			95.6		%		80-120	12-MAY-19
Copper (Cu)-Total			94.2		%		80-120	12-MAY-19
Iron (Fe)-Total			96.6		%		80-120	12-MAY-19
Lead (Pb)-Total			90.7		%		80-120	12-MAY-19
Lithium (Li)-Total			87.4		%		80-120	12-MAY-19
Magnesium (Mg)-Total			97.0		%		80-120	12-MAY-19
Manganese (Mn)-Total			98.3		%		80-120	12-MAY-19
Molybdenum (Mo)-Total			93.2		%		80-120	12-MAY-19
Nickel (Ni)-Total			95.1		%		80-120	12-MAY-19
Potassium (K)-Total			95.7		%		80-120	12-MAY-19
Selenium (Se)-Total			97.3		%		80-120	12-MAY-19
Silicon (Si)-Total			97.7		%		80-120	12-MAY-19
Silver (Ag)-Total			91.8		%		80-120	12-MAY-19
Sodium (Na)-Total			99.1		%		80-120	12-MAY-19
Strontium (Sr)-Total			95.9		%		80-120	12-MAY-19
Thallium (TI)-Total			93.5		%		80-120	12-MAY-19
Tin (Sn)-Total			95.7		%		80-120	12-MAY-19
Titanium (Ti)-Total			99.5		%		80-120	12-MAY-19
Uranium (U)-Total			93.7		%		80-120	12-MAY-19
Vanadium (V)-Total			96.7		%		80-120	12-MAY-19
Zinc (Zn)-Total			89.3		%		80-120	12-MAY-19
WG3047525-1 MB								
Aluminum (AI)-Total			<0.0030		mg/L		0.003	12-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	12-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	12-MAY-19
Cadmium (Cd)-Total			<0.00000	50	mg/L		0.000005	12-MAY-19



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Workorder: L2271140 Report Date: 17-MAY-19

Test Matrix Reference Result Qualifier Units **RPD** Limit Analyzed MET-T-CCMS-VA Water Batch R4632066 WG3047525-1 MB Calcium (Ca)-Total < 0.050 mg/L 0.05 12-MAY-19 Chromium (Cr)-Total < 0.00010 mg/L 0.0001 12-MAY-19 Cobalt (Co)-Total < 0.00010 mg/L 0.0001 12-MAY-19 Copper (Cu)-Total < 0.00050 mg/L 0.0005 12-MAY-19 Iron (Fe)-Total < 0.010 mg/L 0.01 12-MAY-19 Lead (Pb)-Total < 0.000050 mg/L 0.00005 12-MAY-19 Lithium (Li)-Total < 0.0010 mg/L 0.001 12-MAY-19 Magnesium (Mg)-Total < 0.0050 mg/L 0.005 12-MAY-19 Manganese (Mn)-Total < 0.00010 mg/L 0.0001 12-MAY-19 Molybdenum (Mo)-Total < 0.000050 mg/L 0.00005 12-MAY-19 Nickel (Ni)-Total < 0.00050 mg/L 0.0005 12-MAY-19 Potassium (K)-Total < 0.050 mg/L 0.05 12-MAY-19 Selenium (Se)-Total < 0.000050 mg/L 0.00005 12-MAY-19 Silicon (Si)-Total <0.10 mg/L 0.1 12-MAY-19 Silver (Ag)-Total < 0.000010 mg/L 0.00001 12-MAY-19 Sodium (Na)-Total < 0.050 mg/L 0.05 12-MAY-19 Strontium (Sr)-Total < 0.00020 mg/L 0.0002 12-MAY-19 Thallium (TI)-Total < 0.000010 mg/L 0.00001 12-MAY-19 Tin (Sn)-Total < 0.00010 mg/L 0.0001 12-MAY-19 Titanium (Ti)-Total < 0.00030 mg/L 0.0003 12-MAY-19 Uranium (U)-Total < 0.000010 mg/L 0.00001 12-MAY-19 Vanadium (V)-Total < 0.00050 mg/L 0.0005 12-MAY-19 Zinc (Zn)-Total < 0.0030 mg/L 0.003 12-MAY-19 NH3-L-F-CL Water Batch R4636648 WG3051821-6 **LCS** 88.4 Ammonia as N % 85-115 16-MAY-19 WG3051821-5 MB Ammonia as N < 0.0050 mg/L 0.005 16-MAY-19 NO2-L-IC-N-CL Water Batch R4631153 WG3047327-10 LCS Nitrite (as N) 109.3 % 90-110 10-MAY-19 WG3047327-9 MB < 0.0010 Nitrite (as N) mg/L 0.001 10-MAY-19



Workorder: L2271140

Report Date: 17-MAY-19

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Test	Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS Nitrate (as N)			103.6	%		90-110	10-MAY-19
WG3047327-9 MB Nitrate (as N)			<0.0050	mg/L		0.005	10-MAY-19
ORP-CL	Water						
Batch R4635113 WG3050043-7 CRM ORP		CL-ORP	223	mV		210-230	14-MAY-19
P-T-L-COL-CL	Water						
Batch R4636502 WG3051587-22 LCS Phosphorus (P)-Total			103.1	%		80-120	16-MAY-19
WG3051587-21 MB Phosphorus (P)-Total			<0.0020	mg/L		0.002	16-MAY-19
PH-CL	Water						
Batch R4636590 WG3051280-8 LCS pH			6.99	рН		6.9-7.1	15-MAY-19
PO4-DO-L-COL-CL	Water						
Batch R4630905							
WG3046912-6 LCS Orthophosphate-Dissolv	ved (as P)		100.5	%		80-120	10-MAY-19
WG3046912-5 MB Orthophosphate-Dissolv	ved (as P)		<0.0010	mg/L		0.001	10-MAY-19
SO4-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS Sulfate (SO4)			102.6	%		90-110	10-MAY-19
WG3047327-9 MB Sulfate (SO4)			<0.30	mg/L		0.3	10-MAY-19
SOLIDS-TDS-CL	Water						
Batch R4636681 WG3050344-5 LCS Total Dissolved Solids			97.2	%		85-115	15-MAY-19
WG3050344-4 MB			VI .E	70		00-110	13-IVIA 1-19



Workorder: L2271140 Report Date: 17-MAY-19 Page 8 of 10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL Batch R4636681 WG3050344-4 MB Total Dissolved Solids	Water		<10		mg/L		10	15-MAY-19
TKN-L-F-CL Batch R4637012	Water							
WG3052313-10 LCS Total Kjeldahl Nitrogen			95.6		%		75-125	16-MAY-19
WG3052313-14 LCS Total Kjeldahl Nitrogen			95.2		%		75-125	16-MAY-19
WG3052313-18 LCS Total Kjeldahl Nitrogen			94.2		%		75-125	16-MAY-19
WG3052313-2 LCS Total Kjeldahl Nitrogen			97.2		%		75-125	16-MAY-19
WG3052313-6 LCS Total Kjeldahl Nitrogen			95.4		%		75-125	16-MAY-19
WG3052313-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-13 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-17 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-9 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
TSS-L-CL	Water							
Batch R4636615								
WG3050221-6 LCS Total Suspended Solids			94.9		%		85-115	15-MAY-19
WG3050221-5 MB Total Suspended Solids			<1.0		mg/L		1	15-MAY-19
TURBIDITY-CL	Water							
Batch R4637597 WG3047499-2 LCS			07.0		0/			
Turbidity			97.0		%		85-115	11-MAY-19
WG3047499-1 MB Turbidity			<0.10		NTU		0.1	11-MAY-19

Report Date: 17-MAY-19 Workorder: L2271140 Page 9 of 10

Legend:

ALS Control Limit (Data Quality Objectives) Limit

DUP Duplicate

Relative Percent Difference RPD

N/A Not Available

Laboratory Control Sample LCS Standard Reference Material SRM

MS Matrix Spike

MSD

Matrix Spike Duplicate
Average Desorption Efficiency
Method Blank ADE

MB

Internal Reference Material IRM Certified Reference Material CRM Continuing Calibration Verification CCV CVS Calibration Verification Standard LCSD Laboratory Control Sample Duplicate

Workorder: L2271140 Report Date: 17-MAY-19 Page 10 of 10

Hold Time Exceedances:

	Sample						-
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential	l by elect.						
	1	08-MAY-19 17:02	14-MAY-19 15:30	0.25	143	hours	EHTR-FM
Total Suspended Solids							
	1	08-MAY-19 17:02	16-MAY-19 09:00	7	8	days	EHT
рН							
	1	08-MAY-19 17:02	15-MAY-19 09:00	0.25	160	hours	EHTR-FM
Lagand & Qualifier Definition	ne:						

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2271140 were received on 10-MAY-19 09:10.

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

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

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

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

Date Received: 10-MAY-19

Report Date: 17-MAY-19 17:02 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2271157
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-12 - 2

Legal Site Desc:

My

Lyudmyla Shvets, B.Sc. Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298 ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L2271157 CONTD.... PAGE 2 of 7

17-MAY-19 17:02 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2271157-1 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515	L2271157-2 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515 FB-HG		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)	160			
	Hardness (as CaCO3) (mg/L)	79.7			
	pH (pH)	8.09			
	ORP (mV)	407			
	Total Suspended Solids (mg/L)	11.0			
	Total Dissolved Solids (mg/L)	109			
	Turbidity (NTU)	10.6			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.3			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	82.2			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	82.2			
	Ammonia as N (mg/L)	<0.0050			
	Bromide (Br) (mg/L)	<0.050			
	Chloride (CI) (mg/L)	<0.50			
	Fluoride (F) (mg/L)	0.041			
	Ion Balance (%)	100			
	Nitrate (as N) (mg/L)	<0.0050			
	Nitrite (as N) (mg/L)	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.132			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0124			
	Sulfate (SO4) (mg/L)	1.25			
	Anion Sum (meq/L)	1.67			
	Cation Sum (meq/L)	1.67			
	Cation - Anion Balance (%)	0.0			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.85			
	Total Organic Carbon (mg/L)	2.89			
Total Metals	Aluminum (Al)-Total (mg/L)	0.201			
	Antimony (Sb)-Total (mg/L)	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00022			
	Barium (Ba)-Total (mg/L)	0.0554			
	Beryllium (Be)-Total (ug/L)	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050			
	Boron (B)-Total (mg/L)	<0.010			
	Cadmium (Cd)-Total (ug/L)	<0.0050			

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

L2271157 CONTD.... PAGE 3 of 7

ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

17-MAY-19 17:02 (MT)

	Sample ID Description Sampled Date Sampled Time Client ID	L2271157-1 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515	L2271157-2 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515 FB-HG		
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)	20.9			
	Chromium (Cr)-Total (mg/L)	0.00030			
	Cobalt (Co)-Total (ug/L)	0.14			
	Copper (Cu)-Total (mg/L)	0.00056			
	Iron (Fe)-Total (mg/L)	0.254			
	Lead (Pb)-Total (mg/L)	0.000134			
	Lithium (Li)-Total (mg/L)	<0.0010			
	Magnesium (Mg)-Total (mg/L)	7.25			
	Manganese (Mn)-Total (mg/L)	0.00940			
	Mercury (Hg)-Total (ug/L)	0.00168	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.000089			
	Nickel (Ni)-Total (mg/L)	<0.00050			
	Potassium (K)-Total (mg/L)	0.600			
	Selenium (Se)-Total (ug/L)	<0.050			
	Silicon (Si)-Total (mg/L)	4.93			
	Silver (Ag)-Total (mg/L)	<0.000010			
	Sodium (Na)-Total (mg/L)	1.47			
	Strontium (Sr)-Total (mg/L)	0.0312			
	Thallium (TI)-Total (mg/L)	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010			
	Uranium (U)-Total (mg/L)	0.000308			
	Vanadium (V)-Total (mg/L)	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB			
	Dissolved Metals Filtration Location	LAB			
	Aluminum (Al)-Dissolved (mg/L)	0.0118			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00015			
	Barium (Ba)-Dissolved (mg/L)	0.0488			
	Beryllium (Be)-Dissolved (ug/L)	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050			
	Calcium (Ca)-Dissolved (mg/L)	21.0			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10			

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

L2271157 CONTD.... PAGE 4 of 7

ALS ENVIRONMENTAL ANALYTICAL REPORT

17-MAY-19 17:02 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2271157-1 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515	L2271157-2 WS 07-MAY-19 15:15 RG_GC_WS_2019 0507-1515 FB-HG		
Grouping	Analyte				
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050			
	Iron (Fe)-Dissolved (mg/L)	0.011			
	Lead (Pb)-Dissolved (mg/L)	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0010			
	Magnesium (Mg)-Dissolved (mg/L)	6.61			
	Manganese (Mn)-Dissolved (mg/L)	0.00053			
	Mercury (Hg)-Dissolved (mg/L)	<0.000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000080			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050			
	Potassium (K)-Dissolved (mg/L)	0.565			
	Selenium (Se)-Dissolved (ug/L)	<0.050			
	Silicon (Si)-Dissolved (mg/L)	4.47			
	Silver (Ag)-Dissolved (mg/L)	<0.00010			
	Sodium (Na)-Dissolved (mg/L)	1.46			
	Strontium (Sr)-Dissolved (mg/L)	0.0284			
	Thallium (TI)-Dissolved (mg/L)	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000331			
	Vanadium (V)-Dissolved (mg/L)	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010			

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

L2271157 CONTD....

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17-MAY-19 17:02 (MT)

Version: FINAL

Qualifiers for Sample Submission Listed:

Qualifier Description

SFPL Sample was Filtered and Preserved at the laboratory - DOC/D-METAL/D-HG FILTERED AND PRESERVED AT THE LAB

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2271157-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2271157-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2271157-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2271157-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2271157-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2271157-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2271157-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2271157-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2271157-1

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

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subtracting the TIC from the TC.

F-IC-N-CL

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

Fluoride in Water by IC

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

electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

EPA 300.1 (mod)

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

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

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction

with stannous chloride, and analyzed by CVAAS or CVAFS.

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

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

reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APHA 4500-P PHOSPHORUS

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PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended held time from time of compliant (field each vice in recommended for pH where highly except the are product)

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Orthophosphate-Dissolved (as P)

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined

colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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

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

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

Water

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

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

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

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

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

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

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

 Laboratory Definition Code
 Laboratory Location

 CL
 ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

PO4-DO-L-COL-CL

REP-Lentic 19-12 - 2

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client:

Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water						
Batch R4636618							
WG3051277-12 DUP Acidity (as CaCO3)		L2271157-1 3.3	3.4	mg/L	2.4	20	15-MAY-19
WG3051277-11 LCS Acidity (as CaCO3)			104.7	%		85-115	15-MAY-19
WG3051277-10 MB Acidity (as CaCO3)			1.4	mg/L		2	15-MAY-19
ALK-MAN-CL	Water						
Batch R4636590							
WG3051280-11 LCS Alkalinity, Total (as CaC	O3)		97.4	%		85-115	15-MAY-19
WG3051280-10 MB Alkalinity, Total (as CaC	O3)		<1.0	mg/L		1	15-MAY-19
BE-D-L-CCMS-VA	Water						
Batch R4634858							
WG3048893-2 LCS Beryllium (Be)-Dissolved	d		99.8	%		80-120	14-MAY-19
WG3048893-1 MB Beryllium (Be)-Dissolved	d	LF	<0.000020	mg/L		0.00002	14-MAY-19
BE-T-L-CCMS-VA	Water						
Batch R4632066							
WG3047525-2 LCS Beryllium (Be)-Total			88.4	%		80-120	12-MAY-19
WG3047525-1 MB Beryllium (Be)-Total			<0.000020	mg/L		0.00002	12-MAY-19
BR-L-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS							
Bromide (Br)			104.0	%		85-115	10-MAY-19
WG3047327-9 MB Bromide (Br)			<0.050	mg/L		0.05	10-MAY-19
C-DIS-ORG-LOW-CL	Water						
Batch R4637537							
WG3052922-6 LCS Dissolved Organic Carbo	on		100.9	%		80-120	17-MAY-19
WG3052922-5 MB Dissolved Organic Carb	on		<0.50	mg/L		0.5	17-MAY-19
C-TOT-ORG-LOW-CL	Water						



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	Water							
Batch R4637537 WG3052922-6 LCS Total Organic Carbon			108.0		%		80-120	17-MAY-19
WG3052922-5 MB Total Organic Carbon			<0.50		mg/L		0.5	17-MAY-19
CL-IC-N-CL	Water							
Batch R4631153 WG3047327-10 LCS Chloride (CI)			102.5		%		90-110	10-MAY-19
WG3047327-9 MB Chloride (CI)			<0.50		mg/L		0.5	10-MAY-19
EC-L-PCT-CL	Water							
Batch R4636590 WG3051280-11 LCS								
Conductivity (@ 25C)			105.2		%		90-110	15-MAY-19
WG3051280-10 MB Conductivity (@ 25C)			<2.0		uS/cm		2	15-MAY-19
F-IC-N-CL	Water							
Batch R4631153								
WG3047327-10 LCS Fluoride (F)			107.6		%		90-110	10-MAY-19
WG3047327-9 MB Fluoride (F)			<0.020		mg/L		0.02	10-MAY-19
HG-D-CVAA-VA	Water							
Batch R4635213								
WG3049627-6 LCS Mercury (Hg)-Dissolved			102.6		%		80-120	15-MAY-19
WG3049627-5 MB Mercury (Hg)-Dissolved			<0.00000	5C	mg/L		0.000005	15-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4637338								
WG3052736-6 DUP Mercury (Hg)-Total		L2271157-1 0.00168	0.00186		ug/L	10	20	17-MAY-19
WG3052736-2 LCS Mercury (Hg)-Total			115.0		%		80-120	17-MAY-19
WG3052736-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-MAY-19
MET-D-CCMS-VA	Water							



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est Matr	ix Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Wat	er						
Batch R4634858							
WG3048893-2 LCS		404.4		0/		00.455	44 1414 45
Aluminum (Al)-Dissolved		101.4		%		80-120	14-MAY-19
Antimony (Sb)-Dissolved		100.1		%		80-120	14-MAY-19
Arsenic (As)-Dissolved		94.9		%		80-120	14-MAY-19
Barium (Ba)-Dissolved		89.7		%		80-120	14-MAY-19
Bismuth (Bi)-Dissolved		98.0		%		80-120	14-MAY-19
Boron (B)-Dissolved		97.1		%		80-120	14-MAY-19
Cadmium (Cd)-Dissolved		92.9		%		80-120	14-MAY-19
Calcium (Ca)-Dissolved		99.2		%		80-120	14-MAY-19
Chromium (Cr)-Dissolved		98.7		%		80-120	14-MAY-19
Cobalt (Co)-Dissolved		94.1		%		80-120	14-MAY-19
Copper (Cu)-Dissolved		95.8		%		80-120	14-MAY-19
Iron (Fe)-Dissolved		95.4		%		80-120	14-MAY-19
Lead (Pb)-Dissolved		96.9		%		80-120	14-MAY-19
Lithium (Li)-Dissolved		102.3		%		80-120	14-MAY-19
Magnesium (Mg)-Dissolved		107.3		%		80-120	14-MAY-19
Manganese (Mn)-Dissolved		98.7		%		80-120	14-MAY-19
Molybdenum (Mo)-Dissolved		97.3		%		80-120	14-MAY-19
Nickel (Ni)-Dissolved		97.6		%		80-120	14-MAY-19
Potassium (K)-Dissolved		105.7		%		80-120	14-MAY-19
Selenium (Se)-Dissolved		93.9		%		80-120	14-MAY-19
Silicon (Si)-Dissolved		102.3		%		60-140	14-MAY-19
Silver (Ag)-Dissolved		93.4		%		80-120	14-MAY-19
Sodium (Na)-Dissolved		99.9		%		80-120	14-MAY-19
Strontium (Sr)-Dissolved		96.8		%		80-120	14-MAY-19
Thallium (TI)-Dissolved		96.5		%		80-120	14-MAY-19
Tin (Sn)-Dissolved		93.1		%		80-120	14-MAY-19
Titanium (Ti)-Dissolved		96.9		%		80-120	14-MAY-19
Uranium (U)-Dissolved		99.8		%		80-120	14-MAY-19
Vanadium (V)-Dissolved		100.8		%		80-120	14-MAY-19
Zinc (Zn)-Dissolved		95.1		%		80-120	14-MAY-19
WG3048893-1 MB	LF						
Aluminum (Al)-Dissolved		<0.0010		mg/L		0.001	14-MAY-19
Antimony (Sb)-Dissolved		<0.00010		mg/L		0.0001	14-MAY-19
Arsenic (As)-Dissolved		<0.00010		mg/L		0.0001	14-MAY-19



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Test Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water						
Batch R4634858						
WG3048893-1 MB	LF	0.00040	a /l		0.0004	
Barium (Ba)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Bismuth (Bi)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Boron (B)-Dissolved		<0.010	mg/L		0.01	14-MAY-19
Cadmium (Cd)-Dissolved		<0.0000050	mg/L		0.000005	14-MAY-19
Calcium (Ca)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Chromium (Cr)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Cobalt (Co)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Copper (Cu)-Dissolved		<0.00020	mg/L		0.0002	14-MAY-19
Iron (Fe)-Dissolved		<0.010	mg/L		0.01	14-MAY-19
Lead (Pb)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Lithium (Li)-Dissolved		<0.0010	mg/L		0.001	14-MAY-19
Magnesium (Mg)-Dissolved		<0.0050	mg/L		0.005	14-MAY-19
Manganese (Mn)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Molybdenum (Mo)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Nickel (Ni)-Dissolved		<0.00050	mg/L		0.0005	14-MAY-19
Potassium (K)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Selenium (Se)-Dissolved		<0.000050	mg/L		0.00005	14-MAY-19
Silicon (Si)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Silver (Ag)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Sodium (Na)-Dissolved		<0.050	mg/L		0.05	14-MAY-19
Strontium (Sr)-Dissolved		<0.00020	mg/L		0.0002	14-MAY-19
Thallium (TI)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Tin (Sn)-Dissolved		<0.00010	mg/L		0.0001	14-MAY-19
Titanium (Ti)-Dissolved		<0.00030	mg/L		0.0003	14-MAY-19
Uranium (U)-Dissolved		<0.000010	mg/L		0.00001	14-MAY-19
Vanadium (V)-Dissolved		<0.00050	mg/L		0.0005	14-MAY-19
Zinc (Zn)-Dissolved		<0.0010	mg/L		0.001	14-MAY-19
MET-T-CCMS-VA Water						
Batch R4632066						
WG3047525-2 LCS Aluminum (AI)-Total		96.5	%		80-120	12-MAY-19
Antimony (Sb)-Total		94.5	%		80-120	12-MAY-19
Arsenic (As)-Total		96.0	%			
, ,					80-120	12-MAY-19
Barium (Ba)-Total		98.2	%		80-120	12-MAY-19



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4632066								
WG3047525-2 LCS			00.0		0/			
Bismuth (Bi)-Total			90.2		%		80-120	12-MAY-19
Boron (B)-Total			87.5		%		80-120	12-MAY-19
Cadmium (Cd)-Total			96.4		%		80-120	12-MAY-19
Calcium (Ca)-Total			90.3		%		80-120	12-MAY-19
Chromium (Cr)-Total			95.0		%		80-120	12-MAY-19
Cobalt (Co)-Total			95.6		%		80-120	12-MAY-19
Copper (Cu)-Total			94.2		%		80-120	12-MAY-19
Iron (Fe)-Total			96.6		%		80-120	12-MAY-19
Lead (Pb)-Total			90.7		%		80-120	12-MAY-19
Lithium (Li)-Total			87.4		%		80-120	12-MAY-19
Magnesium (Mg)-Total			97.0		%		80-120	12-MAY-19
Manganese (Mn)-Total			98.3		%		80-120	12-MAY-19
Molybdenum (Mo)-Total			93.2		%		80-120	12-MAY-19
Nickel (Ni)-Total			95.1		%		80-120	12-MAY-19
Potassium (K)-Total			95.7		%		80-120	12-MAY-19
Selenium (Se)-Total			97.3		%		80-120	12-MAY-19
Silicon (Si)-Total			97.7		%		80-120	12-MAY-19
Silver (Ag)-Total			91.8		%		80-120	12-MAY-19
Sodium (Na)-Total			99.1		%		80-120	12-MAY-19
Strontium (Sr)-Total			95.9		%		80-120	12-MAY-19
Thallium (TI)-Total			93.5		%		80-120	12-MAY-19
Tin (Sn)-Total			95.7		%		80-120	12-MAY-19
Titanium (Ti)-Total			99.5		%		80-120	12-MAY-19
Uranium (U)-Total			93.7		%		80-120	12-MAY-19
Vanadium (V)-Total			96.7		%		80-120	12-MAY-19
Zinc (Zn)-Total			89.3		%		80-120	12-MAY-19
WG3047525-1 MB								
Aluminum (AI)-Total			<0.0030		mg/L		0.003	12-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	12-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	12-MAY-19
Cadmium (Cd)-Total			<0.00000	50	mg/L		0.000005	12-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4632066								
WG3047525-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	12-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	12-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	12-MAY-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	12-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	12-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	12-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	12-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	12-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	12-MAY-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	12-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	12-MAY-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	12-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	12-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	12-MAY-19
Thallium (TI)-Total			<0.000010		mg/L		0.00001	12-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	12-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	12-MAY-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	12-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	12-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	12-MAY-19
NH3-L-F-CL	Water							
Batch R4636648								
WG3051821-6 LCS								
Ammonia as N			88.4		%		85-115	16-MAY-19
WG3051821-5 MB Ammonia as N			<0.0050		mg/L		0.005	16-MAY-19
NO2-L-IC-N-CL	Water							
Batch R4631153								
WG3047327-10 LCS Nitrite (as N)			109.3		%		90-110	10-MAY-19
WG3047327-9 MB Nitrite (as N)			<0.0010		mg/L		0.001	10-MAY-19



Workorder: L2271157

Report Date: 17-MAY-19

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Test	Matrix	Reference	Result Qua	alifier Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS Nitrate (as N)			103.6	%		90-110	10-MAY-19
WG3047327-9 MB Nitrate (as N)			<0.0050	mg/L		0.005	10-MAY-19
ORP-CL	Water						
Batch R4635113 WG3050043-7 CRM ORP		CL-ORP	223	mV		210-230	14-MAY-19
P-T-L-COL-CL	Water						
Batch R4636502 WG3051587-34 LCS			404.4	0/			
Phosphorus (P)-Total WG3051587-33 MB			101.4	%		80-120	16-MAY-19
Phosphorus (P)-Total			<0.0020	mg/L		0.002	16-MAY-19
PH-CL	Water						
Batch R4636590 WG3051280-11 LCS pH			6.99	рН		6.9-7.1	15-MAY-19
PO4-DO-L-COL-CL	Water						
Batch R4630905							
WG3046912-6 LCS Orthophosphate-Dissolv	ved (as P)		100.5	%		80-120	10-MAY-19
WG3046912-5 MB Orthophosphate-Dissolv	ved (as P)		<0.0010	mg/L		0.001	10-MAY-19
SO4-IC-N-CL	Water						
Batch R4631153 WG3047327-10 LCS Sulfate (SO4)			102.6	%		90-110	10-MAY-19
WG3047327-9 MB Sulfate (SO4)			<0.30	mg/L		0.3	10-MAY-19
SOLIDS-TDS-CL	Water						
Batch R4634892 WG3047948-14 LCS Total Dissolved Solids			95.5	%		85-115	13-MAY-19
WG3047948-13 MB							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL Batch R4634892 WG3047948-13 MB Total Dissolved Solids	Water		<10		mg/L		10	13-MAY-19
TKN-L-F-CL Batch R4637012	Water							
WG3052313-10 LCS Total Kjeldahl Nitrogen			95.6		%		75-125	16-MAY-19
WG3052313-14 LCS Total Kjeldahl Nitrogen			95.2		%		75-125	16-MAY-19
WG3052313-18 LCS Total Kjeldahl Nitrogen			94.2		%		75-125	16-MAY-19
WG3052313-2 LCS Total Kjeldahl Nitrogen			97.2		%		75-125	16-MAY-19
WG3052313-6 LCS Total Kjeldahl Nitrogen			95.4		%		75-125	16-MAY-19
WG3052313-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-13 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-17 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
WG3052313-9 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-MAY-19
TSS-L-CL	Water							
Batch R4634811								
WG3048017-25 LCS Total Suspended Solids			92.9		%		85-115	13-MAY-19
WG3048017-24 MB Total Suspended Solids			<1.0		mg/L		1	13-MAY-19
TURBIDITY-CL	Water							
Batch R4637597 WG3047499-2 LCS Turbidity			97.0		%		85-115	11-MAY-19
WG3047499-1 MB Turbidity			<0.10		NTU		0.1	11-MAY-19

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Legend:

ALS Control Limit (Data Quality Objectives) Limit

DUP Duplicate

Relative Percent Difference RPD

N/A Not Available

Laboratory Control Sample LCS Standard Reference Material SRM

MS Matrix Spike

MSD

Matrix Spike Duplicate
Average Desorption Efficiency
Method Blank ADE

MB

Internal Reference Material IRM Certified Reference Material CRM Continuing Calibration Verification CCV CVS Calibration Verification Standard LCSD Laboratory Control Sample Duplicate

Workorder: L2271157 Report Date: 17-MAY-19 Page 10 of 10

Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential	by elect.						
	1	07-MAY-19 15:15	14-MAY-19 16:05	0.25	169	hours	EHTR-FM
Turbidity							
	1	07-MAY-19 15:15	11-MAY-19 09:00	3	4	days	EHTL
рН							
	1	07-MAY-19 15:15	15-MAY-19 09:00	0.25	186	hours	EHTR-FM
Legend & Qualifier Definition	ie.						

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2271157 were received on 10-MAY-19 09:10.

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

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

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

Teck COC ID: REP-Lentic 19-12 - 2 TURNAROUND TIME: PROJECT/CLIENT INFO LABORATORY Facility Name / Job# Regional Effects Program (REP) Lab Name ALS Calgary POF ledd Excel Project Manager Cait Good Lab Contact Lyudmyla Shvets nt.pond@neck.com Email cait.good@teck.com Email lyudmyla.shvets@alsglobal.com Address 421 Pine Avenue Address 2559 29 Street NE anie anere dieck.com City Calgary City Province ΑB Sparwood Province V0B 2G0 Postal Code T1Y 7B5 Postal Code Country Canada Country Canada Phone Number 250-425-8202 Phone Number 1 403 407 1794 SAMPLE DETAILS SAME ANALYSIS REQUESTED Sielle Pffiered - Fr Pield, L. Lab. FLe Field & Lab. N. Na PRESERV H2SO4 HNO3 Hazardous Material (Yes/No) TECKCOAL-MET-T-VA TECKCOAL-ROUTINE L2271157-COFC LS_Package-DOC HG-T-U-CVAF-VA TECKCOAL-MET Field Time G=Grab #Of Sample ID Sample Location Matrix Date (24hr) C=Comp Cont. RG_GC_WS_20190507-1515 RG_GC & WS No 7-May-19 1515 G 7 х Х х rg_GC_WS_20190507-1515 FB-HG RG GC WS Νo 7-May-19 1515 G 1 No No gyillili ^{jega} Νo No No No and the Nο No No Νo No 100 কুচ No No ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS RELINQUISHED BY/AFFILIATION DATE/TIME ACCEPTED BY/AFFILIATION For Sample RG_DUP_WS_20190507-1300 there are 2 bottles labelled as dissolved metals. One of those bottles was acidified. Could the bottles be tested to see which one was acidified and could a total metals sample be collected from the general sample?

NB OF BOTTLES RETURNED/DESCRIPTION Regular (default) x
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 Signafure

Sampler's Signafure

Date/Time



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

Date Received: 14-MAY-19

Report Date: 22-MAY-19 17:14 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2272864
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM (REP)

C of C Numbers: REP-Lentic 19-12 - 2

Legal Site Desc:

My

Lyudmyla Shvets, B.Sc. Account Manager

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Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-1 WS 13-MAY-19 08:51 RG_G013_WS_20 190513-0851	L2272864-2 WS 13-MAY-19 08:51 RG_GO13_WS_20 190513-0851 FB- HG	L2272864-3 WS 13-MAY-19 08:51 RG_FBLANK_WS_ 20190513-0851	L2272864-4 WS 13-MAY-19 09:32 RG_STPD_WS_20 190513-0932	L2272864-5 WS 13-MAY-19 09:32 RG_STPD_WS_20 190513-0932 FB- HG
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1020		<2.0	387	
	Hardness (as CaCO3) (mg/L)	592		<0.50	213	
	pH (pH)	8.18		6.01	8.18	
	ORP (mV)	453		471	440	
	Total Suspended Solids (mg/L)	23.8		<1.0	1.6	
	Total Dissolved Solids (mg/L)	711		<10	DLHC 235	
	Turbidity (NTU)	18.9		<0.10	1.14	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	4.8		1.4	2.3	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	220		<1.0	140	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0		<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0		<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	220		<1.0	140	
	Ammonia as N (mg/L)	0.0087		<0.0050	<0.0050	
	Bromide (Br) (mg/L)	<0.25		<0.050	<0.050	
	Chloride (CI) (mg/L)	24.7		<0.50	6.82	
	Fluoride (F) (mg/L)	0.17		<0.020	0.132	
	Ion Balance (%)	100		0.0	107	
	Nitrate (as N) (mg/L)	0.955		<0.0050	0.134	
	Nitrite (as N) (mg/L)	<0.0050		<0.0010	0.0058	
	Total Kjeldahl Nitrogen (mg/L)	0.317		<0.050	0.160	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010		<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0208		<0.0020	0.0108	
	Sulfate (SO4) (mg/L)	338		<0.30	57.0	
	Anion Sum (meq/L)	12.2		<0.10	4.19	
	Cation Sum (meq/L)	12.2		<0.10	4.50	
	Cation - Anion Balance (%)	0.1		0.0	3.5	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.91		<0.50	1.38	
	Total Organic Carbon (mg/L)	1.51		<0.50	1.76	
Total Metals	Aluminum (AI)-Total (mg/L)	0.255		<0.0030	0.0167	
	Antimony (Sb)-Total (mg/L)	0.00045		<0.00010	0.00015	
	Arsenic (As)-Total (mg/L)	0.00024		<0.00010	0.00020	
	Barium (Ba)-Total (mg/L)	0.0883		<0.00010	0.0870	
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	0.023		<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0257		<0.0050	0.0061	

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

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Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-6 WS 13-MAY-19 10:17 RG_ER_WS_2019 0513-1017	L2272864-7 WS 13-MAY-19 10:17 RG_ER_WS_2019 0513-1017 FB-HG	L2272864-8 WS 13-MAY-19 13:07 RG_GC_WS_2019 0513-1307	L2272864-9 WS 13-MAY-19 13:07 RG_GC_WS_2019 0513-1307 FB-HG	L2272864-10 WS 13-MAY-19 13:56 RG_EROL_WS_20 190513-1356
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	242		250		420
	Hardness (as CaCO3) (mg/L)	124		128		234
	pH (pH)	8.09		8.12		8.16
	ORP (mV)	415		404		432
	Total Suspended Solids (mg/L)	12.6		6.8		1.1
	Total Dissolved Solids (mg/L)	DLHC 148		DLHC 148		230 DLHC
	Turbidity (NTU)	7.87		3.54		0.44
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.3		<1.0		4.6
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	97.9		110		196
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	97.9		110		196
	Ammonia as N (mg/L)	<0.0050		0.0149		<0.0050
	Bromide (Br) (mg/L)	<0.050		<0.050		<0.050
	Chloride (CI) (mg/L)	3.22		2.45		4.27
	Fluoride (F) (mg/L)	0.079		0.074		0.125
	Ion Balance (%)	103		101		105
	Nitrate (as N) (mg/L)	0.150		0.143		0.291
	Nitrite (as N) (mg/L)	0.0012		0.0014		0.0016
	Total Kjeldahl Nitrogen (mg/L)	0.103		0.130		0.093
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010		0.0022		<0.0010
	Phosphorus (P)-Total (mg/L)	0.0090		0.0084		0.0034
	Sulfate (SO4) (mg/L)	25.8		20.1		28.0
	Anion Sum (meq/L)	2.60		2.71		4.65
	Cation Sum (meq/L)	2.67		2.74		4.86
	Cation - Anion Balance (%)	1.3		0.6		2.2
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.33		1.59		0.81
	Total Organic Carbon (mg/L)	1.51		1.74		0.77
Total Metals	Aluminum (AI)-Total (mg/L)	0.0975		0.0570		0.0110
	Antimony (Sb)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Arsenic (As)-Total (mg/L)	0.00044		0.00038		0.00014
	Barium (Ba)-Total (mg/L)	0.0347		0.0465		0.106
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Total (mg/L)	<0.010		<0.010		<0.010
	Cadmium (Cd)-Total (ug/L)	0.0091		0.0060		0.0112

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-11 WS 13-MAY-19 13:56 RG_EROL_WS_20 190513-1356 FB-HG	L2272864-12 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356	L2272864-13 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356 FB-HG	L2272864-14 WS 13-MAY-19 12:00 RG_TRIP_WS_201 90513-0000	L2272864-15 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)		419		<2.0	516
	Hardness (as CaCO3) (mg/L)		228		<0.50	284
	pH (pH)		8.15		5.43	8.18
	ORP (mV)		408		465	422
	Total Suspended Solids (mg/L)		<1.0		<1.0	2.5
	Total Dissolved Solids (mg/L)		236		<10	317
	Turbidity (NTU)		0.64		<0.10	0.64
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		5.4		1.3	3.9
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		194		<1.0	165
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0		<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0		<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		194		<1.0	165
	Ammonia as N (mg/L)		<0.0050		0.0511	<0.0050
	Bromide (Br) (mg/L)		<0.050		<0.050	<0.050
	Chloride (CI) (mg/L)		4.28		<0.50	2.82
	Fluoride (F) (mg/L)		0.125		<0.020	0.205
	Ion Balance (%)		103		0.0	102
	Nitrate (as N) (mg/L)		0.290		<0.0050	3.18
	Nitrite (as N) (mg/L)		0.0016		<0.0010	0.0034
	Total Kjeldahl Nitrogen (mg/L)		0.079			0.423
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010		<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)		0.0046		<0.0020	0.0164
	Sulfate (SO4) (mg/L)		28.0		<0.30	99.3
	Anion Sum (meq/L)		4.61		<0.10	5.68
	Cation Sum (meq/L)		4.73		<0.10	5.81
	Cation - Anion Balance (%)		1.3		0.0	1.2
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		0.60			<0.50
	Total Organic Carbon (mg/L)		0.87			<0.50
Total Metals	Aluminum (Al)-Total (mg/L)		0.0081		<0.0030	0.0708
	Antimony (Sb)-Total (mg/L)		<0.00010		<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)		0.00012		<0.00010	0.00016
	Barium (Ba)-Total (mg/L)		0.105		<0.00010	0.0686
	Beryllium (Be)-Total (ug/L)		<0.020		<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)		<0.000050		<0.000050	<0.000050
	Boron (B)-Total (mg/L)		<0.010		<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)		0.0125		<0.0050	0.0195

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

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Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-16 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500 FB-HG	L2272864-17 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844	L2272864-18 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844 FB- HG	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)		392		
	Hardness (as CaCO3) (mg/L)		197		
	pH (pH)		8.21		
	ORP (mV)		445		
	Total Suspended Solids (mg/L)		2.6		
	Total Dissolved Solids (mg/L)		213 DLHC		
	Turbidity (NTU)		1.92		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		4.0		
Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		185		
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)		185		
	Ammonia as N (mg/L)		<0.0050		
	Bromide (Br) (mg/L)		<0.050		
	Chloride (CI) (mg/L)		12.2		
	Fluoride (F) (mg/L)		0.091		
	Ion Balance (%)		104		
	Nitrate (as N) (mg/L)		<0.0050		
	Nitrite (as N) (mg/L)		<0.0010		
	Total Kjeldahl Nitrogen (mg/L)		0.260		
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010		
	Phosphorus (P)-Total (mg/L)		0.0172		
	Sulfate (SO4) (mg/L)		7.11		
	Anion Sum (meq/L)		4.20		
	Cation Sum (meq/L)		4.35		
	Cation - Anion Balance (%)		1.8		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		1.66		
	Total Organic Carbon (mg/L)		1.84		
Total Metals	Aluminum (Al)-Total (mg/L)		0.0178		
	Antimony (Sb)-Total (mg/L)		0.00020		
	Arsenic (As)-Total (mg/L)		0.00038		
	Barium (Ba)-Total (mg/L)		0.146		
	Beryllium (Be)-Total (ug/L)		<0.020		
	Bismuth (Bi)-Total (mg/L)		<0.000050		
	Boron (B)-Total (mg/L)		<0.010		
	Cadmium (Cd)-Total (ug/L)		0.0090		

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

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Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-1 WS 13-MAY-19 08:51 RG_G013_WS_20 190513-0851	L2272864-2 WS 13-MAY-19 08:51 RG_GO13_WS_20 190513-0851 FB- HG	L2272864-3 WS 13-MAY-19 08:51 RG_FBLANK_WS_ 20190513-0851	L2272864-4 WS 13-MAY-19 09:32 RG_STPD_WS_20 190513-0932	L2272864-5 WS 13-MAY-19 09:32 RG_STPD_WS_20 190513-0932 FB- HG
Grouping	Analyte		110			110
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	119		<0.050	51.8	
	Chromium (Cr)-Total (mg/L)	0.00039		<0.00010	0.00015	
	Cobalt (Co)-Total (ug/L)	0.19		<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	0.00061		<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.232		<0.010	0.047	
	Lead (Pb)-Total (mg/L)	0.000190		<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0280		<0.0010	0.0057	
	Magnesium (Mg)-Total (mg/L)	69.6		<0.10	18.9	
	Manganese (Mn)-Total (mg/L)	0.0226		<0.00010	0.00372	
	Mercury (Hg)-Total (ug/L)	0.00189	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00228		<0.000050	0.000980	
	Nickel (Ni)-Total (mg/L)	0.00133		<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	1.93		<0.050	0.559	
	Selenium (Se)-Total (ug/L)	68.7		<0.050	5.25	
	Silicon (Si)-Total (mg/L)	2.91		<0.10	0.29	
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	8.42		<0.050	5.27	
	Strontium (Sr)-Total (mg/L)	0.393		<0.00020	0.179	
	Thallium (TI)-Total (mg/L)	0.000018		<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00328		<0.000010	0.000942	
	Vanadium (V)-Total (mg/L)	0.00079		<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	0.0050		<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB	LAB	
	Dissolved Metals Filtration Location	LAB		LAB	LAB	
	Aluminum (AI)-Dissolved (mg/L)	0.0048		<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00039		<0.00010	0.00013	
	Arsenic (As)-Dissolved (mg/L)	0.00015		<0.00010	0.00020	
	Barium (Ba)-Dissolved (mg/L)	0.0928		<0.00010	0.0941	
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	0.022		<0.010	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050		<0.0050	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	120		<0.050	54.0	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		<0.00010	0.00014	
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10	<0.10	

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

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L2272864-6 L2272864-7 L2272864-8 L2272864-9 L2272864-10 Sample ID Description WS WS WS WS WS 13-MAY-19 13-MAY-19 13-MAY-19 Sampled Date 13-MAY-19 13-MAY-19 Sampled Time 10:17 10:17 13:07 13:07 13:56 RG ER WS 2019 RG ER WS 2019 RG GC WS 2019 RG GC WS 2019 RG EROL WS 20 Client ID 0513-1017 0513-1017 FB-HG 0513-1307 0513-1307 FB-HG 190513-1356 Grouping **Analyte WATER Total Metals** Calcium (Ca)-Total (mg/L) 32.3 33.4 62.8 Chromium (Cr)-Total (mg/L) 0.00022 0.00017 0.00017 Cobalt (Co)-Total (ug/L) 0.10 < 0.10 < 0.10 Copper (Cu)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 Iron (Fe)-Total (mg/L) 0.067 0.115 0.040 Lead (Pb)-Total (mg/L) 0.000233 0.000094 < 0.000050 Lithium (Li)-Total (mg/L) 0.0017 0.0017 0.0051 Magnesium (Mg)-Total (mg/L) 9.92 10.7 16.0 Manganese (Mn)-Total (mg/L) 0.0126 0.00674 0.00521 Mercury (Hg)-Total (ug/L) 0.00083 0.00095 < 0.00050 < 0.00050 < 0.00050 Molybdenum (Mo)-Total (mg/L) 0.000594 0.000453 0.000738 Nickel (Ni)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 Potassium (K)-Total (mg/L) 0.619 0.650 0.609 Selenium (Se)-Total (ug/L) 0.351 0.643 2.90 Silicon (Si)-Total (mg/L) 2.42 2.87 2.19 Silver (Ag)-Total (mg/L) < 0.000010 <0.000010 < 0.000010 Sodium (Na)-Total (mg/L) 3.98 3.82 3.64 Strontium (Sr)-Total (mg/L) 0.122 0.106 0.174 Thallium (TI)-Total (mg/L) < 0.000010 < 0.000010 < 0.000010 Tin (Sn)-Total (mg/L) < 0.00010 < 0.00010 < 0.00010 Titanium (Ti)-Total (mg/L) < 0.010 < 0.010 < 0.010 Uranium (U)-Total (mg/L) 0.000618 0.000590 0.000651 Vanadium (V)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 Zinc (Zn)-Total (mg/L) < 0.0030 < 0.0030 <0.0030 Dissolved Mercury Filtration Location **Dissolved Metals** LAB LAB LAB Dissolved Metals Filtration Location LAB LAB LAB Aluminum (Al)-Dissolved (mg/L) 0.0052 0.0048 < 0.0030 Antimony (Sb)-Dissolved (mg/L) < 0.00010 < 0.00010 < 0.00010 Arsenic (As)-Dissolved (mg/L) 0.00034 0.00014 0.00037 Barium (Ba)-Dissolved (mg/L) 0.0473 0.0375 0.114 Beryllium (Be)-Dissolved (ug/L) < 0.020 < 0.020 < 0.020 Bismuth (Bi)-Dissolved (mg/L) < 0.000050 < 0.000050 < 0.000050 Boron (B)-Dissolved (mg/L) < 0.010 < 0.010 < 0.010 Cadmium (Cd)-Dissolved (ug/L) < 0.0050 < 0.0050 0.0109 Calcium (Ca)-Dissolved (mg/L) 33.2 33.8 66.8 Chromium (Cr)-Dissolved (mg/L) < 0.00010 < 0.00010 0.00011 Cobalt (Co)-Dissolved (ug/L) < 0.10 < 0.10 < 0.10

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-11 WS 13-MAY-19 13:56 RG_EROL_WS_20 190513-1356 FB-HG	L2272864-12 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356	L2272864-13 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356 FB-HG	L2272864-14 WS 13-MAY-19 12:00 RG_TRIP_WS_201 90513-0000	L2272864-15 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500
Grouping	Analyte	ng 				
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)		63.4		<0.050	71.8
	Chromium (Cr)-Total (mg/L)		0.00016		<0.00010	0.00039
	Cobalt (Co)-Total (ug/L)		<0.10		<0.10	<0.10
	Copper (Cu)-Total (mg/L)		<0.00050		<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)		0.035		<0.010	0.107
	Lead (Pb)-Total (mg/L)		<0.000050		<0.000050	0.000102
	Lithium (Li)-Total (mg/L)		0.0050		<0.0010	0.0096
	Magnesium (Mg)-Total (mg/L)		16.2		<0.10	25.4
	Manganese (Mn)-Total (mg/L)		0.00512		<0.00010	0.00596
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00106
	Molybdenum (Mo)-Total (mg/L)		0.000737		<0.000050	0.00127
	Nickel (Ni)-Total (mg/L)		<0.00050		<0.00050	<0.00050
	Potassium (K)-Total (mg/L)		0.589		<0.050	0.750
	Selenium (Se)-Total (ug/L)		2.91		<0.050	15.8
	Silicon (Si)-Total (mg/L)		2.21		<0.10	2.13
	Silver (Ag)-Total (mg/L)		<0.000010		<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		3.64		<0.050	2.76
	Strontium (Sr)-Total (mg/L)		0.173		<0.00020	0.261
	Thallium (TI)-Total (mg/L)		<0.000010		<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)		<0.00010		<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		<0.010		<0.010	<0.010
	Uranium (U)-Total (mg/L)		0.000658		<0.000010	0.00135
	Vanadium (V)-Total (mg/L)		<0.00050		<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)		<0.0030		<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location		LAB			LAB
	Dissolved Metals Filtration Location		LAB		LAB	LAB
	Aluminum (Al)-Dissolved (mg/L)		<0.0030			<0.0030
	Antimony (Sb)-Dissolved (mg/L)		<0.00010			<0.00010
	Arsenic (As)-Dissolved (mg/L)		0.00013			<0.00010
	Barium (Ba)-Dissolved (mg/L)		0.114			0.0730
	Beryllium (Be)-Dissolved (ug/L)		<0.020			<0.020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050			<0.000050
	Boron (B)-Dissolved (mg/L)		<0.010			<0.010
	Cadmium (Cd)-Dissolved (ug/L)		0.0095			0.0056
	Calcium (Ca)-Dissolved (mg/L)		64.5		<0.050	71.2
	Chromium (Cr)-Dissolved (mg/L)		0.00011			0.00016
	Cobalt (Co)-Dissolved (ug/L)		<0.10			<0.10

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-16 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500 FB-HG	L2272864-17 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844	L2272864-18 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844 FB- HG	
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)		57.8		
	Chromium (Cr)-Total (mg/L)		0.00015		
	Cobalt (Co)-Total (ug/L)		<0.10		
	Copper (Cu)-Total (mg/L)		<0.00050		
	Iron (Fe)-Total (mg/L)		0.067		
	Lead (Pb)-Total (mg/L)		0.000052		
	Lithium (Li)-Total (mg/L)		0.0048		
	Magnesium (Mg)-Total (mg/L)		11.8		
	Manganese (Mn)-Total (mg/L)		0.0226		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)		0.00137		
	Nickel (Ni)-Total (mg/L)		0.00088		
	Potassium (K)-Total (mg/L)		1.36		
	Selenium (Se)-Total (ug/L)		0.082		
	Silicon (Si)-Total (mg/L)		1.46		
	Silver (Ag)-Total (mg/L)		<0.000010		
	Sodium (Na)-Total (mg/L)		9.12		
	Strontium (Sr)-Total (mg/L)		0.174		
	Thallium (TI)-Total (mg/L)		<0.000010		
	Tin (Sn)-Total (mg/L)		<0.00010		
	Titanium (Ti)-Total (mg/L)		<0.010		
	Uranium (U)-Total (mg/L)		0.000374		
	Vanadium (V)-Total (mg/L)		<0.00050		
	Zinc (Zn)-Total (mg/L)		<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location		LAB		
	Dissolved Metals Filtration Location		LAB		
	Aluminum (Al)-Dissolved (mg/L)		0.0032		
	Antimony (Sb)-Dissolved (mg/L)		0.00018		
	Arsenic (As)-Dissolved (mg/L)		0.00038		
	Barium (Ba)-Dissolved (mg/L)		0.172		
	Beryllium (Be)-Dissolved (ug/L)		<0.020		
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050		
	Boron (B)-Dissolved (mg/L)		<0.010		
	Cadmium (Cd)-Dissolved (ug/L)		<0.0050		
	Calcium (Ca)-Dissolved (mg/L)		59.7		
	Chromium (Cr)-Dissolved (mg/L)		0.00012		
	Cobalt (Co)-Dissolved (ug/L)		<0.10		

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-1 WS 13-MAY-19 08:51 RG_GO13_WS_20 190513-0851	L2272864-2 WS 13-MAY-19 08:51 RG_G013_WS_20 190513-0851 FB- HG	L2272864-3 WS 13-MAY-19 08:51 RG_FBLANK_WS_ 20190513-0851	L2272864-4 WS 13-MAY-19 09:32 RG_STPD_WS_20 190513-0932	L2272864-5 WS 13-MAY-19 09:32 RG_STPD_WS_2 190513-0932 FB- HG
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0253		<0.0010	0.0053	
	Magnesium (Mg)-Dissolved (mg/L)	70.6		<0.10	19.1	
	Manganese (Mn)-Dissolved (mg/L)	0.0106		<0.00010	0.00012	
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050	<0.000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00201		<0.000050	0.000885	
	Nickel (Ni)-Dissolved (mg/L)	0.00103		<0.00050	<0.00050	
	Potassium (K)-Dissolved (mg/L)	1.91		<0.050	0.551	
	Selenium (Se)-Dissolved (ug/L)	78.7		<0.050	5.65	
	Silicon (Si)-Dissolved (mg/L)	2.59		<0.050	0.211	
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	8.11		<0.050	5.00	
	Strontium (Sr)-Dissolved (mg/L)	0.353		<0.00020	0.169	
	Thallium (TI)-Dissolved (mg/L)	0.000015		<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00347		<0.000010	0.000999	
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0018		<0.0010	<0.0010	

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-6 WS 13-MAY-19 10:17 RG_ER_WS_2019 0513-1017	L2272864-7 WS 13-MAY-19 10:17 RG_ER_WS_2019 0513-1017 FB-HG	L2272864-8 WS 13-MAY-19 13:07 RG_GC_WS_2019 0513-1307	U2272864-9 WS 13-MAY-19 13:07 RG_GC_WS_2019 0513-1307 FB-HG	L2272864-10 WS 13-MAY-19 13:56 RG_EROL_WS_20 190513-1356
Grouping	Analyte	•				
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0015		0.0015		0.0048
	Magnesium (Mg)-Dissolved (mg/L)	9.96		10.7		16.4
	Manganese (Mn)-Dissolved (mg/L)	0.00037		0.00017		0.00301
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000539		0.000417		0.000657
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Potassium (K)-Dissolved (mg/L)	0.599		0.605		0.604
	Selenium (Se)-Dissolved (ug/L)	0.425		0.752		3.36
	Silicon (Si)-Dissolved (mg/L)	2.17		2.78		2.25
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.00010
	Sodium (Na)-Dissolved (mg/L)	4.10		3.67		3.76
	Strontium (Sr)-Dissolved (mg/L)	0.122		0.108		0.174
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.000657		0.000658		0.000695
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-11 WS 13-MAY-19 13:56 RG_EROL_WS_20 190513-1356 FB-HG	L2272864-12 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356	L2272864-13 WS 13-MAY-19 13:56 RG_DUP_WS_201 90513-1356 FB-HG	L2272864-14 WS 13-MAY-19 12:00 RG_TRIP_WS_201 90513-0000	L2272864-15 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500
Grouping	Analyte	1				
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		<0.00050			<0.00050
	Iron (Fe)-Dissolved (mg/L)		<0.010			<0.010
	Lead (Pb)-Dissolved (mg/L)		<0.000050			<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0047			0.0090
	Magnesium (Mg)-Dissolved (mg/L)		16.3		<0.0050	25.8
	Manganese (Mn)-Dissolved (mg/L)		0.00283			0.00023
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050			<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000638			0.00113
	Nickel (Ni)-Dissolved (mg/L)		<0.00050			<0.00050
	Potassium (K)-Dissolved (mg/L)		0.601		<0.050	0.698
	Selenium (Se)-Dissolved (ug/L)		3.39			18.4
	Silicon (Si)-Dissolved (mg/L)		2.20			2.06
	Silver (Ag)-Dissolved (mg/L)		<0.000010			<0.000010
	Sodium (Na)-Dissolved (mg/L)		3.65		<0.050	2.83
	Strontium (Sr)-Dissolved (mg/L)		0.171			0.251
	Thallium (TI)-Dissolved (mg/L)		<0.000010			<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010			<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.010			<0.010
	Uranium (U)-Dissolved (mg/L)		0.000707			0.00140
	Vanadium (V)-Dissolved (mg/L)		<0.00050			<0.00050
	Zinc (Zn)-Dissolved (mg/L)		<0.0010			<0.0010
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^{*} Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L2272864-16 WS 13-MAY-19 15:00 RG_ELWDGC_WS _20190513-1500 FB-HG	L2272864-17 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844	L2272864-18 WS 13-MAY-19 08:44 RG_ERIMF_WS_2 0190513-0844 FB- HG	
Grouping	Analyte				
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		<0.00050		
	Iron (Fe)-Dissolved (mg/L)		<0.010		
	Lead (Pb)-Dissolved (mg/L)		<0.000050		
	Lithium (Li)-Dissolved (mg/L)		0.0045		
	Magnesium (Mg)-Dissolved (mg/L)		11.6		
	Manganese (Mn)-Dissolved (mg/L)		0.00011		
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)		0.00125		
	Nickel (Ni)-Dissolved (mg/L)		0.00078		
	Potassium (K)-Dissolved (mg/L)		1.36		
	Selenium (Se)-Dissolved (ug/L)		0.066		
	Silicon (Si)-Dissolved (mg/L)		1.37		
	Silver (Ag)-Dissolved (mg/L)		<0.000010		
	Sodium (Na)-Dissolved (mg/L)		8.93		
	Strontium (Sr)-Dissolved (mg/L)		0.167		
	Thallium (TI)-Dissolved (mg/L)		<0.000010		
	Tin (Sn)-Dissolved (mg/L)		<0.00010		
	Titanium (Ti)-Dissolved (mg/L)		<0.010		
	Uranium (U)-Dissolved (mg/L)		0.000397		
	Vanadium (V)-Dissolved (mg/L)		<0.00050		
	Zinc (Zn)-Dissolved (mg/L)		<0.0010		
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^{*} Please refer to the Reference Information section for an explanation of any qualifiers detected.

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Reference Information

Qualifiers for Sample Submission Listed:					
Qualifier	Description				
SFPL	Sample was Filtered and Preserved at the laboratory - DOC, DIS METALS LAB FILTER/PRESERVE				
QC Samples with 0	Qualifiers & Comments:				
QC Type Description Parameter		Qualifier	Applies to Sample Number(s)		

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2272864-3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2272864-3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2272864-3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2272864-3
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L2272864-3
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2272864-3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2272864-3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2272864-3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2272864-3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2272864-10, -12, -15, -17, -6, -8
Matrix Spike	Aluminum (Al)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Manganese (Mn)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Selenium (Se)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2272864-1, -10, -12, -14, -15, -17, -3, -4, -6, -8

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL

Water

Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APHA 4500 H-Electrode

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TURBIDITY-CL Water **Turbidity** APHA 2130 B-Nephelometer

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

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

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

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

Chain of Custody Numbers:

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL Water							
Batch R4637403							
WG3052391-12 DUP	L2272864-6	0.4		a /I		20	40.1411/40
Acidity (as CaCO3)	2.3	2.1		mg/L	11	20	16-MAY-19
WG3052391-11 LCS Acidity (as CaCO3)		103.1		%		85-115	16-MAY-19
WG3052391-14 LCS Acidity (as CaCO3)		103.6		%		85-115	16-MAY-19
WG3052391-10 MB Acidity (as CaCO3)		1.1		mg/L		2	16-MAY-19
WG3052391-13 MB							
Acidity (as CaCO3)		1.2		mg/L		2	16-MAY-19
ALK-MAN-CL Water							
Batch R4637446							
WG3052842-3 DUP Alkalinity, Total (as CaCO3)	L2272864-6 97.9	95.9		mg/L	2.1	20	17-MAY-19
WG3052842-2 LCS Alkalinity, Total (as CaCO3)		99.3		%		85-115	17-MAY-19
WG3052842-5 LCS Alkalinity, Total (as CaCO3)		100.1		%		85-115	17-MAY-19
WG3052842-1 MB							
Alkalinity, Total (as CaCO3)		<1.0		mg/L		1	17-MAY-19
WG3052842-4 MB							
Alkalinity, Total (as CaCO3)		<1.0		mg/L		1	17-MAY-19
BE-D-L-CCMS-VA Water							
Batch R4637723							
WG3052264-2 LCS		0.4.5		0.4			
Beryllium (Be)-Dissolved		94.5		%		80-120	17-MAY-19
WG3052567-2 LCS Beryllium (Be)-Dissolved		93.9		%		80-120	17-MAY-19
WG3052264-1 MB	LF	00.0		,•		00-120	17-WIA1-19
Beryllium (Be)-Dissolved	Li	<0.000020		mg/L		0.00002	17-MAY-19
WG3052567-1 MB	LF						
Beryllium (Be)-Dissolved		<0.000020		mg/L		0.00002	17-MAY-19
BE-T-L-CCMS-VA Water							
Batch R4637588							
WG3052239-3 DUP	L2272864-4	0.000000	DE5 ***	/I		00	
Beryllium (Be)-Total	<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	17-MAY-19
WG3052239-2 LCS Beryllium (Be)-Total		99.7		%		80-120	17-MAY-19
, (20) Total		00		70		00-120	17-1VIA 1-19



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Test Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BE-T-L-CCMS-VA Water							
Batch R4637588 WG3052239-1 MB Beryllium (Be)-Total		<0.000020)	mg/L		0.00002	17-MAY-19
WG3052239-4 MS Beryllium (Be)-Total	L2272864-1	98.4		%		70-130	17-MAY-19
BR-L-IC-N-CL Water							
Batch R4635267 WG3050253-15 DUP Bromide (Br)	L2272864-14 <0.050	<0.050	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 LCS Bromide (Br)		103.7		%		85-115	14-MAY-19
WG3050253-14 LCS Bromide (Br)		102.9		%		85-115	14-MAY-19
WG3050253-13 MB Bromide (Br)		<0.050		mg/L		0.05	14-MAY-19
WG3050253-9 MB Bromide (Br)		<0.050		mg/L		0.05	14-MAY-19
WG3050253-16 MS Bromide (Br)	L2272864-14	103.1		%		75-125	14-MAY-19
C-DIS-ORG-LOW-CL Water							
Batch R4638391 WG3053936-3 DUP Dissolved Organic Carbon	L2272864-15 <0.50	<0.50	RPD-NA	mg/L	N/A	20	19-MAY-19
WG3053936-2 LCS Dissolved Organic Carbon		97.1		%		80-120	19-MAY-19
WG3053936-6 LCS Dissolved Organic Carbon		101.6		%		80-120	19-MAY-19
WG3053936-1 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	19-MAY-19
WG3053936-5 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	19-MAY-19
WG3053936-4 MS Dissolved Organic Carbon	L2272864-17	95.8		%		70-130	19-MAY-19
C-TOT-ORG-LOW-CL Water							
Batch R4638391 WG3053936-3 DUP Total Organic Carbon	L2272864-15 <0.50	<0.50	RPD-NA	mg/L	N/A	20	19-MAY-19
WG3053936-2 LCS Total Organic Carbon		102.8		%		80-120	19-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	Water							
Batch R4638391 WG3053936-6 LCS Total Organic Carbon			101.0		%		80-120	19-MAY-19
WG3053936-1 MB Total Organic Carbon			<0.50		mg/L		0.5	19-MAY-19
WG3053936-5 MB Total Organic Carbon			<0.50		mg/L		0.5	19-MAY-19
WG3053936-4 MS Total Organic Carbon		L2272864-17	110.9		%		70-130	19-MAY-19
CL-IC-N-CL	Water							
Batch R4635267								
WG3050253-15 DUP Chloride (CI)		L2272864-14 <0.50	<0.50	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 LCS Chloride (CI)			99.5		%		90-110	14-MAY-19
WG3050253-14 LCS Chloride (CI)			99.5		%		90-110	14-MAY-19
WG3050253-13 MB Chloride (CI)			<0.50		mg/L		0.5	14-MAY-19
WG3050253-9 MB Chloride (CI)			<0.50		mg/L		0.5	14-MAY-19
WG3050253-16 MS Chloride (CI)		L2272864-14	100.6		%		75-125	14-MAY-19
EC-L-PCT-CL	Water							
Batch R4637446								
WG3052842-3 DUP Conductivity (@ 25C)		L2272864-6 242	242		uS/cm	0.0	10	17-MAY-19
WG3052842-2 LCS Conductivity (@ 25C)			102.9		%		90-110	17-MAY-19
WG3052842-5 LCS Conductivity (@ 25C)			102.9		%		90-110	17-MAY-19
WG3052842-1 MB Conductivity (@ 25C)			<2.0		uS/cm		2	17-MAY-19
WG3052842-4 MB Conductivity (@ 25C)			<2.0		uS/cm		2	17-MAY-19
F-IC-N-CL	Water							



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	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	Water							
Batch R4635267 WG3050253-15 DUP Fluoride (F)		L2272864-14 <0.020	<0.020	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 LCS Fluoride (F)			103.6		%		90-110	14-MAY-19
WG3050253-14 LCS Fluoride (F)			103.2		%		90-110	14-MAY-19
WG3050253-13 MB Fluoride (F)			<0.020		mg/L		0.02	14-MAY-19
WG3050253-9 MB Fluoride (F)			<0.020		mg/L		0.02	14-MAY-19
WG3050253-16 MS Fluoride (F)		L2272864-14	104.2		%		75-125	14-MAY-19
HG-D-CVAA-VA	Water							
Batch R4639533 WG3054696-2 LCS Mercury (Hg)-Dissolved			100.6		%		80-120	21-MAY-19
WG3054696-1 MB Mercury (Hg)-Dissolved			<0.0000050	2	mg/L		0.000005	21-MAY-19
WG3054696-4 MS Mercury (Hg)-Dissolved		L2272864-1	102.3		%		70-130	21-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4638022 WG3053487-2 LCS Mercury (Hg)-Total			96.8		%		80-120	18-MAY-19
WG3053487-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	18-MAY-19
Batch R4639602								
WG3054527-2 LCS Mercury (Hg)-Total			102.0		%		80-120	21-MAY-19
WG3054527-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	21-MAY-19
WG3054527-4 MS Mercury (Hg)-Total		L2272864-18	95.2		%		70-130	21-MAY-19
MET-D-CCMS-CL	Water							
Batch R4639708 WG3054655-11 DUP Calcium (Ca)-Dissolved		L2272864-14 <0.050	<0.050		mg/L	N/A	20	24 MAN 42
		<u.uou< td=""><td><0.030</td><td>RPD-NA</td><td>mg/L</td><td>N/A</td><td>/0</td><td>21-MAY-19</td></u.uou<>	<0.030	RPD-NA	mg/L	N/A	/0	21-MAY-19



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Test Mar	trix Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL Wa	ater						
Batch R4639708							
WG3054655-11 DUP	L2272864-14						
Potassium (K)-Dissolved	<0.050	<0.050	RPD-NA	mg/L	N/A	20	21-MAY-19
Sodium (Na)-Dissolved	<0.050	<0.050	RPD-NA	mg/L	N/A	20	21-MAY-19
WG3054655-6 LCS Calcium (Ca)-Dissolved		95.4		%		80-120	21-MAY-19
Magnesium (Mg)-Dissolved		95.3		%		80-120	21-MAY-19
Potassium (K)-Dissolved		105.1		%		80-120	21-MAY-19
Sodium (Na)-Dissolved		98.9		%		80-120	21-MAY-19
WG3054655-5 MB						00 120	21 100 10
Calcium (Ca)-Dissolved		<0.050		mg/L		0.05	21-MAY-19
Magnesium (Mg)-Dissolved		<0.0050		mg/L		0.005	21-MAY-19
Potassium (K)-Dissolved		<0.050		mg/L		0.05	21-MAY-19
Sodium (Na)-Dissolved		<0.050		mg/L		0.05	21-MAY-19
WG3054655-12 MS	L2272864-14						
Calcium (Ca)-Dissolved		100.4		%		70-130	21-MAY-19
Magnesium (Mg)-Dissolved		100.8		%		70-130	21-MAY-19
Potassium (K)-Dissolved		112.4		%		70-130	21-MAY-19
Sodium (Na)-Dissolved		104.6		%		70-130	21-MAY-19
MET-D-CCMS-VA Wa	ater						
Batch R4637723							
WG3052264-2 LCS Aluminum (Al)-Dissolved		99.9		%		80-120	17-MAY-19
Antimony (Sb)-Dissolved		90.1		%		80-120	17-MAY-19
Arsenic (As)-Dissolved		97.1		%		80-120	17-MAY-19
Barium (Ba)-Dissolved		98.9		%		80-120	17-MAY-19
Bismuth (Bi)-Dissolved		106.9		%		80-120	17-MAY-19
Boron (B)-Dissolved		92.5		%		80-120	17-MAY-19
Cadmium (Cd)-Dissolved		96.1		%		80-120	17-MAY-19
Calcium (Ca)-Dissolved		94.4		%			
Chromium (Cr)-Dissolved		99.4		%		80-120 80-120	17-MAY-19 17-MAY-19
Cobalt (Co)-Dissolved		97.5		%			
Copper (Cu)-Dissolved		96.7		%		80-120 80-120	17-MAY-19
Iron (Fe)-Dissolved		95.3		%		80-120 80-120	17-MAY-19
Lead (Pb)-Dissolved		95.5 102.5		%		80-120	17-MAY-19
Lithium (Li)-Dissolved		92.2		%		80-120	17-MAY-19
						80-120	17-MAY-19
Magnesium (Mg)-Dissolved		106.6		%		80-120	17-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4637723								
WG3052264-2 LCS								
Manganese (Mn)-Dissol			101.9		%		80-120	17-MAY-19
Molybdenum (Mo)-Disso	olved		92.8		%		80-120	17-MAY-19
Nickel (Ni)-Dissolved			96.0		%		80-120	17-MAY-19
Potassium (K)-Dissolved			99.0		%		80-120	17-MAY-19
Selenium (Se)-Dissolved	d		95.2		%		80-120	17-MAY-19
Silicon (Si)-Dissolved			99.8		%		60-140	17-MAY-19
Silver (Ag)-Dissolved			86.1		%		80-120	17-MAY-19
Sodium (Na)-Dissolved			95.7		%		80-120	17-MAY-19
Strontium (Sr)-Dissolved	i		94.2		%		80-120	17-MAY-19
Thallium (TI)-Dissolved			100.5		%		80-120	17-MAY-19
Tin (Sn)-Dissolved			91.3		%		80-120	17-MAY-19
Titanium (Ti)-Dissolved			95.3		%		80-120	17-MAY-19
Uranium (U)-Dissolved			101.7		%		80-120	17-MAY-19
Vanadium (V)-Dissolved			100.3		%		80-120	17-MAY-19
Zinc (Zn)-Dissolved			97.9		%		80-120	17-MAY-19
WG3052567-2 LCS								
Aluminum (Al)-Dissolved			103.5		%		80-120	17-MAY-19
Antimony (Sb)-Dissolved	d		91.0		%		80-120	17-MAY-19
Arsenic (As)-Dissolved			101.8		%		80-120	17-MAY-19
Barium (Ba)-Dissolved			104.1		%		80-120	17-MAY-19
Bismuth (Bi)-Dissolved			102.7		%		80-120	17-MAY-19
Boron (B)-Dissolved			88.9		%		80-120	17-MAY-19
Cadmium (Cd)-Dissolve	d		99.3		%		80-120	17-MAY-19
Calcium (Ca)-Dissolved			96.9		%		80-120	17-MAY-19
Chromium (Cr)-Dissolve	d		102.2		%		80-120	17-MAY-19
Cobalt (Co)-Dissolved			100.1		%		80-120	17-MAY-19
Copper (Cu)-Dissolved			98.8		%		80-120	17-MAY-19
Iron (Fe)-Dissolved			97.8		%		80-120	17-MAY-19
Lead (Pb)-Dissolved			94.8		%		80-120	17-MAY-19
Lithium (Li)-Dissolved			89.8		%		80-120	17-MAY-19
Magnesium (Mg)-Dissol	ved		107.5		%		80-120	17-MAY-19
Manganese (Mn)-Dissol	ved		100.6		%		80-120	17-MAY-19
Molybdenum (Mo)-Disso	olved		92.3		%		80-120	17-MAY-19
Nickel (Ni)-Dissolved			98.3		%		80-120	17-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4637723	3							
WG3052567-2 LCS	a d		400.0		0/			.=
Potassium (K)-Dissolve			102.0		%		80-120	17-MAY-19
Selenium (Se)-Dissolve	ea		97.9		%		80-120	17-MAY-19
Silicon (Si)-Dissolved			98.6		%		60-140	17-MAY-19
Silver (Ag)-Dissolved			90.6		%		80-120	17-MAY-19
Sodium (Na)-Dissolved			96.8		%		80-120	17-MAY-19
Strontium (Sr)-Dissolve			95.2		%		80-120	17-MAY-19
Thallium (TI)-Dissolved	d		94.6		%		80-120	17-MAY-19
Tin (Sn)-Dissolved			93.1		%		80-120	17-MAY-19
Titanium (Ti)-Dissolved			97.2		%		80-120	17-MAY-19
Uranium (U)-Dissolved			95.8		%		80-120	17-MAY-19
Vanadium (V)-Dissolve	ed		102.6		%		80-120	17-MAY-19
Zinc (Zn)-Dissolved			101.2		%		80-120	17-MAY-19
WG3052264-1 MB Aluminum (Al)-Dissolve	ed	LF	<0.0010		mg/L		0.001	17-MAY-19
Antimony (Sb)-Dissolve	ed		<0.00010		mg/L		0.0001	17-MAY-19
Arsenic (As)-Dissolved	I		<0.00010		mg/L		0.0001	17-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Bismuth (Bi)-Dissolved	I		<0.000050)	mg/L		0.00005	17-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-MAY-19
Cadmium (Cd)-Dissolv	red		<0.000005	5C	mg/L		0.000005	17-MAY-19
Calcium (Ca)-Dissolve	d		< 0.050		mg/L		0.05	17-MAY-19
Chromium (Cr)-Dissolv	/ed		<0.00010		mg/L		0.0001	17-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Copper (Cu)-Dissolved	Į		<0.00020		mg/L		0.0002	17-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-MAY-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	17-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	17-MAY-19
Magnesium (Mg)-Disso	olved		<0.0050		mg/L		0.005	17-MAY-19
Manganese (Mn)-Disse	olved		<0.00010		mg/L		0.0001	17-MAY-19
Molybdenum (Mo)-Diss	solved		<0.000050)	mg/L		0.00005	17-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-MAY-19
Potassium (K)-Dissolve	ed		<0.050		mg/L		0.05	17-MAY-19
Selenium (Se)-Dissolv	ed		<0.000050)	mg/L		0.00005	17-MAY-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	17-MAY-19
(,					J. –		0.00	77 1417 11 10



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Test N	/latrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4637723								
WG3052264-1 MB		LF	0.000040					
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-MAY-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-MAY-19
Thallium (TI)-Dissolved			<0.000010		mg/L		0.00001	17-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-MAY-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	17-MAY-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	17-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-MAY-19
WG3052567-1 MB Aluminum (Al)-Dissolved		LF	<0.0010		mg/L		0.001	17-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	17-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-MAY-19
Cadmium (Cd)-Dissolved			<0.000005	С	mg/L		0.000005	17-MAY-19
Calcium (Ca)-Dissolved			< 0.050		mg/L		0.05	17-MAY-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-MAY-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-MAY-19
Lithium (Li)-Dissolved			< 0.0010		mg/L		0.001	17-MAY-19
Magnesium (Mg)-Dissolve	d		< 0.0050		mg/L		0.005	17-MAY-19
Manganese (Mn)-Dissolve	d		<0.00010		mg/L		0.0001	17-MAY-19
Molybdenum (Mo)-Dissolv	ed		<0.000050		mg/L		0.00005	17-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-MAY-19
Potassium (K)-Dissolved			< 0.050		mg/L		0.05	17-MAY-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	17-MAY-19
Silicon (Si)-Dissolved			< 0.050		mg/L		0.05	17-MAY-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	17-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-MAY-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	17-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4637723								
WG3052567-1 MB		LF						
Thallium (TI)-Dissolved			<0.000010)	mg/L		0.00001	17-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	17-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	17-MAY-19
Uranium (U)-Dissolved			<0.000010)	mg/L		0.00001	17-MAY-19
Vanadium (V)-Dissolved	t		<0.00050		mg/L		0.0005	17-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-MAY-19
Batch R4638064								
WG3053299-2 LCS Aluminum (Al)-Dissolve	d		100.1		%		00.400	40.1407/40
							80-120	18-MAY-19
Antimony (Sb)-Dissolve	u		92.5		%		80-120	18-MAY-19
Arsenic (As)-Dissolved			94.9		%		80-120	18-MAY-19
Barium (Ba)-Dissolved			100.9		%		80-120	18-MAY-19
Bismuth (Bi)-Dissolved			94.2		%		80-120	18-MAY-19
Boron (B)-Dissolved			87.8		%		80-120	18-MAY-19
Cadmium (Cd)-Dissolve			93.5		%		80-120	18-MAY-19
Calcium (Ca)-Dissolved			93.1		%		80-120	18-MAY-19
Chromium (Cr)-Dissolve	ed		94.2		%		80-120	18-MAY-19
Cobalt (Co)-Dissolved			96.0		%		80-120	18-MAY-19
Copper (Cu)-Dissolved			95.2		%		80-120	18-MAY-19
Iron (Fe)-Dissolved			94.7		%		80-120	18-MAY-19
Lead (Pb)-Dissolved			94.6		%		80-120	18-MAY-19
Lithium (Li)-Dissolved			85.9		%		80-120	18-MAY-19
Magnesium (Mg)-Disso	ved		99.4		%		80-120	18-MAY-19
Manganese (Mn)-Disso	ved		97.4		%		80-120	18-MAY-19
Molybdenum (Mo)-Diss	olved		97.0		%		80-120	18-MAY-19
Nickel (Ni)-Dissolved			95.1		%		80-120	18-MAY-19
Potassium (K)-Dissolve	d		102.7		%		80-120	18-MAY-19
Selenium (Se)-Dissolve	d		97.8		%		80-120	18-MAY-19
Silicon (Si)-Dissolved			93.9		%		60-140	18-MAY-19
Silver (Ag)-Dissolved			92.9		%		80-120	18-MAY-19
Sodium (Na)-Dissolved			96.3		%		80-120	18-MAY-19
Strontium (Sr)-Dissolve	b		92.1		%		80-120	18-MAY-19
Thallium (TI)-Dissolved			95.5		%		80-120	18-MAY-19
Tin (Sn)-Dissolved			90.9		%		80-120	18-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4638064								
WG3053299-2 LCS								
Titanium (Ti)-Dissolved			95.7		%		80-120	18-MAY-19
Uranium (U)-Dissolved			89.5		%		80-120	18-MAY-19
Vanadium (V)-Dissolved			96.7		%		80-120	18-MAY-19
Zinc (Zn)-Dissolved			93.9		%		80-120	18-MAY-19
WG3053299-1 MB Aluminum (Al)-Dissolved		LF	<0.0010		mg/L		0.001	18-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-MAY-19
Cadmium (Cd)-Dissolved			<0.0000050]	mg/L		0.000005	18-MAY-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-MAY-19
Chromium (Cr)-Dissolved	i		<0.00010		mg/L		0.0001	18-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-MAY-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-MAY-19
Magnesium (Mg)-Dissolv	ed		<0.0050		mg/L		0.005	18-MAY-19
Manganese (Mn)-Dissolv	ed		<0.00010		mg/L		0.0001	18-MAY-19
Molybdenum (Mo)-Dissol	ved		<0.000050		mg/L		0.00005	18-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-MAY-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-MAY-19
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-MAY-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	18-MAY-19
Thallium (TI)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-MAY-19
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-19



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Test Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4638064 WG3053299-1 MB Zinc (Zn)-Dissolved		LF	<0.0010		mg/L		0.001	18-MAY-19
MET-T-CCMS-VA	Water							
Batch R4637588								
WG3052239-3 DUP Aluminum (Al)-Total		L2272864-4 0.0167	0.0156		mg/L	6.3	20	17-MAY-19
Antimony (Sb)-Total		0.00015	0.00014		mg/L	7.1	20	17-MAY-19
Arsenic (As)-Total		0.00020	0.00021		mg/L	6.9	20	17-MAY-19
Barium (Ba)-Total		0.0870	0.0852		mg/L	2.1	20	17-MAY-19
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-MAY-19
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-MAY-19
Cadmium (Cd)-Total		0.0000061	0.0000090	J	mg/L	0.000002	0.00001	17-MAY-19
Calcium (Ca)-Total		51.8	50.4		mg/L	2.7	20	17-MAY-19
Chromium (Cr)-Total		0.00015	0.00021	J	mg/L	0.00006	0.0002	17-MAY-19
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-MAY-19
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-MAY-19
Iron (Fe)-Total		0.047	0.046		mg/L	0.5	20	17-MAY-19
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-MAY-19
Lithium (Li)-Total		0.0057	0.0057		mg/L	0.9	20	17-MAY-19
Magnesium (Mg)-Total		18.9	19.0		mg/L	0.8	20	17-MAY-19
Manganese (Mn)-Total		0.00372	0.00366		mg/L	1.4	20	17-MAY-19
Molybdenum (Mo)-Total		0.000980	0.00101		mg/L	3.1	20	17-MAY-19
Nickel (Ni)-Total		<0.00050	0.00052	RPD-NA	mg/L	N/A	20	17-MAY-19
Potassium (K)-Total		0.559	0.603		mg/L	7.4	20	17-MAY-19
Selenium (Se)-Total		0.00525	0.00530		mg/L	1.0	20	17-MAY-19
Silicon (Si)-Total		0.29	0.29		mg/L	0.5	20	17-MAY-19
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-MAY-19
Sodium (Na)-Total		5.27	5.24		mg/L	0.6	20	17-MAY-19
Strontium (Sr)-Total		0.179	0.184		mg/L	2.3	20	17-MAY-19
Thallium (TI)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-MAY-19
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-MAY-19
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-MAY-19
Uranium (U)-Total		0.000942	0.000928		mg/L	1.6	20	17-MAY-19
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-MAY-19



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4637588								
WG3052239-3 DUP Zinc (Zn)-Total		L2272864-4 < 0.0030	<0.0030	RPD-NA	mg/L	N/A	20	17-MAY-19
WG3052239-2 LCS								
Aluminum (Al)-Total			104.2		%		80-120	17-MAY-19
Antimony (Sb)-Total			100.4		%		80-120	17-MAY-19
Arsenic (As)-Total			96.6		%		80-120	17-MAY-19
Barium (Ba)-Total			92.9		%		80-120	17-MAY-19
Bismuth (Bi)-Total			109.0		%		80-120	17-MAY-19
Boron (B)-Total			97.2		%		80-120	17-MAY-19
Cadmium (Cd)-Total			97.5		%		80-120	17-MAY-19
Calcium (Ca)-Total			103.9		%		80-120	17-MAY-19
Chromium (Cr)-Total			99.8		%		80-120	17-MAY-19
Cobalt (Co)-Total			98.0		%		80-120	17-MAY-19
Copper (Cu)-Total			96.2		%		80-120	17-MAY-19
Iron (Fe)-Total			97.5		%		80-120	17-MAY-19
Lead (Pb)-Total			103.7		%		80-120	17-MAY-19
Lithium (Li)-Total			99.0		%		80-120	17-MAY-19
Magnesium (Mg)-Total			102.7		%		80-120	17-MAY-19
Manganese (Mn)-Total			96.4		%		80-120	17-MAY-19
Molybdenum (Mo)-Total			102.4		%		80-120	17-MAY-19
Nickel (Ni)-Total			97.9		%		80-120	17-MAY-19
Potassium (K)-Total			102.1		%		80-120	17-MAY-19
Selenium (Se)-Total			96.3		%		80-120	17-MAY-19
Silicon (Si)-Total			97.9		%		80-120	17-MAY-19
Silver (Ag)-Total			98.2		%		80-120	17-MAY-19
Sodium (Na)-Total			104.7		%		80-120	17-MAY-19
Strontium (Sr)-Total			99.2		%		80-120	17-MAY-19
Thallium (TI)-Total			102.5		%		80-120	17-MAY-19
Tin (Sn)-Total			97.6		%		80-120	17-MAY-19
Titanium (Ti)-Total			99.4		%		80-120	17-MAY-19
Uranium (U)-Total			96.8		%		80-120	17-MAY-19
Vanadium (V)-Total			100.3		%		80-120	17-MAY-19
Zinc (Zn)-Total			98.0		%		80-120	17-MAY-19
WG3052239-1 MB			00.0		,,		00-120	17-1VIA1-19
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-MAY-19



Workorder: L2272864 Report Date: 22-MAY-19 Page 13 of 19

Test	Matrix	Reference	Result	Qualif	ier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water								
Batch R4637588									
WG3052239-1 MB Arsenic (As)-Total			<0.00010			m a /l		0.0004	47.140./ 40
Barium (Ba)-Total			<0.00010			mg/L mg/L		0.0001 0.0001	17-MAY-19
Bismuth (Bi)-Total			<0.00010			mg/L			17-MAY-19
Boron (B)-Total			<0.010	U		mg/L		0.00005	17-MAY-19
Cadmium (Cd)-Total			<0.00000	EC.		mg/L		0.01 0.000005	17-MAY-19
Calcium (Ca)-Total			<0.050	JC		mg/L			17-MAY-19
Chromium (Cr)-Total			<0.00010			mg/L		0.05	17-MAY-19
Cobalt (Co)-Total			<0.00010			mg/L		0.0001	17-MAY-19
Copper (Cu)-Total			<0.00010			•		0.0001	17-MAY-19
Iron (Fe)-Total			<0.00030			mg/L		0.0005	17-MAY-19
Lead (Pb)-Total			<0.010	٥		mg/L		0.01	17-MAY-19
` '			<0.00005	U		mg/L		0.00005	17-MAY-19
Lithium (Li)-Total						mg/L		0.001	17-MAY-19
Magnesium (Mg)-Total Manganese (Mn)-Total			<0.0050 <0.00010			mg/L		0.005	17-MAY-19
. ,			<0.00010			mg/L		0.0001	17-MAY-19
Molybdenum (Mo)-Total Nickel (Ni)-Total			<0.00050			mg/L		0.00005	17-MAY-19
						mg/L		0.0005	17-MAY-19
Potassium (K)-Total			<0.050	0		mg/L		0.05	17-MAY-19
Selenium (Se)-Total			<0.00005	U		mg/L		0.00005	17-MAY-19
Silicon (Si)-Total			<0.10	0		mg/L		0.1	17-MAY-19
Silver (Ag)-Total			<0.00001	U		mg/L		0.00001	17-MAY-19
Sodium (Na)-Total			<0.050			mg/L		0.05	17-MAY-19
Strontium (Sr)-Total			<0.00020			mg/L		0.0002	17-MAY-19
Thallium (TI)-Total			<0.00001			mg/L		0.00001	17-MAY-19
Tin (Sn)-Total			<0.00010			mg/L		0.0001	17-MAY-19
Titanium (Ti)-Total			<0.00030			mg/L		0.0003	17-MAY-19
Uranium (U)-Total			<0.00001			mg/L		0.00001	17-MAY-19
Vanadium (V)-Total			<0.00050			mg/L		0.0005	17-MAY-19
Zinc (Zn)-Total			<0.0030			mg/L		0.003	17-MAY-19
WG3052239-4 MS Aluminum (Al)-Total		L2272864-1	N/A	N	//S-B	%		-	17-MAY-19
Antimony (Sb)-Total			99.9			%		70-130	17-MAY-19
Arsenic (As)-Total			98.9			%		70-130	17-MAY-19
Barium (Ba)-Total			N/A	N	/IS-B	%		-	17-MAY-19
Bismuth (Bi)-Total			90.7			%		70-130	17-MAY-19



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4637588								
WG3052239-4 MS		L2272864-1	00.7		0/			
Boron (B)-Total			98.7		%		70-130	17-MAY-19
Cadmium (Cd)-Total			95.9	MO D	%		70-130	17-MAY-19
Calcium (Ca)-Total			N/A	MS-B	%		-	17-MAY-19
Chromium (Cr)-Total			95.8		%		70-130	17-MAY-19
Cobalt (Co)-Total			93.5		%		70-130	17-MAY-19
Copper (Cu)-Total			92.1		%		70-130	17-MAY-19
Iron (Fe)-Total			94.4		%		70-130	17-MAY-19
Lead (Pb)-Total			93.4		%		70-130	17-MAY-19
Lithium (Li)-Total			80.6		%		70-130	17-MAY-19
Magnesium (Mg)-Total			N/A	MS-B	%		-	17-MAY-19
Manganese (Mn)-Total			N/A	MS-B	%		-	17-MAY-19
Molybdenum (Mo)-Total			104.3		%		70-130	17-MAY-19
Nickel (Ni)-Total			93.0		%		70-130	17-MAY-19
Potassium (K)-Total			99.6		%		70-130	17-MAY-19
Selenium (Se)-Total			N/A	MS-B	%		-	17-MAY-19
Silicon (Si)-Total			88.7		%		70-130	17-MAY-19
Silver (Ag)-Total			97.1		%		70-130	17-MAY-19
Sodium (Na)-Total			N/A	MS-B	%		-	17-MAY-19
Strontium (Sr)-Total			N/A	MS-B	%		-	17-MAY-19
Thallium (TI)-Total			94.0		%		70-130	17-MAY-19
Tin (Sn)-Total			98.7		%		70-130	17-MAY-19
Titanium (Ti)-Total			82.0		%		70-130	17-MAY-19
Uranium (U)-Total			89.9		%		70-130	17-MAY-19
Vanadium (V)-Total			98.3		%		70-130	17-MAY-19
Zinc (Zn)-Total			92.5		%		70-130	17-MAY-19
NH3-L-F-CL	Water							
Batch R4639207								
WG3054254-3 DUP Ammonia as N		L2272864-3 < 0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-MAY-19
WG3054254-2 LCS Ammonia as N			86.4		%		85-115	17-MAY-19
WG3054254-1 MB Ammonia as N			<0.0050		mg/L		0.005	17-MAY-19
WG3054254-4 MS Ammonia as N		L2272864-3	82.1		%		75-125	17-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	Water							
Batch R46399 WG3054258-10 LC Ammonia as N			90.7		%		85-115	17-MAY-19
WG3054258-9 ME Ammonia as N	3		<0.0050		mg/L		0.005	17-MAY-19
Batch R46404 WG3055365-2 LC Ammonia as N			88.2		%		85-115	21-MAY-19
WG3055365-1 ME Ammonia as N	3		<0.0050		mg/L		0.005	21-MAY-19
NO2-L-IC-N-CL	Water							
Batch R46352 WG3050253-15 DU Nitrite (as N)	-	L2272864-14 <0.0010	<0.0010	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 LC Nitrite (as N)	s		103.2		%		90-110	14-MAY-19
WG3050253-14 LC Nitrite (as N)	s		103.3		%		90-110	14-MAY-19
WG3050253-13 MB Nitrite (as N)	3		<0.0010		mg/L		0.001	14-MAY-19
WG3050253-9 MB Nitrite (as N)	3		<0.0010		mg/L		0.001	14-MAY-19
WG3050253-16 MS Nitrite (as N)	5	L2272864-14	104.3		%		75-125	14-MAY-19
NO3-L-IC-N-CL	Water							
Batch R4635								
WG3050253-15 DL Nitrate (as N)	JP	L2272864-14 <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 LC Nitrate (as N)	S		97.4		%		90-110	14-MAY-19
WG3050253-14 LC Nitrate (as N)	S		97.8		%		90-110	14-MAY-19
WG3050253-13 ME Nitrate (as N)	3		<0.0050		mg/L		0.005	14-MAY-19
WG3050253-9 MB Nitrate (as N)	3		<0.0050		mg/L		0.005	14-MAY-19
WG3050253-16 MS Nitrate (as N)	5	L2272864-14	98.5		%		75-125	14-MAY-19
ORP-CL	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	Water		_					
Batch R46	636998							
WG3052349-5 ORP	CRM	CL-ORP	226		mV		210-230	16-MAY-19
WG3052349-7 ORP	CRM	CL-ORP	223		mV		210-230	16-MAY-19
WG3052349-8 ORP	DUP	L2272864-17 445	444	J	mV	0.8	15	16-MAY-19
P-T-L-COL-CL	Water							
Batch R46	39827							
WG3054783-18 Phosphorus (P)-			97.8		%		80-120	21-MAY-19
WG3054783-17 Phosphorus (P)-			<0.0020		mg/L		0.002	21-MAY-19
PH-CL	Water							
Batch R46 WG3052842-3	537446 DUP	L2272864-6						
рН		8.09	8.08	J	рН	0.01	0.2	17-MAY-19
WG3052842-2 pH	LCS		6.98		рН		6.9-7.1	17-MAY-19
WG3052842-5 pH	LCS		7.00		рН		6.9-7.1	17-MAY-19
PO4-DO-L-COL-CL	Water							
Batch R46	635484							
	LCS -Dissolved (as P)		103.0		%		80-120	15-MAY-19
WG3050462-7 Orthophosphate	MB -Dissolved (as P)		<0.0010		mg/L		0.001	15-MAY-19
SO4-IC-N-CL	Water							
Batch R46	635267							
WG3050253-15 Sulfate (SO4)	DUP	L2272864-14 <0.30	<0.30	RPD-NA	mg/L	N/A	20	14-MAY-19
WG3050253-10 Sulfate (SO4)	LCS		98.6		%		90-110	14-MAY-19
WG3050253-14 Sulfate (SO4)	LCS		98.7		%		90-110	14-MAY-19
WG3050253-13 Sulfate (SO4)	МВ		<0.30		mg/L		0.3	14-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL Batch R4635267 WG3050253-9 MB	Water							
Sulfate (SO4)			<0.30		mg/L		0.3	14-MAY-19
WG3050253-16 MS Sulfate (SO4)		L2272864-14	99.8		%		75-125	14-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4638160 WG3053431-8 LCS Total Dissolved Solids			94.6		%		85-115	18-MAY-19
WG3053431-7 MB Total Dissolved Solids			<10		mg/L		10	18-MAY-19
TKN-L-F-CL	Water							
Batch R4640154 WG3055263-2 LCS								
Total Kjeldahl Nitrogen			91.3		%		75-125	21-MAY-19
WG3055263-6 LCS Total Kjeldahl Nitrogen			93.1		%		75-125	21-MAY-19
WG3055263-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-MAY-19
WG3055263-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-MAY-19
TSS-L-CL	Water							
Batch R4639447 WG3053810-8 LCS								
Total Suspended Solids			93.9		%		85-115	19-MAY-19
WG3053810-7 MB Total Suspended Solids			<1.0		mg/L		1	19-MAY-19
TURBIDITY-CL	Water							
Batch R4636103								
WG3051153-11 LCS Turbidity			98.0		%		85-115	15-MAY-19
WG3051153-8 LCS Turbidity			100.0		%		85-115	15-MAY-19
WG3051153-10 MB Turbidity			<0.10		NTU		0.1	15-MAY-19
WG3051153-7 MB Turbidity			<0.10		NTU		0.1	15-MAY-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

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

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Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	al by elect.						
	1	13-MAY-19 08:51	16-MAY-19 16:00	0.25	79	hours	EHTR-FM
	3	13-MAY-19 08:51	16-MAY-19 16:00	0.25	79	hours	EHTR-FM
	4	13-MAY-19 09:32	16-MAY-19 16:00	0.25	78	hours	EHTR-FM
	6	13-MAY-19 10:17	16-MAY-19 16:00	0.25	78	hours	EHTR-FM
	8	13-MAY-19 13:07	16-MAY-19 16:35	0.25	75	hours	EHTR-FM
	10	13-MAY-19 13:56	16-MAY-19 16:35	0.25	75	hours	EHTR-FM
	12	13-MAY-19 13:56	16-MAY-19 16:35	0.25	75	hours	EHTR-FM
	14	13-MAY-19 12:00	16-MAY-19 16:35	0.25	77	hours	EHTR-FM
	15	13-MAY-19 15:00	16-MAY-19 16:35	0.25	74	hours	EHTR-FM
	17	13-MAY-19 08:44	16-MAY-19 16:35	0.25	80	hours	EHTR-FM
рН							
	1	13-MAY-19 08:51	17-MAY-19 09:00	0.25	96	hours	EHTR-FM
	3	13-MAY-19 08:51	17-MAY-19 09:00	0.25	96	hours	EHTR-FM
	4	13-MAY-19 09:32	17-MAY-19 09:00	0.25	96	hours	EHTR-FM
	6	13-MAY-19 10:17	17-MAY-19 09:00	0.25	95	hours	EHTR-FM
	8	13-MAY-19 13:07	17-MAY-19 09:00	0.25	92	hours	EHTR-FM
	10	13-MAY-19 13:56	17-MAY-19 09:00	0.25	91	hours	EHTR-FM
	12	13-MAY-19 13:56	17-MAY-19 09:00	0.25	91	hours	EHTR-FM
	14	13-MAY-19 12:00	17-MAY-19 09:00	0.25	93	hours	EHTR-FM
	15	13-MAY-19 15:00	17-MAY-19 09:00	0.25	90	hours	EHTR-FM
	17	13-MAY-19 08:44	17-MAY-19 09:00	0.25	96	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2272864 were received on 14-MAY-19 13:45.

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

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

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

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Sample ID	Sampl	e Location	Field Matrix	-laz	Date		Time (24hr)	G=Grab C=Comp	# Of Cont.	Ĭ.	Y EC	11.5	l Si	في	ۏۣٙ	ည်	\ ¥ [£C				
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Sample ID	San	nple Location	Matrix	εΉ	Date	e	(24hr)	C=Comp	Cont.	M E	5	¥	7	≌	≌	🖺	Z Z		l		
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Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC VOB 2G0

Date Received: 15-MAY-19

Report Date: 23-MAY-19 14:39 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2273883
Project P.O. #: VPO00616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-12 - 2

Legal Site Desc:

My

Lyudmyla Shvets, B.Sc. Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298 ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L2273883 CONTD....

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Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2273883-1 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940	L2273883-2 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940 FB- HG	L2273883-3 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315	L2273883-4 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315 FB- HG	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	251		303		
	Hardness (as CaCO3) (mg/L)	135		180		
	pH (pH)	8.23		8.25		
	ORP (mV)	486		412		
	Total Suspended Solids (mg/L)	1.4		2.9		
	Total Dissolved Solids (mg/L)	DLHC 168		DLHC 178		
	Turbidity (NTU)	1.19		1.29		
Anions and	Acidity (as CaCO3) (mg/L)	<1.0		<1.0		
Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	131		149		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0		<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0		<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	131		149		
	Ammonia as N (mg/L)	0.0262		<0.0050		
	Bromide (Br) (mg/L)	<0.050		<0.050		
	Chloride (CI) (mg/L)	2.54		<0.50		
	Fluoride (F) (mg/L)	0.060		0.587		
	Ion Balance (%)	105		107		
	Nitrate (as N) (mg/L)	<0.0050		<0.0050		
	Nitrite (as N) (mg/L)	<0.0010		<0.0010		
	Total Kjeldahl Nitrogen (mg/L)	0.930		0.204		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010		0.0013		
	Phosphorus (P)-Total (mg/L)	0.0086		0.0067		
	Sulfate (SO4) (mg/L)	3.12		20.8		
	Anion Sum (meq/L)	2.76		3.44		
	Cation Sum (meq/L)	2.91		3.70		
	Cation - Anion Balance (%)	2.6		3.5		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	9.80		2.47		
	Total Organic Carbon (mg/L)	10.1		2.71		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0062		0.0071		
	Antimony (Sb)-Total (mg/L)	<0.00010		<0.00010		
	Arsenic (As)-Total (mg/L)	0.00050		0.00037		
	Barium (Ba)-Total (mg/L)	0.200		0.0553		
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050		
	Boron (B)-Total (mg/L)	<0.010		<0.010		
	Cadmium (Cd)-Total (ug/L)	<0.0050		<0.0050		

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

L2273883 CONTD....

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Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2273883-1 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940	L2273883-2 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940 FB- HG	L2273883-3 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315	L2273883-4 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315 FB- HG	
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	26.8		37.7		
	Chromium (Cr)-Total (mg/L)	<0.00010		<0.00010		
	Cobalt (Co)-Total (ug/L)	<0.10		<0.10		
	Copper (Cu)-Total (mg/L)	0.00175		<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010		<0.010		
	Lead (Pb)-Total (mg/L)	<0.000050		<0.000050		
	Lithium (Li)-Total (mg/L)	0.0016		0.0031		
	Magnesium (Mg)-Total (mg/L)	16.1		18.3		
	Manganese (Mn)-Total (mg/L)	0.00636		0.00222		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.000348		0.00133		
	Nickel (Ni)-Total (mg/L)	<0.00050		<0.00050		
	Potassium (K)-Total (mg/L)	1.31		1.04		
	Selenium (Se)-Total (ug/L)	<0.050		0.223		
	Silicon (Si)-Total (mg/L)	1.23		2.37		
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		
	Sodium (Na)-Total (mg/L)	4.13		1.80		
	Strontium (Sr)-Total (mg/L)	0.0735		0.128		
	Thallium (TI)-Total (mg/L)	<0.000010		<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		
	Uranium (U)-Total (mg/L)	0.000243		0.000803		
	Vanadium (V)-Total (mg/L)	<0.00050		<0.00050		
	Zinc (Zn)-Total (mg/L)	<0.0030		<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB		
	Dissolved Metals Filtration Location	LAB		LAB		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030		<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010		<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00053		0.00039		
	Barium (Ba)-Dissolved (mg/L)	0.196		0.0658		
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050		<0.0050		
	Calcium (Ca)-Dissolved (mg/L)	27.4		39.5		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10		

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

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Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2273883-1 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940	L2273883-2 WS 14-MAY-19 09:40 RG_LNLK_WS_20 190514-0940 FB- HG	L2273883-3 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315	L2273883-4 WS 14-MAY-19 13:15 RG_GRLK_WS_20 190514-1315 FB- HG	
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0016		0.0031		
	Magnesium (Mg)-Dissolved (mg/L)	16.1		19.7		
	Manganese (Mn)-Dissolved (mg/L)	0.00017		0.00021		
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000414		0.00127		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		<0.00050		
	Potassium (K)-Dissolved (mg/L)	1.29		1.11		
	Selenium (Se)-Dissolved (ug/L)	<0.050		0.290		
	Silicon (Si)-Dissolved (mg/L)	1.18		2.23		
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		
	Sodium (Na)-Dissolved (mg/L)	4.19		1.76		
	Strontium (Sr)-Dissolved (mg/L)	0.0764		0.137		
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000239		0.000859		
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		<0.0010		

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

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Version: **FINAL**

Qualifiers	for	Sample	Submission	Listed:
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Qualifier Description **SFPL** Sample was Filtered and Preserved at the laboratory - DOC/D-METAL/D-HG FILTERED AND PRESERVED AT THE LAB

QC S	Samples	with	Qualifiers 8	&	Comments:
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QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2273883-3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2273883-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2273883-3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2273883-1
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2273883-3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2273883-3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2273883-1
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2273883-3
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2273883-3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2273883-3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2273883-3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2273883-3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2273883-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2273883-3
Matrix Spike	Aluminum (Al)-Total	MS-B	L2273883-1, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2273883-1, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2273883-1, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2273883-1, -3
Matrix Spike	Manganese (Mn)-Total	MS-B	L2273883-1, -3
Matrix Spike	Selenium (Se)-Total	MS-B	L2273883-1, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2273883-1, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2273883-1, -3
Matrix Spike	Ammonia as N	MS-B	L2273883-1, -3

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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Version: FINAL

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL

Water

Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

EPA 300.1 (mod)

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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al.

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

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

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

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

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

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

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

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

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

PH-CL Water pH APHA 4500 H-Electrode

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

 Laboratory Definition Code
 Laboratory Location

 CL
 ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Гest	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water							
Batch R4639655								
WG3054174-6 DUP		L2273883-3						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	17-MAY-19
WG3054174-5 LCS Acidity (as CaCO3)			101.7		%		85-115	17-MAY-19
WG3054174-4 MB Acidity (as CaCO3)			1.2		mg/L		2	17-MAY-19
ALK-MAN-CL	Water							
Batch R4639705 WG3054620-2 LCS								
Alkalinity, Total (as CaCo	O3)		100.6		%		85-115	21-MAY-19
WG3054620-1 MB Alkalinity, Total (as CaC	O3)		<1.0		mg/L		1	21-MAY-19
BE-D-L-CCMS-VA	Water							
Batch R4639409								
WG3052556-2 LCS Beryllium (Be)-Dissolved	l		92.7		%		80-120	18-MAY-19
WG3052556-1 MB Beryllium (Be)-Dissolved	l	LF	<0.000020	1	mg/L		0.00002	18-MAY-19
Batch R4639546								
WG3053722-2 LCS								
Beryllium (Be)-Dissolved			96.7		%		80-120	19-MAY-19
WG3053722-1 MB Beryllium (Be)-Dissolved	l	LF	<0.000020	1	mg/L		0.00002	19-MAY-19
BE-T-L-CCMS-VA	Water							
Batch R4637588								
WG3052239-2 LCS								
Beryllium (Be)-Total			99.7		%		80-120	17-MAY-19
WG3052239-1 MB								
Beryllium (Be)-Total			<0.000020	1	mg/L		0.00002	17-MAY-19
BR-L-IC-N-CL	Water							
Batch R4636190								
WG3051370-14 LCS Bromide (Br)			100.9		%		85-115	15-MAY-19
WG3051370-13 MB Bromide (Br)			<0.050		mg/L		0.05	15-MAY-19
	Water							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	Water							
Batch R4640468 WG3055624-6 LCS								
Dissolved Organic Carbo	on		108.3		%		80-120	21-MAY-19
WG3055624-5 MB Dissolved Organic Carbo	on		<0.50		mg/L		0.5	21-MAY-19
C-TOT-ORG-LOW-CL	Water				9-		0.0	21 107(1-10
Batch R4640468								
WG3055624-6 LCS Total Organic Carbon			111.4		%		80-120	21-MAY-19
WG3055624-5 MB Total Organic Carbon			<0.50		mg/L		0.5	21-MAY-19
CL-IC-N-CL	Water							
Batch R4636190								
WG3051370-14 LCS Chloride (CI)			98.7		%		90-110	15-MAY-19
WG3051370-13 MB Chloride (CI)			<0.50		mg/L		0.5	15-MAY-19
EC-L-PCT-CL	Water							
Batch R4639705								
WG3054620-2 LCS Conductivity (@ 25C)			103.3		%		90-110	21-MAY-19
WG3054620-1 MB Conductivity (@ 25C)			<2.0		uS/cm		2	21-MAY-19
F-IC-N-CL	Water							
Batch R4636190								
WG3051370-14 LCS Fluoride (F)			102.4		%		90-110	15-MAY-19
WG3051370-13 MB Fluoride (F)			<0.020		mg/L		0.02	15-MAY-19
HG-D-CVAA-VA	Water							
Batch R4639533								
WG3054471-6 LCS Mercury (Hg)-Dissolved			98.0		%		80-120	21-MAY-19
WG3054696-2 LCS Mercury (Hg)-Dissolved			100.6		%		80-120	21-MAY-19
WG3054471-5 MB Mercury (Hg)-Dissolved			<0.00000	5C	mg/L		0.000005	21-MAY-19
WG3054696-1 MB								



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	Water							
Batch R4639533 WG3054696-1 MB Mercury (Hg)-Dissolved			<0.00000	5C	mg/L		0.000005	21-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4640518 WG3055680-2 LCS Mercury (Hg)-Total			89.2		%		80-120	22-MAY-19
WG3055680-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	22-MAY-19
MET-D-CCMS-VA	Water							
Batch R4639409 WG3052556-2 LCS								
Aluminum (Al)-Dissolved			98.4		%		80-120	18-MAY-19
Antimony (Sb)-Dissolved	d		101.1		%		80-120	18-MAY-19
Arsenic (As)-Dissolved			100.6		%		80-120	18-MAY-19
Barium (Ba)-Dissolved			110.5		%		80-120	18-MAY-19
Bismuth (Bi)-Dissolved			100.7		%		80-120	18-MAY-19
Boron (B)-Dissolved			94.8		%		80-120	18-MAY-19
Cadmium (Cd)-Dissolved	d		100.0		%		80-120	18-MAY-19
Calcium (Ca)-Dissolved			99.7		%		80-120	18-MAY-19
Chromium (Cr)-Dissolve	d		102.5		%		80-120	18-MAY-19
Cobalt (Co)-Dissolved			99.7		%		80-120	18-MAY-19
Copper (Cu)-Dissolved			99.4		%		80-120	18-MAY-19
Iron (Fe)-Dissolved			92.3		%		80-120	18-MAY-19
Lead (Pb)-Dissolved			99.6		%		80-120	18-MAY-19
Lithium (Li)-Dissolved			93.0		%		80-120	18-MAY-19
Magnesium (Mg)-Dissolv	ved		102.6		%		80-120	18-MAY-19
Manganese (Mn)-Dissolv	ved		104.3		%		80-120	18-MAY-19
Molybdenum (Mo)-Disso	olved		102.3		%		80-120	18-MAY-19
Nickel (Ni)-Dissolved			98.3		%		80-120	18-MAY-19
Potassium (K)-Dissolved	d		99.9		%		80-120	18-MAY-19
Selenium (Se)-Dissolved	d		98.6		%		80-120	18-MAY-19
Silicon (Si)-Dissolved			96.1		%		60-140	18-MAY-19
Silver (Ag)-Dissolved			101.8		%		80-120	18-MAY-19
Sodium (Na)-Dissolved			95.1		%		80-120	18-MAY-19
Strontium (Sr)-Dissolved	i		101.3		%		80-120	18-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4639409								
WG3052556-2 LCS			00.0		0/			
Thallium (TI)-Dissolved			99.3		%		80-120	18-MAY-19
Tin (Sn)-Dissolved			100.8		%		80-120	18-MAY-19
Titanium (Ti)-Dissolved			96.6		%		80-120	18-MAY-19
Uranium (U)-Dissolved			101.0		%		80-120	18-MAY-19
Vanadium (V)-Dissolved			100.4		%		80-120	18-MAY-19
Zinc (Zn)-Dissolved			98.8		%		80-120	18-MAY-19
WG3052556-1 MB Aluminum (Al)-Dissolved	i	LF	<0.0010		mg/L		0.001	18-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Bismuth (Bi)-Dissolved			<0.000050)	mg/L		0.00005	18-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-MAY-19
Cadmium (Cd)-Dissolved	d		<0.000005	6C	mg/L		0.000005	18-MAY-19
Calcium (Ca)-Dissolved			< 0.050		mg/L		0.05	18-MAY-19
Chromium (Cr)-Dissolve	d		<0.00010		mg/L		0.0001	18-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-MAY-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	18-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-MAY-19
Magnesium (Mg)-Dissolv	ved		<0.0050		mg/L		0.005	18-MAY-19
Manganese (Mn)-Dissolv	ved		<0.00010		mg/L		0.0001	18-MAY-19
Molybdenum (Mo)-Disso	lved		<0.000050)	mg/L		0.00005	18-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-19
Potassium (K)-Dissolved	d		<0.050		mg/L		0.05	18-MAY-19
Selenium (Se)-Dissolved	d		<0.000050)	mg/L		0.00005	18-MAY-19
Silicon (Si)-Dissolved			< 0.050		mg/L		0.05	18-MAY-19
Silver (Ag)-Dissolved			<0.000010)	mg/L		0.00001	18-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-MAY-19
Strontium (Sr)-Dissolved	I		<0.00020		mg/L		0.0002	18-MAY-19
Thallium (TI)-Dissolved			<0.000010)	mg/L		0.00001	18-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-MAY-19



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Test M	latrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA V	Vater							
Batch R4639409								
WG3052556-1 MB		LF	0.000044					
Uranium (U)-Dissolved			<0.000010)	mg/L		0.00001	18-MAY-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-MAY-19
Batch R4639546								
WG3053722-2 LCS Aluminum (Al)-Dissolved			100.5		%		80-120	19-MAY-19
Antimony (Sb)-Dissolved			97.9		%		80-120	19-MAY-19
Arsenic (As)-Dissolved			99.5		%		80-120	19-MAY-19
Barium (Ba)-Dissolved			97.6		%		80-120	19-MAY-19
Bismuth (Bi)-Dissolved			94.5		%		80-120	19-MAY-19
Boron (B)-Dissolved			97.4		%		80-120	19-MAY-19
Cadmium (Cd)-Dissolved			96.6		%		80-120	19-MAY-19
Calcium (Ca)-Dissolved			96.6		%		80-120	19-MAY-19
Chromium (Cr)-Dissolved			99.9		%		80-120	19-MAY-19
Cobalt (Co)-Dissolved			97.0		%		80-120	19-MAY-19
Copper (Cu)-Dissolved			98.2		%		80-120	19-MAY-19
Iron (Fe)-Dissolved			95.1		%		80-120	19-MAY-19
Lead (Pb)-Dissolved			95.6		%		80-120	19-MAY-19
Lithium (Li)-Dissolved			93.6		%		80-120	19-MAY-19
Magnesium (Mg)-Dissolved	i		102.1		%		80-120	19-MAY-19
Manganese (Mn)-Dissolved	d		102.0		%		80-120	19-MAY-19
Molybdenum (Mo)-Dissolve	ed		102.0		%		80-120	19-MAY-19
Nickel (Ni)-Dissolved			99.0		%		80-120	19-MAY-19
Potassium (K)-Dissolved			103.4		%		80-120	19-MAY-19
Selenium (Se)-Dissolved			96.2		%		80-120	19-MAY-19
Silicon (Si)-Dissolved			95.6		%		60-140	19-MAY-19
Silver (Ag)-Dissolved			92.6		%		80-120	19-MAY-19
Sodium (Na)-Dissolved			101.4		%		80-120	19-MAY-19
Strontium (Sr)-Dissolved			96.2		%		80-120	19-MAY-19
Thallium (TI)-Dissolved			95.5		%		80-120	19-MAY-19
Tin (Sn)-Dissolved			97.4		%		80-120	19-MAY-19
Titanium (Ti)-Dissolved			101.7		%		80-120	19-MAY-19
Uranium (U)-Dissolved			92.6		%		80-120	19-MAY-19
Vanadium (V)-Dissolved			99.9		%		80-120	19-MAY-19



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Test	Matrix	Reference	Result Qu	alifier Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water						
Batch R4639546							
WG3053722-2 LCS			00.0	0/			
Zinc (Zn)-Dissolved			93.9	%		80-120	19-MAY-19
WG3053722-1 MB Aluminum (Al)-Dissolve	ed	LF	<0.0010	mg/L		0.001	19-MAY-19
Antimony (Sb)-Dissolve			<0.00010	mg/L		0.0001	19-MAY-19
Arsenic (As)-Dissolved	~		<0.00010	mg/L		0.0001	19-MAY-19
Barium (Ba)-Dissolved			<0.00010	mg/L		0.0001	19-MAY-19
Bismuth (Bi)-Dissolved			<0.00050	mg/L		0.00005	19-MAY-19
Boron (B)-Dissolved			<0.010	mg/L		0.000	19-MAY-19
Cadmium (Cd)-Dissolve	ed		<0.000050	mg/L		0.000005	19-MAY-19
Calcium (Ca)-Dissolved			<0.050	mg/L		0.05	19-MAY-19
Chromium (Cr)-Dissolve			<0.00010	mg/L		0.0001	19-MAY-19
Cobalt (Co)-Dissolved			<0.00010	mg/L		0.0001	19-MAY-19
Copper (Cu)-Dissolved			<0.00020	mg/L		0.0001	19-MAY-19
Iron (Fe)-Dissolved			<0.010	mg/L		0.000	19-MAY-19
Lead (Pb)-Dissolved			<0.00050	mg/L		0.00005	19-MAY-19
Lithium (Li)-Dissolved			<0.0010	mg/L		0.001	19-MAY-19
Magnesium (Mg)-Disso	lved		<0.0050	mg/L		0.005	19-MAY-19
Manganese (Mn)-Disso			<0.00010	mg/L		0.0001	19-MAY-19
Molybdenum (Mo)-Diss			<0.00050	mg/L		0.00005	19-MAY-19
Nickel (Ni)-Dissolved			<0.00050	mg/L		0.0005	19-MAY-19
Potassium (K)-Dissolve	ed		<0.050	mg/L		0.05	19-MAY-19
Selenium (Se)-Dissolve			<0.000050	mg/L		0.00005	19-MAY-19
Silicon (Si)-Dissolved			<0.050	mg/L		0.05	19-MAY-19
Silver (Ag)-Dissolved			<0.000010	mg/L		0.00001	19-MAY-19
Sodium (Na)-Dissolved			<0.050	mg/L		0.05	19-MAY-19
Strontium (Sr)-Dissolve	d		<0.00020	mg/L		0.0002	19-MAY-19
Thallium (TI)-Dissolved			<0.000010	mg/L		0.00001	19-MAY-19
Tin (Sn)-Dissolved			<0.00010	mg/L		0.0001	19-MAY-19
Titanium (Ti)-Dissolved			<0.00030	mg/L		0.0003	19-MAY-19
Uranium (U)-Dissolved			<0.000010	mg/L		0.00001	19-MAY-19
Vanadium (V)-Dissolve	d		<0.00050	mg/L		0.0005	19-MAY-19
Zinc (Zn)-Dissolved			<0.0010	mg/L		0.001	19-MAY-19

MET-T-CCMS-VA

Water



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4637588								
WG3052239-2 LCS			404.0		0/			.=
Aluminum (Al)-Total			104.2		%		80-120	17-MAY-19
Antimony (Sb)-Total			100.4		%		80-120	17-MAY-19
Arsenic (As)-Total			96.6		%		80-120	17-MAY-19
Barium (Ba)-Total			92.9		%		80-120	17-MAY-19
Bismuth (Bi)-Total			109.0		%		80-120	17-MAY-19
Boron (B)-Total			97.2		%		80-120	17-MAY-19
Cadmium (Cd)-Total			97.5		%		80-120	17-MAY-19
Calcium (Ca)-Total			103.9		%		80-120	17-MAY-19
Chromium (Cr)-Total			99.8		%		80-120	17-MAY-19
Cobalt (Co)-Total			98.0		%		80-120	17-MAY-19
Copper (Cu)-Total			96.2		%		80-120	17-MAY-19
Iron (Fe)-Total			97.5		%		80-120	17-MAY-19
Lead (Pb)-Total			103.7		%		80-120	17-MAY-19
Lithium (Li)-Total			99.0		%		80-120	17-MAY-19
Magnesium (Mg)-Total			102.7		%		80-120	17-MAY-19
Manganese (Mn)-Total			96.4		%		80-120	17-MAY-19
Molybdenum (Mo)-Total			102.4		%		80-120	17-MAY-19
Nickel (Ni)-Total			97.9		%		80-120	17-MAY-19
Potassium (K)-Total			102.1		%		80-120	17-MAY-19
Selenium (Se)-Total			96.3		%		80-120	17-MAY-19
Silicon (Si)-Total			97.9		%		80-120	17-MAY-19
Silver (Ag)-Total			98.2		%		80-120	17-MAY-19
Sodium (Na)-Total			104.7		%		80-120	17-MAY-19
Strontium (Sr)-Total			99.2		%		80-120	17-MAY-19
Thallium (TI)-Total			102.5		%		80-120	17-MAY-19
Tin (Sn)-Total			97.6		%		80-120	17-MAY-19
Titanium (Ti)-Total			99.4		%		80-120	17-MAY-19
Uranium (U)-Total			96.8		%		80-120	17-MAY-19
Vanadium (V)-Total			100.3		%		80-120	17-MAY-19
Zinc (Zn)-Total			98.0		%		80-120	17-MAY-19
WG3052239-1 MB			-				33 120	
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-MAY-19



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Workorder: L2273883 Report Date: 23-MAY-19

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4637588								
WG3052239-1 MB			0.00040					
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	17-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	17-MAY-19
Cadmium (Cd)-Total			<0.00000	5C	mg/L		0.000005	17-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	17-MAY-19
Lead (Pb)-Total			<0.00005	0	mg/L		0.00005	17-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Molybdenum (Mo)-Total			<0.00005	0	mg/L		0.00005	17-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Potassium (K)-Total			< 0.050		mg/L		0.05	17-MAY-19
Selenium (Se)-Total			<0.00005	0	mg/L		0.00005	17-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	17-MAY-19
Silver (Ag)-Total			<0.00001	0	mg/L		0.00001	17-MAY-19
Sodium (Na)-Total			< 0.050		mg/L		0.05	17-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-MAY-19
Thallium (TI)-Total			<0.00001	0	mg/L		0.00001	17-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-MAY-19
Uranium (U)-Total			<0.00001	0	mg/L		0.00001	17-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-MAY-19
NH3-L-F-CL	Water							
Batch R4641366								
WG3055338-14 LCS Ammonia as N			89.7		%		85-115	22-MAY-19
WG3055338-13 MB Ammonia as N			<0.0050		mg/L		0.005	22-MAY-19
NO2-L-IC-N-CL	Water							



Workorder: L2273883

Report Date: 23-MAY-19

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Test N	latrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL V	Vater							
Batch R4636190 WG3051370-14 LCS Nitrite (as N)			102.3		%		90-110	15-MAY-19
WG3051370-13 MB Nitrite (as N)			<0.0010		mg/L		0.001	15-MAY-19
NO3-L-IC-N-CL V	Vater							
Batch R4636190 WG3051370-14 LCS Nitrate (as N)			96.5		%		90-110	15-MAY-19
WG3051370-13 MB Nitrate (as N)			<0.0050		mg/L		0.005	15-MAY-19
ORP-CL V	Vater							
Batch R4640112 WG3055212-9 CRM ORP		CL-ORP	225		mV		210-230	21-MAY-19
Batch R4640587 WG3055773-4 LCS	Vater							
Phosphorus (P)-Total WG3055773-3 MB Phosphorus (P)-Total			102.9 <0.0020		% mg/L		80-120 0.002	22-MAY-19 22-MAY-19
PH-CL V Batch R4639705 WG3054620-2 LCS pH	Vater		7.01		рН		6.9-7.1	21-MAY-19
PO4-DO-L-COL-CL V	Vater							
Batch R4635484 WG3050462-34 LCS Orthophosphate-Dissolved	(as P)		104.4		%		80-120	15-MAY-19
WG3050462-38 LCS Orthophosphate-Dissolved			107.5		%		80-120	15-MAY-19
WG3050462-33 MB Orthophosphate-Dissolved	(as P)		<0.0010		mg/L		0.001	15-MAY-19
WG3050462-37 MB Orthophosphate-Dissolved	(as P)		<0.0010		mg/L		0.001	15-MAY-19
WG3050462-35 MS		L2273883-3						



Workorder: L2273883 Report Date: 23-MAY-19 Page 10 of 13

								-
Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL Batch R4635484	Water							
WG3050462-35 MS Orthophosphate-Dissolve	ed (as P)	L2273883-3	93.3		%		70-130	15-MAY-19
SO4-IC-N-CL	Water							
Batch R4636190 WG3051370-14 LCS Sulfate (SO4)			98.0		%		90-110	15-MAY-19
WG3051370-13 MB Sulfate (SO4)			<0.30		mg/L		0.3	15-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4640638 WG3054269-14 LCS Total Dissolved Solids			94.6		%		85-115	21-MAY-19
WG3054269-13 MB Total Dissolved Solids			<10		mg/L		10	21-MAY-19
TKN-L-F-CL	Water							
Batch R4640402 WG3055467-10 LCS Total Kjeldahl Nitrogen			92.7		%		75-125	22-MAY-19
WG3055467-12 LCS Total Kjeldahl Nitrogen			94.9		%		75-125	22-MAY-19
WG3055467-15 LCS Total Kjeldahl Nitrogen			94.4		%		75-125	22-MAY-19
WG3055467-2 LCS Total Kjeldahl Nitrogen			92.6		%		75-125	22-MAY-19
WG3055467-6 LCS Total Kjeldahl Nitrogen			93.5		%		75-125	22-MAY-19
WG3055467-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAY-19
WG3055467-11 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAY-19
WG3055467-14 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAY-19
WG3055467-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAY-19
WG3055467-9 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-MAY-19
TSS-L-CL	Water							



Workorder: L2273883

Report Date: 23-MAY-19

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Test Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	Water							
Batch R4640398 WG3054786-10 LCS Total Suspended Solids			96.4		%		05.445	04 MAY 40
WG3054786-9 MB Total Suspended Solids			<1.0		mg/L		85-115 1	21-MAY-19 21-MAY-19
TURBIDITY-CL	Water							
Batch R4636984								
WG3051917-2 LCS Turbidity			96.5		%		85-115	16-MAY-19
WG3051917-1 MB Turbidity			<0.10		NTU		0.1	16-MAY-19

Workorder: L2273883 Report Date: 23-MAY-19 Page 12 of 13

Legend:

_	
Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Workorder: L2273883 Report Date: 23-MAY-19 Page 13 of 13

Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifie
Physical Tests							
Oxidation redution potentia	al by elect.						
	1	14-MAY-19 09:40	21-MAY-19 12:55	0.25	171	hours	EHTR-FN
	3	14-MAY-19 13:15	21-MAY-19 12:55	0.25	168	hours	EHTR-FN
рН							
	1	14-MAY-19 09:40	21-MAY-19 09:00	0.25	167	hours	EHTR-FN
	3	14-MAY-19 13:15	21-MAY-19 09:00	0.25	164	hours	EHTR-FN

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2273883 were received on 15-MAY-19 09:00.

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

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

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

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For Sample RG_DUP_WS_2019050	7-1300 there are 2 bottles lab	etted as dissolved metals. One o	, -					\vdash			 		// }				/} - 2 *	$\overline{}$	i
these bottles was acidified. Could the		ch one was acidified and could a						┼─			 		H	_		├ ∪⁄	+		(-)
total metals sample be collected fror	n the general sample?		 					 			 -	/	110			<u> </u>	Ų		\Box
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	Priority (2-3	business days) - 50% surcharge		Sampler's Non	ne							Mol	hile#						
	Emergency (1	Business Day) - 100% surcharge		Sampler's Signal	tura			_				Dar.	/Time -	 					
,	For Emergency <1 Day, AS	SAP or Weekend - Contact ALS		Ownibus: 3 Signa	iui c	l						Livate	/Time	<u> </u>					



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

Date Received: 22-MAY-19

Report Date: 31-MAY-19 15:06 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2277038
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM (REP)

C of C Numbers: 19-12-5

Legal Site Desc:

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Lyudmyla Shvets, B.Sc. Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

31-MAY-19 15:06 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-1 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900	L2277038-2 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900 FB- HG	L2277038-3 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933	L2277038-4 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933 FB-HG	L2277038-5 WS 21-MAY-19 10:26 RG_FBLANK_WS_ 20190521-1026
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	307		177		<2.0
	Hardness (as CaCO3) (mg/L)	166		85.2		<0.50
	pH (pH)	8.32		8.09		5.33
	ORP (mV)	420		399		434
	Total Suspended Solids (mg/L)	<1.0		3.4		<1.0
	Total Dissolved Solids (mg/L)	DLHC 171		DLHC 101		<10
	Turbidity (NTU)	0.31		4.35		0.24
Anions and	Acidity (as CaCO3) (mg/L)	<1.0		1.5		1.6
Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	4.40		00.4		4.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	149		86.4		<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	1.2		<1.0		<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Ammonia as N (mg/L)	150		86.4		<1.0
	Bromide (Br) (mg/L)	<0.0050		<0.0050		<0.0050
	Chloride (CI) (mg/L)	<0.050		<0.050		<0.050
	Fluoride (F) (mg/L)	0.52		0.76		<0.50
	Ion Balance (%)	0.617		0.055		<0.020
	Nitrate (as N) (mg/L)	97.9		94.7		0.0
	Nitrite (as N) (mg/L)	<0.0050		0.185		<0.0050
	Total Kjeldahl Nitrogen (mg/L)	<0.0010		<0.0010		<0.0010
	Orthophosphate-Dissolved (as P) (mg/L)	0.223		0.082		<0.050
	Phosphorus (P)-Total (mg/L)	<0.0010		0.0019		<0.0010
	Sulfate (SO4) (mg/L)	0.0060		0.0090		<0.0020
	Anion Sum (meg/L)	21.6		6.38		<0.30
	Cation Sum (meq/L)	3.49		1.90		<0.10
	Cation - Anion Balance (%)	3.42		1.80		<0.10
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	-1.1 2.10		-2.7 2.49		0.0 <0.50
-	Total Organic Carbon (mg/L)	2.12		2.57		<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0052		0.117		<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Arsenic (As)-Total (mg/L)	0.00037		0.00027		<0.00010
	Barium (Ba)-Total (mg/L)	0.0510		0.0426		0.00029
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Total (mg/L)	<0.010		<0.010		<0.010
	Cadmium (Cd)-Total (ug/L)	<0.0050		0.0052		<0.0050

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

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Version:

31-MAY-19 15:06 (MT)

FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

L2277038-6 L2277038-7 L2277038-8 L2277038-9 L2277038-10 Sample ID Description WS WS WS WS WS 21-MAY-19 21-MAY-19 21-MAY-19 21-MAY-19 Sampled Date 21-MAY-19 Sampled Time 10:26 10:26 10:26 10:26 10:26 RG TRIP WS 201 RG ER WS 2019 RG ER WS 2019 RG DUP WS 201 RG DUP WS 201 Client ID 90521-1026 0521-1026 0521-1026 FB-HG 90521-1026 90521-1026 FB-HG Grouping **Analyte WATER Physical Tests** Conductivity (@ 25C) (uS/cm) <2.0 304 253 Hardness (as CaCO3) (mg/L) < 0.50 128 120 pH (pH) 5.29 8.23 8.16 ORP (mV) 432 442 425 Total Suspended Solids (mg/L) <1.0 23.4 19.3 DLHC DLHC Total Dissolved Solids (mg/L) 165 <10 134 Turbidity (NTU) < 0.10 17.3 11.9 Acidity (as CaCO3) (mg/L) Anions and 1.5 <1.0 1.2 **Nutrients** Alkalinity, Bicarbonate (as CaCO3) (mg/L) <1.0 142 115 Alkalinity, Carbonate (as CaCO3) (mg/L) <1.0 <1.0 <1.0 Alkalinity, Hydroxide (as CaCO3) (mg/L) <1.0 <1.0 <1.0 Alkalinity, Total (as CaCO3) (mg/L) 142 <1.0 115 Ammonia as N (mg/L) < 0.0050 < 0.0050 0.0063 Bromide (Br) (mg/L) < 0.050 < 0.050 < 0.050 Chloride (CI) (mg/L) < 0.50 3.18 2.23 Fluoride (F) (mg/L) < 0.020 0.091 0.082 Ion Balance (%) 0.0 83.4 93.4 Nitrate (as N) (mg/L) < 0.0050 0.269 0.316 Nitrite (as N) (mg/L) <0.0010 <0.0010 <0.0010 Total Kjeldahl Nitrogen (mg/L) < 0.050 0.118 0.101 Orthophosphate-Dissolved (as P) (mg/L) < 0.0010 0.0070 0.0035 Phosphorus (P)-Total (mg/L) < 0.0020 0.0199 0.0272 Sulfate (SO4) (mg/L) < 0.30 16.5 17.9 Anion Sum (meq/L) < 0.10 3.29 2.75 Cation Sum (meg/L) < 0.10 2.74 2.57 Cation - Anion Balance (%) 0.0 -9.0 -3.4 Dissolved Organic Carbon (mg/L) Organic / 1.95 1.92 **Inorganic Carbon** Total Organic Carbon (mg/L) < 0.50 2.25 2.17 **Total Metals** Aluminum (Al)-Total (mg/L) < 0.0030 0.273 0.452 Antimony (Sb)-Total (mg/L) < 0.00010 < 0.00010 < 0.00010 Arsenic (As)-Total (mg/L) 0.00055 < 0.00010 0.00058 Barium (Ba)-Total (mg/L) 0.0542 0.0514 < 0.00010 Beryllium (Be)-Total (ug/L) < 0.020 0.025 < 0.020 Bismuth (Bi)-Total (mg/L) < 0.000050 < 0.000050 < 0.000050 Boron (B)-Total (mg/L) < 0.010 < 0.010 < 0.010 Cadmium (Cd)-Total (ug/L) < 0.0050 0.0127 0.0131

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-11 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417	L2277038-12 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417 FB- HG	L2277038-13 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300	L2277038-14 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300 FB-HG	L2277038-15 WS 21-MAY-19 15:15 RG_ERWSF_WS_ 20190521-1515
Grouping	Analyte				110	
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	427		358		594
	Hardness (as CaCO3) (mg/L)	212		160		272
	pH (pH)	8.21		8.25		8.26
	ORP (mV)	402		413		447
	Total Suspended Solids (mg/L)	<1.0		2.1		2.5
	Total Dissolved Solids (mg/L)	DLHC 237		177 DLHC		321
	Turbidity (NTU)	0.88		2.82		3.12
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.7		<1.0		<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	161		166		257
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0		<1.0		<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	161		166		257
	Ammonia as N (mg/L)	0.0135		<0.0050		0.0092
	Bromide (Br) (mg/L)	<0.050		<0.050		<0.050
	Chloride (CI) (mg/L)	3.03		9.82		32.9
	Fluoride (F) (mg/L)	0.165		0.096		0.095
	Ion Balance (%)	96.5		95.5		98.9
	Nitrate (as N) (mg/L)	0.868		<0.0050		0.410
	Nitrite (as N) (mg/L)	0.0041		<0.0010		0.0013
	Total Kjeldahl Nitrogen (mg/L)	0.174		0.156		0.284
	Orthophosphate-Dissolved (as P) (mg/L)	0.0010		<0.0010		0.0015
	Phosphorus (P)-Total (mg/L)	0.0072		0.0129		0.0210
	Sulfate (SO4) (mg/L)	56.8		6.41		11.6
	Anion Sum (meq/L)	4.56		3.73		6.35
	Cation Sum (meq/L)	4.40		3.56		6.28
	Cation - Anion Balance (%)	-1.8		-2.3		-0.6
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.10		2.69		2.45
	Total Organic Carbon (mg/L)	0.84		2.39		2.80
Total Metals	Aluminum (AI)-Total (mg/L)	0.0035		0.0307		0.114
	Antimony (Sb)-Total (mg/L)	<0.00010		0.00022		0.00015
	Arsenic (As)-Total (mg/L)	0.00014		0.00038		0.00042
	Barium (Ba)-Total (mg/L)	0.0983		0.127		0.0890
	Beryllium (Be)-Total (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Total (mg/L)	<0.010		<0.010		0.016
	Cadmium (Cd)-Total (ug/L)	0.0084		0.0079		0.0202

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: **FINAL** L2277038-16 Sample ID Description WS 21-MAY-19 Sampled Date 15:15 Sampled Time RG_ERWSF_WS_ Client ID 20190521-1515 FB-HG Grouping **Analyte WATER** Conductivity (@ 25C) (uS/cm) **Physical Tests** Hardness (as CaCO3) (mg/L) pH (pH) ORP (mV) Total Suspended Solids (mg/L) Total Dissolved Solids (mg/L) Turbidity (NTU) Anions and Acidity (as CaCO3) (mg/L) **Nutrients** Alkalinity, Bicarbonate (as CaCO3) (mg/L) Alkalinity, Carbonate (as CaCO3) (mg/L) Alkalinity, Hydroxide (as CaCO3) (mg/L) Alkalinity, Total (as CaCO3) (mg/L) Ammonia as N (mg/L) Bromide (Br) (mg/L) Chloride (CI) (mg/L) Fluoride (F) (mg/L) Ion Balance (%) Nitrate (as N) (mg/L) Nitrite (as N) (mg/L) Total Kjeldahl Nitrogen (mg/L) Orthophosphate-Dissolved (as P) (mg/L) Phosphorus (P)-Total (mg/L) Sulfate (SO4) (mg/L) Anion Sum (meq/L) Cation Sum (meq/L) Cation - Anion Balance (%) Dissolved Organic Carbon (mg/L) Organic / **Inorganic Carbon** Total Organic Carbon (mg/L) **Total Metals** Aluminum (Al)-Total (mg/L) Antimony (Sb)-Total (mg/L) Arsenic (As)-Total (mg/L) Barium (Ba)-Total (mg/L) Beryllium (Be)-Total (ug/L) Bismuth (Bi)-Total (mg/L) Boron (B)-Total (mg/L) Cadmium (Cd)-Total (ug/L)

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-1 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900	L2277038-2 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900 FB- HG	L2277038-3 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933	L2277038-4 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933 FB-HG	L2277038-5 WS 21-MAY-19 10:26 RG_FBLANK_WS_ 20190521-1026
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	36.2		23.3		<0.050
	Chromium (Cr)-Total (mg/L)	<0.00010		0.00017		<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10		<0.10		<0.10
	Copper (Cu)-Total (mg/L)	<0.00050		0.00072		<0.00050
	Iron (Fe)-Total (mg/L)	<0.010		0.103		<0.010
	Lead (Pb)-Total (mg/L)	<0.000050		0.000111		<0.000050
	Lithium (Li)-Total (mg/L)	0.0035		0.0011		<0.0010
	Magnesium (Mg)-Total (mg/L)	18.0		7.39		<0.10
	Manganese (Mn)-Total (mg/L)	0.00263		0.00554		<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	0.00122	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00124		0.000245		<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Potassium (K)-Total (mg/L)	1.01		0.571		<0.050
	Selenium (Se)-Total (ug/L)	0.301		0.313		<0.050
	Silicon (Si)-Total (mg/L)	2.75		4.32		<0.10
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Total (mg/L)	1.87		1.87		<0.050
	Strontium (Sr)-Total (mg/L)	0.129		0.0536		<0.00020
	Thallium (TI)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Total (mg/L)	0.000814		0.000456		<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030		<0.0030		<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB		LAB
	Dissolved Metals Filtration Location	LAB		LAB		LAB
	Aluminum (AI)-Dissolved (mg/L)	<0.0030		0.0142		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00033		0.00022		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0599		0.0483		<0.00010
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050		<0.0050		<0.0050
	Calcium (Ca)-Dissolved (mg/L)	35.6		22.5		<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10		<0.10

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-6 WS 21-MAY-19 10:26 RG_TRIP_WS_201 90521-1026	L2277038-7 WS 21-MAY-19 10:26 RG_ER_WS_2019 0521-1026	L2277038-8 WS 21-MAY-19 10:26 RG_ER_WS_2019 0521-1026 FB-HG	L2277038-9 WS 21-MAY-19 10:26 RG_DUP_WS_201 90521-1026	L2277038-10 WS 21-MAY-19 10:26 RG_DUP_WS_201 90521-1026 FB-HG
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	<0.050	34.9		34.2	
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00042		0.00066	
	Cobalt (Co)-Total (ug/L)	<0.10	0.20		0.31	
	Copper (Cu)-Total (mg/L)	<0.00050	0.00097		0.00121	
	Iron (Fe)-Total (mg/L)	<0.010	0.314		0.563	
	Lead (Pb)-Total (mg/L)	<0.00050	0.000376		0.000623	
	Lithium (Li)-Total (mg/L)	<0.0010	0.0024		0.0025	
	Magnesium (Mg)-Total (mg/L)	<0.10	12.5		11.8	
	Manganese (Mn)-Total (mg/L)	<0.00010	0.0145		0.0219	
	Mercury (Hg)-Total (ug/L)	<0.00050	0.00101	<0.00050	0.00147	<0.00050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000568		0.000512	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050		0.00073	
	Potassium (K)-Total (mg/L)	<0.050	0.887		0.832	
	Selenium (Se)-Total (ug/L)	<0.050	0.955		0.988	
	Silicon (Si)-Total (mg/L)	<0.10	3.53		3.55	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		<0.000010	
	Sodium (Na)-Total (mg/L)	<0.050	3.97		3.36	
	Strontium (Sr)-Total (mg/L)	<0.00020	0.121		0.118	
	Thallium (TI)-Total (mg/L)	<0.000010	<0.000010		<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010		<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010		<0.010	
	Uranium (U)-Total (mg/L)	<0.000010	0.00100		0.000925	
	Vanadium (V)-Total (mg/L)	<0.00050	0.00071		0.00090	
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0045		0.0046	
Dissolved Metals	Dissolved Mercury Filtration Location		LAB		LAB	
	Dissolved Metals Filtration Location	LAB	LAB		LAB	
	Aluminum (Al)-Dissolved (mg/L)		0.0100		0.0103	
	Antimony (Sb)-Dissolved (mg/L)		<0.00010		<0.00010	
	Arsenic (As)-Dissolved (mg/L)		0.00040		0.00040	
	Barium (Ba)-Dissolved (mg/L)		0.0541		0.0504	
	Beryllium (Be)-Dissolved (ug/L)		<0.020		<0.020	
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050		<0.000050	
	Boron (B)-Dissolved (mg/L)		<0.010		<0.010	
	Cadmium (Cd)-Dissolved (ug/L)		<0.0050		<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	<0.050	31.7		29.7	
	Chromium (Cr)-Dissolved (mg/L)		<0.00010		<0.00010	
	Cobalt (Co)-Dissolved (ug/L)		<0.10		<0.10	

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	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-11 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417	L2277038-12 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417 FB- HG	L2277038-13 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300	L2277038-14 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300 FB-HG	L2277038-15 WS 21-MAY-19 15:15 RG_ERWSF_WS_ 20190521-1515
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	57.5		47.2		84.6
	Chromium (Cr)-Total (mg/L)	0.00019		0.00022		0.00043
	Cobalt (Co)-Total (ug/L)	0.11		0.13		0.14
	Copper (Cu)-Total (mg/L)	<0.00050		0.00092		0.00057
	Iron (Fe)-Total (mg/L)	0.022		0.086		0.461
	Lead (Pb)-Total (mg/L)	<0.000050		0.000054		0.000133
	Lithium (Li)-Total (mg/L)	0.0067		0.0052		0.0028
	Magnesium (Mg)-Total (mg/L)	17.8		10.7		13.8
	Manganese (Mn)-Total (mg/L)	0.00475		0.0161		0.0109
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.000906		0.00123		0.000568
	Nickel (Ni)-Total (mg/L)	<0.00050		0.00073		0.00072
	Potassium (K)-Total (mg/L)	0.485		0.809		1.51
	Selenium (Se)-Total (ug/L)	6.98		0.076		0.751
	Silicon (Si)-Total (mg/L)	1.91		0.98		3.16
	Silver (Ag)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Total (mg/L)	3.52		8.00		18.1
	Strontium (Sr)-Total (mg/L)	0.177		0.155		0.157
	Thallium (TI)-Total (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Total (mg/L)	0.000947		0.000367		0.000568
	Vanadium (V)-Total (mg/L)	<0.00050		<0.00050		0.00063
	Zinc (Zn)-Total (mg/L)	<0.0030		0.0041		<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB		LAB		LAB
	Dissolved Metals Filtration Location	LAB		LAB		LAB
	Aluminum (AI)-Dissolved (mg/L)	<0.0030		<0.0030		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.00010		0.00020		0.00014
	Arsenic (As)-Dissolved (mg/L)	0.00014		0.00032		0.00033
	Barium (Ba)-Dissolved (mg/L)	0.103		0.140		0.0966
	Beryllium (Be)-Dissolved (ug/L)	<0.020		<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010		<0.010		0.014
	Cadmium (Cd)-Dissolved (ug/L)	0.0082		<0.0050		0.0071
	Calcium (Ca)-Dissolved (mg/L)	56.7		45.7		85.0
	Chromium (Cr)-Dissolved (mg/L)	0.00011		0.00012		0.00021
	Cobalt (Co)-Dissolved (ug/L)	<0.10		<0.10		<0.10

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-16 WS 21-MAY-19 15:15 RG_ERWSF_WS_ 20190521-1515 FB-HG		
Grouping	Analyte			
WATER				
Total Metals	Calcium (Ca)-Total (mg/L)			
	Chromium (Cr)-Total (mg/L)			
	Cobalt (Co)-Total (ug/L)			
	Copper (Cu)-Total (mg/L)			
	Iron (Fe)-Total (mg/L)			
	Lead (Pb)-Total (mg/L)			
	Lithium (Li)-Total (mg/L)			
	Magnesium (Mg)-Total (mg/L)			
	Manganese (Mn)-Total (mg/L)			
	Mercury (Hg)-Total (ug/L)	<0.00050		
	Molybdenum (Mo)-Total (mg/L)			
	Nickel (Ni)-Total (mg/L)			
	Potassium (K)-Total (mg/L)			
	Selenium (Se)-Total (ug/L)			
	Silicon (Si)-Total (mg/L)			
	Silver (Ag)-Total (mg/L)			
	Sodium (Na)-Total (mg/L)			
	Strontium (Sr)-Total (mg/L)			
	Thallium (TI)-Total (mg/L)			
	Tin (Sn)-Total (mg/L)			
	Titanium (Ti)-Total (mg/L)			
	Uranium (U)-Total (mg/L)			
	Vanadium (V)-Total (mg/L)			
	Zinc (Zn)-Total (mg/L)			
Dissolved Metals	Dissolved Mercury Filtration Location			
	Dissolved Metals Filtration Location			
	Aluminum (Al)-Dissolved (mg/L)			
	Antimony (Sb)-Dissolved (mg/L)			
	Arsenic (As)-Dissolved (mg/L)			
	Barium (Ba)-Dissolved (mg/L)			
	Beryllium (Be)-Dissolved (ug/L)			
	Bismuth (Bi)-Dissolved (mg/L)			
	Boron (B)-Dissolved (mg/L)			
	Cadmium (Cd)-Dissolved (ug/L)			
	Calcium (Ca)-Dissolved (mg/L)			
	Chromium (Cr)-Dissolved (mg/L)			
	Cobalt (Co)-Dissolved (ug/L)			

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-1 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900	L2277038-2 WS 21-MAY-19 09:00 RG_GRLK_WS_20 190521-0900 FB- HG	L2277038-3 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933	L2277038-4 WS 21-MAY-19 09:33 RG_GC_WS_2019 0521-0933 FB-HG	L2277038-5 WS 21-MAY-19 10:26 RG_FBLANK_WS_ 20190521-1026
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Dissolved (mg/L)	<0.010		0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0029		<0.0010		<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	18.7		7.05		<0.10
	Manganese (Mn)-Dissolved (mg/L)	<0.00010		0.00048		<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00140		0.000227		<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Potassium (K)-Dissolved (mg/L)	1.01		0.540		<0.050
	Selenium (Se)-Dissolved (ug/L)	0.260		0.303		<0.050
	Silicon (Si)-Dissolved (mg/L)	2.49		3.78		<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.81		1.81		<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.130		0.0521		<0.00020
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.000767		0.000421		<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		<0.0010		<0.0010

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

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Comping Analyte		Sample ID Description Sampled Date Sampled Time Client ID	L2277038-6 WS 21-MAY-19 10:26 RG_TRIP_WS_201 90521-1026	L2277038-7 WS 21-MAY-19 10:26 RG_ER_WS_2019 0521-1026	L2277038-8 WS 21-MAY-19 10:26 RG_ER_WS_2019 0521-1026 FB-HG	L2277038-9 WS 21-MAY-19 10:26 RG_DUP_WS_201 90521-1026	L2277038-10 WS 21-MAY-19 10:26 RG_DUP_WS_201 90521-1026 FB-HG
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	Grouping	Analyte	-				
Iron (Fe)-Dissolved (mg/L)	WATER						
Lead (Pb)-Dissolved (mg/L) Lithium (Li)-Dissolved (mg/L) Magnesium (Mg)-Dissolved (mg/L) Manganese (Mn)-Dissolved (mg/L) Mercury (Hg)-Dissolved (mg/L) Molybdenum (Mo)-Dissolved (mg/L) Potassium (K)-Dissolved (mg/L) Selenium (Se)-Dissolved (mg/L) Silicon (Si)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Thallium (Tl)-Dissolved (mg/L) Tin (Sn)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Vanodium (V)-Dissol	Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		<0.00050		<0.00050	
Lithium (Li)-Dissolved (mg/L) Magnesium (Mg)-Dissolved (mg/L) Manganese (Mn)-Dissolved (mg/L) Mercury (Hg)-Dissolved (mg/L) Molybdenum (Mo)-Dissolved (mg/L) Nickel (Ni)-Dissolved (mg/L) Potassium (K)-Dissolved (mg/L) Selenium (Se)-Dissolved (mg/L) Silicon (Si)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Thallium (Ti)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Vanodium (V)-Dissolved (mg/		Iron (Fe)-Dissolved (mg/L)		<0.010		<0.010	
Magnesium (Mg)-Dissolved (mg/L) <0.0050 11.9 11.2 Manganese (Mn)-Dissolved (mg/L) 0.00285 0.00225 Mercury (Hg)-Dissolved (mg/L) <0.0000050 <0.000050 Molybdenum (Mo)-Dissolved (mg/L) 0.000533 0.000533 Nickel (Ni)-Dissolved (mg/L) <0.00050 <0.00050 Potassium (K)-Dissolved (mg/L) <0.050 0.746 0.685 Selenium (Se)-Dissolved (mg/L) 0.999 1.02 Silicon (Si)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) <0.050 3.70 3.36 Strontium (Sr)-Dissolved (mg/L) <0.00010 <0.00010 <0.000010 Thallium (Ti)-Dissolved (mg/L) <0.00010 <0.00010 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Lead (Pb)-Dissolved (mg/L)		<0.000050		<0.000050	
Manganese (Mn)-Dissolved (mg/L) Mercury (Hg)-Dissolved (mg/L) Molybdenum (Mo)-Dissolved (mg/L) Nickel (Ni)-Dissolved (mg/L) Potassium (K)-Dissolved (mg/L) Silicon (Si)-Dissolved (mg/L) Silver (Ag)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Thallium (Tl)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Vanodium (V)-Dissolved (mg/L)		Lithium (Li)-Dissolved (mg/L)		0.0017		0.0016	
Mercury (Hg)-Dissolved (mg/L) <0.0000050 <0.0000050 Molybdenum (Mo)-Dissolved (mg/L) 0.000553 0.000533 Nickel (Ni)-Dissolved (mg/L) <0.00050 <0.00050 Potassium (K)-Dissolved (mg/L) <0.050 0.746 0.685 Selenium (Se)-Dissolved (ug/L) 0.999 1.02 Silicon (Si)-Dissolved (mg/L) 2.87 2.70 Silver (Ag)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) <0.050 3.70 3.36 Strontium (Sr)-Dissolved (mg/L) <0.00010 <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.00010 <0.00010 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.0010 <0.000826 <0.00050 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Magnesium (Mg)-Dissolved (mg/L)	<0.0050	11.9		11.2	
Molybdenum (Mo)-Dissolved (mg/L) Nickel (Ni)-Dissolved (mg/L) Potassium (K)-Dissolved (mg/L) Selenium (Se)-Dissolved (mg/L) Silicon (Si)-Dissolved (mg/L) Silver (Ag)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Sotrontium (Sr)-Dissolved (mg/L) Thallium (Tl)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Vanoobso Vanadium (V)-Dissolved (mg/L) Vanoobso	Manganese (Mn)-Dissolved (mg/L)		0.00285		0.00225		
Nickel (Ni)-Dissolved (mg/L) <0.00050 <0.00050 Potassium (K)-Dissolved (mg/L) <0.050 0.746 0.685 Selenium (Se)-Dissolved (ug/L) 0.999 1.02 Silicon (Si)-Dissolved (mg/L) 2.87 2.70 Silver (Ag)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) <0.050 3.70 3.36 Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (Ti)-Dissolved (mg/L) <0.000010 <0.000010 Titanium (Ti)-Dissolved (mg/L) <0.0010 <0.0010 Uranium (U)-Dissolved (mg/L) 0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Mercury (Hg)-Dissolved (mg/L)		<0.000050		<0.0000050	
Potassium (K)-Dissolved (mg/L)		Molybdenum (Mo)-Dissolved (mg/L)		0.000553		0.000533	
Selenium (Se)-Dissolved (ug/L) 0.999 1.02 Silicon (Si)-Dissolved (mg/L) 2.87 2.70 Silver (Ag)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) 3.36 3.36 Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (Tl)-Dissolved (mg/L) <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.00010 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Nickel (Ni)-Dissolved (mg/L)		<0.00050		<0.00050	
Silicon (Si)-Dissolved (mg/L) 2.87 2.70 Silver (Ag)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) 3.70 3.36 Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (Tl)-Dissolved (mg/L) <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.0001 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.010 <0.010 Uranium (U)-Dissolved (mg/L) 0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Potassium (K)-Dissolved (mg/L)	<0.050	0.746		0.685	
Silver (Ag)-Dissolved (mg/L) <0.000010 <0.000010 Sodium (Na)-Dissolved (mg/L) 3.36 Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (TI)-Dissolved (mg/L) <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.0001 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.010 <0.010 Uranium (U)-Dissolved (mg/L) 0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Selenium (Se)-Dissolved (ug/L)		0.999		1.02	
Sodium (Na)-Dissolved (mg/L) <0.050 3.70 3.36 Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (Tl)-Dissolved (mg/L) <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.0010 <0.0010 Titanium (Ti)-Dissolved (mg/L) <0.010 <0.010 Uranium (U)-Dissolved (mg/L) 0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Silicon (Si)-Dissolved (mg/L)		2.87		2.70	
Strontium (Sr)-Dissolved (mg/L) 0.114 0.108 Thallium (TI)-Dissolved (mg/L) <0.000010 <0.000010 Tin (Sn)-Dissolved (mg/L) <0.00010 <0.00010 Titanium (Ti)-Dissolved (mg/L) <0.010 <0.010 Uranium (U)-Dissolved (mg/L) 0.000883 0.000826 Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Silver (Ag)-Dissolved (mg/L)		<0.000010		<0.000010	
Thallium (TI)-Dissolved (mg/L) Tin (Sn)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L)		Sodium (Na)-Dissolved (mg/L)	<0.050	3.70		3.36	
Tin (Sn)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L)		Strontium (Sr)-Dissolved (mg/L)		0.114		0.108	
Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L)		Thallium (TI)-Dissolved (mg/L)		<0.000010		<0.000010	
Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L)		Tin (Sn)-Dissolved (mg/L)		<0.00010		<0.00010	
Vanadium (V)-Dissolved (mg/L) <0.00050 <0.00050		Titanium (Ti)-Dissolved (mg/L)		<0.010		<0.010	
7: (7:) Product (x://)		Uranium (U)-Dissolved (mg/L)		0.000883		0.000826	
Zinc (Zn)-Dissolved (mg/L) 0.0013 0.0011		Vanadium (V)-Dissolved (mg/L)		<0.00050		<0.00050	
		Zinc (Zn)-Dissolved (mg/L)		0.0013		0.0011	
	1						

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-11 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417	L2277038-12 WS 21-MAY-19 14:17 RG_STPD_WS_20 190521-1417 FB- HG	L2277038-13 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300	U2277038-14 WS 21-MAY-19 13:00 RG_ERIMF_WS_2 0190521-1300 FB-HG	L2277038-15 WS 21-MAY-19 15:15 RG_ERWSF_WS_ 20190521-1515
Grouping	Analyte		110		110	
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Iron (Fe)-Dissolved (mg/L)	<0.010		<0.010		0.092
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0059		0.0044		0.0022
	Magnesium (Mg)-Dissolved (mg/L)	17.1		11.1		14.4
	Manganese (Mn)-Dissolved (mg/L)	0.00011		0.00014		0.00276
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000896		0.00115		0.000599
	Nickel (Ni)-Dissolved (mg/L)	<0.00050		0.00074		0.00066
	Potassium (K)-Dissolved (mg/L)	0.475		0.791		1.50
	Selenium (Se)-Dissolved (ug/L)	7.41		0.070		0.840
	Silicon (Si)-Dissolved (mg/L)	1.86		0.881		2.74
	Silver (Ag)-Dissolved (mg/L)	<0.00010		<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	3.38		7.90		18.4
	Strontium (Sr)-Dissolved (mg/L)	0.179		0.155		0.161
	Thallium (TI)-Dissolved (mg/L)	<0.00010		<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010		<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.000839		0.000336		0.000515
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010		0.0021		<0.0010

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2277038-16 WS 21-MAY-19 15:15 RG_ERWSF_WS_ 20190521-1515 FB-HG		
Grouping	Analyte			
WATER				
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)			
	Iron (Fe)-Dissolved (mg/L)			
	Lead (Pb)-Dissolved (mg/L)			
	Lithium (Li)-Dissolved (mg/L)			
	Magnesium (Mg)-Dissolved (mg/L)			
	Manganese (Mn)-Dissolved (mg/L)			
	Mercury (Hg)-Dissolved (mg/L)			
	Molybdenum (Mo)-Dissolved (mg/L)			
	Nickel (Ni)-Dissolved (mg/L)			
	Potassium (K)-Dissolved (mg/L)			
	Selenium (Se)-Dissolved (ug/L)			
	Silicon (Si)-Dissolved (mg/L)			
	Silver (Ag)-Dissolved (mg/L)			
	Sodium (Na)-Dissolved (mg/L)			
	Strontium (Sr)-Dissolved (mg/L)			
	Thallium (TI)-Dissolved (mg/L)			
	Tin (Sn)-Dissolved (mg/L)			
	Titanium (Ti)-Dissolved (mg/L)			
	Uranium (U)-Dissolved (mg/L)			
	Vanadium (V)-Dissolved (mg/L)			
	Zinc (Zn)-Dissolved (mg/L)			

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

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Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
SFPL	Sample was Filtered and Preserved at the laboratory - DOC/D-MET/D-HG

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Copper (Cu)-Dissolved	MB-LOR	L2277038-1, -11, -13, -15, -3, -5, -7, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2277038-1, -11, -13, -15, -3, -5, -7, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2277038-1, -11, -13, -15, -3, -5, -7, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2277038-1, -11, -13, -15, -3, -5, -7, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2277038-1, -11, -13, -15, -3, -5, -7, -9
Matrix Spike	Boron (B)-Total	MS-B	L2277038-1, -11, -13, -15, -3, -5, -6, -7, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L2277038-1, -11, -13, -15, -3, -5, -6, -7, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2277038-1, -11, -13, -15, -3, -5, -6, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

Fluoride in Water by IC

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

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

HARDNESS-CALC-VA Water Hardness **APHA 2340B**

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents.

FPA 300.1 (mod)

Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction

with stannous chloride, and analyzed by CVAAS or CVAFS.

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

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

reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry. Ion Balance Calculation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Oxidation redution potential by elect. **ASTM D1498**

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

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

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically

after persulphate digestion of the sample.

APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined

colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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

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

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

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

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

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

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

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

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl

Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

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

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids

(TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

Laboratory Definition Code Laboratory Location

CL ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

19-12-5

Reference Information

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Workorder: L2277038 Report Date: 31-MAY-19 Page 1 of 15

Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result C	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water							
Batch R4647467								
WG3061402-11 LCS Acidity (as CaCO3)			105.0		%		85-115	28-MAY-19
WG3061402-14 LCS								
Acidity (as CaCO3)			105.1		%		85-115	28-MAY-19
WG3061402-10 MB Acidity (as CaCO3)			1.4		mg/L		2	28-MAY-19
WG3061402-13 MB					•			
Acidity (as CaCO3)			1.3		mg/L		2	28-MAY-19
ALK-MAN-CL	Water							
Batch R4648808								
WG3061972-4 MB Alkalinity, Total (as CaCC	D3)		<1.0		mg/L		1	29-MAY-19
BE-D-L-CCMS-VA	Water							
Batch R4644967								
WG3057945-11 DUP Beryllium (Be)-Dissolved		L2277038-1 <0.000020	<0.000020	RPD-NA	mg/L	N/A	20	24-MAY-19
WG3057945-10 LCS			07.0		0/			
Beryllium (Be)-Dissolved WG3057945-9 MB		LF	97.2		%		80-120	24-MAY-19
Beryllium (Be)-Dissolved		LF	<0.000020		mg/L		0.00002	24-MAY-19
WG3057945-12 MS		L2277038-3						
Beryllium (Be)-Dissolved			97.9		%		70-130	24-MAY-19
BE-T-L-CCMS-VA	Water							
Batch R4645179 WG3058068-2 LCS								
Beryllium (Be)-Total			107.2		%		80-120	27-MAY-19
WG3058068-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	27-MAY-19
BR-L-IC-N-CL	Water							
Batch R4641262 WG3056695-10 LCS								
Bromide (Br)			105.8		%		85-115	22-MAY-19
WG3056695-9 MB					4			
Bromide (Br)			<0.050		mg/L		0.05	22-MAY-19
C-DIS-ORG-LOW-CL	Water							



Workorder: L2277038

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Test	Matrix	Reference	Result C	tualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	Water							
Batch R4645792 WG3060711-2 LCS Dissolved Organic Carb			87.6		%		80-120	27-MAY-19
WG3060711-1 MB Dissolved Organic Carb	oon		<0.50		mg/L		0.5	27-MAY-19
C-TOT-ORG-LOW-CL	Water							
Batch R4645792 WG3060711-2 LCS Total Organic Carbon			93.7		%		80-120	27-MAY-19
WG3060711-1 MB Total Organic Carbon			<0.50		mg/L		0.5	27-MAY-19
CL-IC-N-CL	Water							
Batch R4641262								
WG3056695-10 LCS Chloride (CI)			102.0		%		90-110	22-MAY-19
WG3056695-9 MB Chloride (Cl)			<0.50		mg/L		0.5	22-MAY-19
EC-L-PCT-CL	Water							
Batch R4648808 WG3061972-4 MB Conductivity (@ 25C)			<2.0		uS/cm		2	29-MAY-19
F-IC-N-CL	Water							
Batch R4641262 WG3056695-10 LCS Fluoride (F)			106.1		%		90-110	22-MAY-19
WG3056695-9 MB Fluoride (F)			<0.020		mg/L		0.02	22-MAY-19
HG-D-CVAA-VA	Water							
Batch R4646526								
WG3060307-3 DUP Mercury (Hg)-Dissolved		L2277038-1 <0.000050	<0.0000050	RPD-NA	mg/L	N/A	20	28-MAY-19
WG3060307-2 LCS Mercury (Hg)-Dissolved			103.9		%		80-120	28-MAY-19
WG3060307-1 MB Mercury (Hg)-Dissolved		LF	<0.0000050		mg/L		0.000005	28-MAY-19
WG3060307-4 MS Mercury (Hg)-Dissolved		L2277038-3	76.0		%		70-130	28-MAY-19



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						1 ago 0 01 10		
Test Matri	ix Reference	Result	Qualifier	Units	RPD	Limit	Analyzed	
HG-T-U-CVAF-VA Wate	er							
Batch R4645122								
WG3059731-7 DUP	L2277038-7							
Mercury (Hg)-Total	0.00101	0.00104		ug/L	3.2	20	27-MAY-19	
WG3059731-2 LCS		05.5		0/				
Mercury (Hg)-Total		95.5		%		80-120	27-MAY-19	
WG3059731-1 MB Mercury (Hg)-Total		<0.00050		ug/L		0.0005	27-MAY-19	
WG3059731-6 MS	L2277038-15	40.00000		ug/L		0.0003	21-10141-19	
Mercury (Hg)-Total	L22//030-15	87.3		%		70-130	27-MAY-19	
MET-D-CCMS-CL Water	er							
Batch R4645759								
WG3060652-2 LCS	TMRM							
Calcium (Ca)-Dissolved		97.6		%		80-120	28-MAY-19	
Magnesium (Mg)-Dissolved		94.8		%		80-120	28-MAY-19	
Potassium (K)-Dissolved		99.6		%		80-120	28-MAY-19	
Sodium (Na)-Dissolved		105.6		%		80-120	28-MAY-19	
WG3060652-1 MB								
Calcium (Ca)-Dissolved		<0.050		mg/L		0.05	28-MAY-19	
Magnesium (Mg)-Dissolved		<0.0050		mg/L		0.005	28-MAY-19	
Potassium (K)-Dissolved		<0.050		mg/L		0.05	28-MAY-19	
Sodium (Na)-Dissolved		<0.050		mg/L		0.05	28-MAY-19	
MET-D-CCMS-VA Water	er							
Batch R4644967								
WG3057945-11 DUP Aluminum (Al)-Dissolved	L2277038-1	-0.0020	DDD NA	m a/l	N1/A	00	04.144.7/40	
	<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	24-MAY-19	
Antimony (Sb)-Dissolved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAY-19	
Arsenic (As)-Dissolved	0.00033	0.00036		mg/L	8.6	20	24-MAY-19	
Barium (Ba)-Dissolved	0.0599	0.0596	DDD 111	mg/L	0.4	20	24-MAY-19	
Bismuth (Bi)-Dissolved	<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-MAY-19	
Boron (B)-Dissolved	<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-MAY-19	
Cadmium (Cd)-Dissolved	<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-MAY-19	
Calcium (Ca)-Dissolved	35.6	35.1		mg/L	1.3	20	24-MAY-19	
Chromium (Cr)-Dissolved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAY-19	
Cobalt (Co)-Dissolved	<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAY-19	
Copper (Cu)-Dissolved	<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-MAY-19	
Iron (Fe)-Dissolved	<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-MAY-19	
Lead (Pb)-Dissolved	< 0.000050	< 0.000050	RPD-NA	mg/L	N/A	20	24-MAY-19	



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Test M	atrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA W	/ater							
Batch R4644967								
WG3057945-11 DUP		L2277038-1						
Lithium (Li)-Dissolved		0.0029	0.0029		mg/L	1.3	20	24-MAY-19
Magnesium (Mg)-Dissolved		18.7	18.5		mg/L	1.2	20	24-MAY-19
Manganese (Mn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAY-19
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-MAY-19
Potassium (K)-Dissolved		1.01	1.01		mg/L	0.0	20	24-MAY-19
Selenium (Se)-Dissolved		0.000260	0.000247		mg/L	5.1	20	24-MAY-19
Silicon (Si)-Dissolved		2.49	2.53		mg/L	1.6	20	24-MAY-19
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-MAY-19
Sodium (Na)-Dissolved		1.81	1.84		mg/L	1.9	20	24-MAY-19
Strontium (Sr)-Dissolved		0.130	0.132		mg/L	1.3	20	24-MAY-19
Thallium (TI)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-MAY-19
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-MAY-19
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-MAY-19
Uranium (U)-Dissolved		0.000767	0.000773		mg/L	0.8	20	24-MAY-19
Vanadium (V)-Dissolved		<0.00050	< 0.00050	RPD-NA	mg/L	N/A	20	24-MAY-19
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	24-MAY-19
WG3057945-10 LCS								
Aluminum (Al)-Dissolved			105.2		%		80-120	24-MAY-19
Antimony (Sb)-Dissolved			96.1		%		80-120	24-MAY-19
Arsenic (As)-Dissolved			101.7		%		80-120	24-MAY-19
Barium (Ba)-Dissolved			113.3		%		80-120	24-MAY-19
Bismuth (Bi)-Dissolved			97.1		%		80-120	24-MAY-19
Boron (B)-Dissolved			96.0		%		80-120	24-MAY-19
Cadmium (Cd)-Dissolved			99.3		%		80-120	24-MAY-19
Calcium (Ca)-Dissolved			97.1		%		80-120	24-MAY-19
Chromium (Cr)-Dissolved			102.3		%		80-120	24-MAY-19
Cobalt (Co)-Dissolved			101.5		%		80-120	24-MAY-19
Copper (Cu)-Dissolved			100.0		%		80-120	24-MAY-19
Iron (Fe)-Dissolved			99.5		%		80-120	24-MAY-19
Lead (Pb)-Dissolved			99.7		%		80-120	24-MAY-19
Lithium (Li)-Dissolved			95.0		%		80-120	24-MAY-19
Magnesium (Mg)-Dissolved			103.8		%		80-120	24-MAY-19
Manganese (Mn)-Dissolved			105.5		%		80-120	24-MAY-19
Molybdenum (Mo)-Dissolve	d		103.0		%		80-120	24-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4644967								
WG3057945-10 LCS								
Nickel (Ni)-Dissolved			100.0		%		80-120	24-MAY-19
Potassium (K)-Dissolved			103.4		%		80-120	24-MAY-19
Selenium (Se)-Dissolved			102.6		%		80-120	24-MAY-19
Silicon (Si)-Dissolved			109.4		%		60-140	24-MAY-19
Silver (Ag)-Dissolved			101.4		%		80-120	24-MAY-19
Sodium (Na)-Dissolved			108.0		%		80-120	24-MAY-19
Strontium (Sr)-Dissolved			100.0		%		80-120	24-MAY-19
Thallium (TI)-Dissolved			99.1		%		80-120	24-MAY-19
Tin (Sn)-Dissolved			99.9		%		80-120	24-MAY-19
Titanium (Ti)-Dissolved			104.1		%		80-120	24-MAY-19
Uranium (U)-Dissolved			101.0		%		80-120	24-MAY-19
Vanadium (V)-Dissolved			104.8		%		80-120	24-MAY-19
Zinc (Zn)-Dissolved			96.9		%		80-120	24-MAY-19
WG3057945-9 MB		LF						
Aluminum (AI)-Dissolved			<0.0010		mg/L		0.001	24-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Bismuth (Bi)-Dissolved			<0.000050)	mg/L		0.00005	24-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-MAY-19
Cadmium (Cd)-Dissolved			< 0.000005	6C	mg/L		0.000005	24-MAY-19
Calcium (Ca)-Dissolved			< 0.050		mg/L		0.05	24-MAY-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Copper (Cu)-Dissolved			0.0148	MB-LOR	mg/L		0.0002	24-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	24-MAY-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	24-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	24-MAY-19
Magnesium (Mg)-Dissolve	ed		<0.0050		mg/L		0.005	24-MAY-19
Manganese (Mn)-Dissolve			<0.00010		mg/L		0.0001	24-MAY-19
Molybdenum (Mo)-Dissolv			<0.000050)	mg/L		0.00005	24-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	24-MAY-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-MAY-19
Selenium (Se)-Dissolved			<0.00050		mg/L		0.00005	24-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4644967								
WG3057945-9 MB		LF	0.050					
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-MAY-19
Silver (Ag)-Dissolved			<0.000010)	mg/L		0.00001	24-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-MAY-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	24-MAY-19
Thallium (TI)-Dissolved			<0.000010)	mg/L		0.00001	24-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	24-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	24-MAY-19
Uranium (U)-Dissolved			<0.000010)	mg/L		0.00001	24-MAY-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	24-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-MAY-19
WG3057945-12 MS Aluminum (Al)-Dissolved		L2277038-3	98.4		%		70.400	04 144 1/40
Antimony (Sb)-Dissolved			94.6		%		70-130	24-MAY-19
Arsenic (As)-Dissolved			101.0		%		70-130	24-MAY-19 24-MAY-19
Barium (Ba)-Dissolved			N/A	MS-B	%		70-130	-
Bismuth (Bi)-Dissolved			81.3	IVIO-D	%		70.400	24-MAY-19
Boron (B)-Dissolved			93.9		%		70-130	24-MAY-19
Cadmium (Cd)-Dissolved			101.1		%		70-130	24-MAY-19
` ′			N/A	MS-B	%		70-130	24-MAY-19
Calcium (Ca)-Dissolved				IVIO-D			-	24-MAY-19
Chromium (Cr)-Dissolved			98.7		%		70-130	24-MAY-19
Cobalt (Co)-Dissolved			98.9		%		70-130	24-MAY-19
Copper (Cu)-Dissolved			99.4		%		70-130	24-MAY-19
Iron (Fe)-Dissolved			97.4		%		70-130	24-MAY-19
Lead (Pb)-Dissolved			93.3		%		70-130	24-MAY-19
Lithium (Li)-Dissolved			96.2	140.0	%		70-130	24-MAY-19
Magnesium (Mg)-Dissolve			N/A	MS-B	%		-	24-MAY-19
Manganese (Mn)-Dissolve			96.7		%		70-130	24-MAY-19
Molybdenum (Mo)-Dissolv	red .		97.6		%		70-130	24-MAY-19
Nickel (Ni)-Dissolved			97.4		%		70-130	24-MAY-19
Potassium (K)-Dissolved			98.2		%		70-130	24-MAY-19
Selenium (Se)-Dissolved			104.9		%		70-130	24-MAY-19
Silicon (Si)-Dissolved			97.9		%		70-130	24-MAY-19
Silver (Ag)-Dissolved			96.0		%		70-130	24-MAY-19
Sodium (Na)-Dissolved			91.8		%		70-130	24-MAY-19



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Test Matr	rix Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water	er						
Batch R4644967							
WG3057945-12 MS	L2277038-3	NI/A	MC D	0/			
Strontium (Sr)-Dissolved		N/A	MS-B	%		-	24-MAY-19
Thallium (TI)-Dissolved		93.2 96.2		%		70-130	24-MAY-19
Tin (Sn)-Dissolved		102.9		%		70-130	24-MAY-19
Titanium (Ti)-Dissolved		92.1		%		70-130	24-MAY-19
Uranium (U)-Dissolved Vanadium (V)-Dissolved		100.8		%		70-130	24-MAY-19
Zinc (Zn)-Dissolved		98.6		%		70-130	24-MAY-19
, ,		90.0		70		70-130	24-MAY-19
Batch R4645132 WG3057945-11 DUP	1 2277020 4						
Molybdenum (Mo)-Dissolved	L2277038-1 0.00140	0.00134		mg/L	4.7	20	27-MAY-19
, , ,				-		-	
MET-T-CCMS-VA Water	er						
Batch R4645179							
WG3058068-2 LCS							
Aluminum (Al)-Total		104.0		%		80-120	27-MAY-19
Antimony (Sb)-Total		108.1		%		80-120	27-MAY-19
Arsenic (As)-Total		104.3		%		80-120	27-MAY-19
Barium (Ba)-Total		103.3		%		80-120	27-MAY-19
Bismuth (Bi)-Total		102.0		%		80-120	27-MAY-19
Boron (B)-Total		104.9		%		80-120	27-MAY-19
Cadmium (Cd)-Total		106.5		%		80-120	27-MAY-19
Calcium (Ca)-Total		103.4		%		80-120	27-MAY-19
Cobalt (Co)-Total		105.6		%		80-120	27-MAY-19
Copper (Cu)-Total		103.6		%		80-120	27-MAY-19
Lead (Pb)-Total		102.3		%		80-120	27-MAY-19
Lithium (Li)-Total		108.0		%		80-120	27-MAY-19
Magnesium (Mg)-Total		103.9		%		80-120	27-MAY-19
Manganese (Mn)-Total		110.9		%		80-120	27-MAY-19
Molybdenum (Mo)-Total		104.4		%		80-120	27-MAY-19
Nickel (Ni)-Total		104.8		%		80-120	27-MAY-19
Potassium (K)-Total		107.3		%		80-120	27-MAY-19
Selenium (Se)-Total		106.8		%		80-120	27-MAY-19
Silicon (Si)-Total		118.3		%		80-120	27-MAY-19
Silver (Ag)-Total		113.8		%		80-120	27-MAY-19
Sodium (Na)-Total		109.3		%		80-120	27-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4645179)							
WG3058068-2 LCS			400.4		0/			
Strontium (Sr)-Total			108.4		%		80-120	27-MAY-19
Thallium (TI)-Total			100.5		%		80-120	27-MAY-19
Tin (Sn)-Total			105.2		%		80-120	27-MAY-19
Titanium (Ti)-Total			100.4		%		80-120	27-MAY-19
Uranium (U)-Total			111.0		%		80-120	27-MAY-19
Vanadium (V)-Total			108.9		%		80-120	27-MAY-19
Zinc (Zn)-Total			111.4		%		80-120	27-MAY-19
WG3058068-1 MB Aluminum (Al)-Total			<0.0030		mg/L		0.003	27-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.003	27-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Bismuth (Bi)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Boron (B)-Total			<0.010	o .	mg/L		0.00003	27-MAY-19
Cadmium (Cd)-Total			<0.00000	50	mg/L		0.000005	27-MAY-19
Calcium (Ca)-Total			<0.050	50	mg/L		0.05	27-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Copper (Cu)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Lead (Pb)-Total			<0.00005		mg/L		0.0005	27-MAY-19
Lithium (Li)-Total			<0.0010	O	mg/L		0.00003	27-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.001	27-MAY-19
Molybdenum (Mo)-Tota			<0.00005	n	mg/L		0.0005	27-MAY-19
Nickel (Ni)-Total	•		<0.00050		mg/L		0.0005	27-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	27-MAY-19
Selenium (Se)-Total			<0.00005	0	mg/L		0.00005	27-MAY-19
Silicon (Si)-Total			<0.10	•	mg/L		0.00003	27-MAY-19
Silver (Ag)-Total			<0.00001	0	mg/L		0.00001	27-MAY-19
Sodium (Na)-Total			<0.050	-	mg/L		0.05	27-MAY-19 27-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	27-MAY-19
Thallium (TI)-Total			<0.00020		mg/L		0.0002	27-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0001	27-MAY-19
Uranium (U)-Total			<0.00001		mg/L		0.0003	27-MAY-19 27-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	27-MAY-19
variadiani (v)-i olai			~0.00000		mg/L		0.0000	21-1VIM 1-19



Workorder: L2277038 Report I

Report Date: 31-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4645179								
WG3058068-1 MB Zinc (Zn)-Total			<0.0030		mg/L		0.003	27-MAY-19
Batch R4646029								
WG3058068-2 LCS Chromium (Cr)-Total			107.3		%		80-120	27-MAY-19
Iron (Fe)-Total			97.8		%		80-120	27-MAY-19
WG3058068-1 MB Chromium (Cr)-Total			<0.00010		mg/L		0.0001	27-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.0001	27-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	27-MAY-19
			40.00010		mg/L		0.0001	27-WAT-19
Batch R4647134 WG3061003-2 LCS								
Aluminum (Al)-Total			101.6		%		80-120	29-MAY-19
Antimony (Sb)-Total			114.5		%		80-120	29-MAY-19
Arsenic (As)-Total			102.1		%		80-120	29-MAY-19
Barium (Ba)-Total			109.1		%		80-120	29-MAY-19
Bismuth (Bi)-Total			112.8		%		80-120	29-MAY-19
Boron (B)-Total			98.2		%		80-120	29-MAY-19
Cadmium (Cd)-Total			104.9		%		80-120	29-MAY-19
Calcium (Ca)-Total			104.6		%		80-120	29-MAY-19
Chromium (Cr)-Total			103.2		%		80-120	29-MAY-19
Cobalt (Co)-Total			102.1		%		80-120	29-MAY-19
Copper (Cu)-Total			100.6		%		80-120	29-MAY-19
Iron (Fe)-Total			97.3		%		80-120	29-MAY-19
Lead (Pb)-Total			106.1		%		80-120	29-MAY-19
Lithium (Li)-Total			100.6		%		80-120	29-MAY-19
Magnesium (Mg)-Total			103.4		%		80-120	29-MAY-19
Manganese (Mn)-Total			103.5		%		80-120	29-MAY-19
Molybdenum (Mo)-Total			107.7		%		80-120	29-MAY-19
Nickel (Ni)-Total			99.2		%		80-120	29-MAY-19
Potassium (K)-Total			104.5		%		80-120	29-MAY-19
Selenium (Se)-Total			100.4		%		80-120	29-MAY-19
Silicon (Si)-Total			105.1		%		80-120	29-MAY-19
Silver (Ag)-Total			107.3		%		80-120	29-MAY-19
Sodium (Na)-Total			106.9		%		80-120	29-MAY-19



Workorder: L2277038 Report Date: 31-MAY-19 Page 10 of 15

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4647134								
WG3061003-2 LCS Strontium (Sr)-Total			106.3		%		80-120	29-MAY-19
Thallium (TI)-Total			105.6		%		80-120	29-MAY-19
Tin (Sn)-Total			105.5		%		80-120	29-MAY-19
Titanium (Ti)-Total			103.1		%		80-120	29-MAY-19
Uranium (U)-Total			100.2		%		80-120	29-MAY-19
Vanadium (V)-Total			104.7		%		80-120	29-MAY-19
Zinc (Zn)-Total			100.5		%		80-120	29-MAY-19
WG3061003-1 MB			0.0000		a /l			
Aluminum (Al)-Total			<0.0030		mg/L		0.003	29-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	29-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-MAY-19
Barium (Ba)-Total			<0.00010	_	mg/L		0.0001	29-MAY-19
Bismuth (Bi)-Total			<0.000050)	mg/L		0.00005	29-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	29-MAY-19
Cadmium (Cd)-Total			<0.000005	5C	mg/L		0.000005	29-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	29-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	29-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	29-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	29-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	29-MAY-19
Lead (Pb)-Total			<0.000050)	mg/L		0.00005	29-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	29-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	29-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	29-MAY-19
Molybdenum (Mo)-Total			<0.000050)	mg/L		0.00005	29-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-MAY-19
Potassium (K)-Total			< 0.050		mg/L		0.05	29-MAY-19
Selenium (Se)-Total			<0.000050)	mg/L		0.00005	29-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	29-MAY-19
Silver (Ag)-Total			<0.000010)	mg/L		0.00001	29-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	29-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	29-MAY-19
Thallium (TI)-Total			<0.000010)	mg/L		0.00001	29-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	29-MAY-19



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Report Date: 31-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4647134 WG3061003-1 MB Titanium (Ti)-Total			<0.00030		mg/L		0.0003	29-MAY-19
Uranium (U)-Total			<0.000010)	mg/L		0.00001	29-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	29-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-MAY-19
NH3-L-F-CL	Water							
Batch R4645760 WG3060291-10 LCS Ammonia as N			99.2		%		85-115	27-MAY-19
WG3060291-9 MB Ammonia as N			<0.0050		mg/L		0.005	27-MAY-19
NO2-L-IC-N-CL	Water							
Batch R4641262 WG3056695-10 LCS Nitrite (as N)			106.1		%		90-110	22-MAY-19
WG3056695-9 MB Nitrite (as N)			<0.0010		mg/L		0.001	22-MAY-19
NO3-L-IC-N-CL	Water							
Batch R4641262 WG3056695-10 LCS Nitrate (as N)			102.8		%		90-110	22-MAY-19
WG3056695-9 MB Nitrate (as N)			<0.0050		mg/L		0.005	22-MAY-19
ORP-CL	Water							
Batch R4645303 WG3059764-1 CRM ORP		CL-ORP	222		mV		210-230	27-MAY-19
WG3059764-2 DUP ORP		L2277038-13 413	405	J	mV	8.3	15	27-MAY-19
P-T-L-COL-CL	Water							
Batch R4645492 WG3060338-18 LCS Phosphorus (P)-Total			102.1		%		80-120	27-MAY-19
WG3060338-17 MB Phosphorus (P)-Total			<0.0020		mg/L		0.002	27-MAY-19
PO4-DO-L-COL-CL	Water							



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Test	Matrix	Reference	Result Q	ualifier Units	s RPD	Limit	Analyzed
PO4-DO-L-COL-CL	Water						
Batch R4643346							
WG3057792-10 LCS Orthophosphate-Dissolv	red (as P)		98.9	%		80-120	24-MAY-19
WG3057792-14 LCS Orthophosphate-Dissolv	red (as P)		97.6	%		80-120	24-MAY-19
WG3057792-13 MB Orthophosphate-Dissolv	red (as P)		<0.0010	mg/l	L	0.001	24-MAY-19
WG3057792-9 MB Orthophosphate-Dissolv	red (as P)		<0.0010	mg/l	_	0.001	24-MAY-19
WG3057792-12 MS Orthophosphate-Dissolv	red (as P)	L2277038-9	94.7	%		70-130	23-MAY-19
SO4-IC-N-CL	Water						
Batch R4641262							
WG3056695-10 LCS Sulfate (SO4)			102.6	%		90-110	22-MAY-19
WG3056695-9 MB Sulfate (SO4)			<0.30	mg/l	_	0.3	22-MAY-19
SOLIDS-TDS-CL	Water						
Batch R4645916 WG3059255-6 DUP		L2277038-1					
Total Dissolved Solids		171	177	mg/l	3.5	20	27-MAY-19
WG3059255-5 LCS Total Dissolved Solids			94.5	%		85-115	27-MAY-19
WG3059255-8 LCS Total Dissolved Solids			98.0	%		85-115	27-MAY-19
WG3059255-4 MB Total Dissolved Solids			<10	mg/l	L	10	27-MAY-19
WG3059255-7 MB Total Dissolved Solids			<10	mg/l	_	10	27-MAY-19
TKN-L-F-CL	Water						
Batch R4647726							
WG3061425-2 LCS Total Kjeldahl Nitrogen			98.3	%		75-125	29-MAY-19
WG3061425-4 LCS Total Kjeldahl Nitrogen			99.6	%		75-125	29-MAY-19
WG3061425-1 MB Total Kjeldahl Nitrogen			<0.050	mg/l	_	0.05	29-MAY-19
WG3061425-3 MB Total Kjeldahl Nitrogen			<0.050	mg/l	_	0.05	29-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	Water							
Batch R4645669 WG3058876-4 LCS Total Suspended Solids			97.5		%		85-115	26-MAY-19
WG3058876-3 MB Total Suspended Solids			<1.0		mg/L		1	26-MAY-19
Batch R4647849 WG3060857-2 LCS Total Suspended Solids			95.7		%		85-115	28-MAY-19
WG3060857-1 MB Total Suspended Solids			<1.0		mg/L		1	28-MAY-19
TURBIDITY-CL	Water							
Batch R4640924 WG3056281-20 LCS Turbidity			98.0		%		85-115	22-MAY-19
WG3056281-19 MB Turbidity			<0.10		NTU		0.1	22-MAY-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	al by elect.						
	1	21-MAY-19 09:00	27-MAY-19 09:30	0.25	144	hours	EHTR-FM
	3	21-MAY-19 09:33	27-MAY-19 09:30	0.25	144	hours	EHTR-FM
	5	21-MAY-19 10:26	27-MAY-19 09:30	0.25	143	hours	EHTR-FM
	6	21-MAY-19 10:26	27-MAY-19 09:30	0.25	143	hours	EHTR-FM
	7	21-MAY-19 10:26	27-MAY-19 09:30	0.25	143	hours	EHTR-FM
	9	21-MAY-19 10:26	27-MAY-19 09:30	0.25	143	hours	EHTR-FM
	11	21-MAY-19 14:17	27-MAY-19 09:30	0.25	139	hours	EHTR-FM
	13	21-MAY-19 13:00	27-MAY-19 09:30	0.25	140	hours	EHTR-FM
	15	21-MAY-19 15:15	27-MAY-19 09:30	0.25	138	hours	EHTR-FM
рН							
	1	21-MAY-19 09:00	29-MAY-19 10:00	0.25	193	hours	EHTR-FM
	3	21-MAY-19 09:33	29-MAY-19 10:00	0.25	192	hours	EHTR-FM
	5	21-MAY-19 10:26	29-MAY-19 13:00	0.25	195	hours	EHTR-FM
	6	21-MAY-19 10:26	29-MAY-19 13:00	0.25	195	hours	EHTR-FM
	7	21-MAY-19 10:26	29-MAY-19 13:00	0.25	195	hours	EHTR-FM
	9	21-MAY-19 10:26	29-MAY-19 13:00	0.25	195	hours	EHTR-FM
	11	21-MAY-19 14:17	29-MAY-19 13:00	0.25	191	hours	EHTR-FM
	13	21-MAY-19 13:00	29-MAY-19 13:00	0.25	192	hours	EHTR-FM
	15	21-MAY-19 15:15	29-MAY-19 13:00	0.25	190	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2277038 were received on 22-MAY-19 08:50.

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

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

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

Teck TURNAROUND TIME: COC ID: 19-12 Lante Aven Supporting Study Tox Shore PROJECT/CLIENT INFO Lab Name ALS Calgary Excel PDF EDD Facility Name / Julis Regional Effects Program (REP) Lab Contact Lyndmyla Shrets Project Manager Cair Good Email fyudmyla.shvets@alsglobal.com Email cait.good@teck.com Address 2559 29 Street NE Address 421 Pine Avenue dsemental K (BOS)ODONIAN City Calgary City Sparwood Province Province Postal Code T1Y 785 Canada Postal Code V08 2G0 Phone Number 1 403 407 1794 Phone Number 250-425-8202 SAMPLE DETAILS ... ANALYSIS REQUESTED Pittered - P. Field, L. Lab. Pl., Post & Cab. N. Kan N ENOS HISOM Hazardous Material (Yes/No) 1 2277038-COFC TECKCOAL-MET-D-VA G≖Grab # Of Field Time (24hr) C=Comp Sample Location Matrix No 21-Na4-19 0900 RC GRUL WS 20190521-6900 RG-GRUK X K WS. No AL-Mer A OSON RG-BRUK RG -GALK-WS 20190511-0900 11. HO W > No 21 May 8 6937 X × KG GC. US 20190501-0933 \leftarrow {6 - GC W S No RI-NOY-17 0533 W S No Al-NOY-1 1026 W S No 21-NOY-17 1026 KG. AC- Ws. 20190521-0933 AB-16 <u>La sc</u> Q RG-FBLAN K G 7 > FREAMY US 20190521- 026 × RG. TEZP 4 727-9_WS_20190521-192-× ELWS-20190501.100 WS No 21-Mg. 13/2026 26- ER صو -RG. ER WS-DOTAGEST. INTO TB-HG CG-ER NO BING-19 1026 1 RG DUP WS 20190501-1626 No Q1-Ma-15 1026 1 \sim RG DUP G- Tref We 201969-100 FB46 AB-DUP NS NO 11-NE-15 1026 6 1 ميد RG-5700 No SI-Mer 15 1417 1 6. 5 PD WS-20190521- 1417 W3 4 \leftarrow V 06.57PD 578 D. WS . 26 A6501-14A TB. HE WS. NO A1 - NG 19 1417 ERINTUS 2050821-1300 RG-BRAMF ws 6 7 として No 21-Marth 1300 YC. ĸ حرا RG-BRAME ITEG ELIMENS DIREST BYES NO 21-May 49 1380 Ġ Ş RGTELUSE No 2 10, 6 1515 15 RG. ERUSEUS 108052-1515 -چ. ~ ĸ-\$ 05 EXWSF_WS 70,8062-1515 LO. ELUSF وس No 21-NG-15 155 No No No No No No No No RELINQUISHED BY/AFFILIATION ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS NO OF BOTTLES RETURNED/DESCRIPTION Regular (default) x Sampler's Name Mobile # Priority (2-3 business days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge Sampler's Signature Date/Time For Emergency <1 Day, ASAP or Weekend - Contact ALS

Pega left

To

3



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

Date Received: 23-MAY-19

Report Date: 01-JUN-19 16:46 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2278104 Project P.O. #: VPO00616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: 19-12

Legal Site Desc:

Lyudmyla Shvets, B.Sc. Account Manager

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Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-1	RG_LNLK_WS_2019	0522-1055							
Sample Date:	CLIENT on 22-MAY-19 @	10:55							
Matrix:	WS								
	Total Organic O	arbon	8.99		0.5	mg/L		28-MAY-19	HSC
	Total Kjeldahl N	litrogen	0.862		0.05	mg/L		31-MAY-19	SCL
	Mercury (Hg)-T	-	<0.00050		0.0005	ug/L		28-MAY-19	MA2
	Dissolved Orga		8.04		0.5	mg/L		28-MAY-19	HSC
	Routine for Teck Co					9. =			
	Phosphorus (P)-1	otal							
	Phosphorus (P		0.0043		0.002	mg/L		29-MAY-19	RZF
	Ion Balance		99.0		-100	%		30-MAY-19	
	ORP		428		-1000	mV		28-MAY-19	RGB
	рН		8.30		0.1	pН		30-MAY-19	RMS
	Turbidity					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
	Turbidity		0.33		0.1	NTU		24-MAY-19	RGB
	Total Suspended	Solids							
	Total Suspende		<1.0		1	mg/L		29-MAY-19	EDT
	Total Dissolved S	olids							
	Total Dissolved	Solids	141	DLHC	20	mg/L		28-MAY-19	LT2
	Sulfate in Water I	y IC							
	Sulfate (SO4)		3.56		0.3	mg/L		24-MAY-19	RMS
	Orthophosphate-	. ,							
	Orthophosphate	e-Dissolved (as P)	<0.0010		0.001	mg/L		24-MAY-19	RZF
	Nitrite in Water by	y IC (Low Level)							
	Nitrite (as N)		<0.0010		0.001	mg/L		24-MAY-19	RMS
	Nitrate in Water b	y IC (Low Level)	.0.0050		0.005	,		04.84837.40	D. 46
	Nitrate (as N)		<0.0050		0.005	mg/L		24-MAY-19	RMS
	Ion Balance Calc		-0.5			%		30-MAY-19	
	Cation - Anion Anion Sum	Salance	2.96			meg/L		30-MAY-19	
	Cation Sum		2.93			meg/L		30-MAY-19	
		h10	2.93			meq/L		30-IVIA 1 - 19	
	Fluoride in Water Fluoride (F)	by IC	0.060		0.02	mg/L		24-MAY-19	RMS
	Electrical Conduc	tivity (EC)	0.000		0.02	1119/12		2110000	"
	Conductivity (@		270		2	uS/cm		30-MAY-19	RMS
	Chloride in Water								
	Chloride (CI)	,	2.63		0.5	mg/L		24-MAY-19	RMS
	Bromide in Water	by IC (Low Level)				_			
	Bromide (Br)	• , ,	<0.050		0.05	mg/L		24-MAY-19	RMS
	Ammonia, Total (as N)							
	Ammonia as N		0.0917		0.005	mg/L		31-MAY-19	LWY
	Alkalinity (Specie	s) by Manual Titration							
		bonate (as CaCO3)	139		1	mg/L		30-MAY-19	RMS
	•	onate (as CaCO3)	1.2		1	mg/L		30-MAY-19	RMS
		oxide (as CaCO3)	<1.0		1	mg/L		30-MAY-19	RMS
	Alkalinity, Total	· ·	140		1	mg/L		30-MAY-19	RMS
	Acidity by Autom		<1.0		1	ma/l		29-MAY-19	CH3
	Acidity (as CaC		~1.0		'	mg/L		23-IVIA 1 - 19	CH3
	Dissolved Metals in								
	DISSOIVED METAIS	in Water by CRC ICPMS		1					

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-1	RG_LNLK_WS_2019	90522-1055							
	 CLIENT on 22-MAY-19 (
	WS								
		18/2400							
	Dissolved Metals in								
		in Water by CRC ICPMS als Filtration Location	LAB					26-MAY-19	EM2
	Aluminum (AI)-		<0.0030		0.003	mg/L	26-MAY-19	27-MAY-19	MMS2
	Antimony (Sb)-		<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Arsenic (As)-Di		0.00048		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Barium (Ba)-Di		0.208		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Bismuth (Bi)-Di		<0.000050		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Boron (B)-Diss	olved	<0.010		0.01	mg/L	26-MAY-19	27-MAY-19	MMS2
	Cadmium (Cd)	-Dissolved	<0.0000050		0.00000 5	mg/L	26-MAY-19	27-MAY-19	MMS2
	Calcium (Ca)-E	Dissolved	28.3		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Chromium (Cr)		<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Cobalt (Co)-Dis	ssolved	<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Copper (Cu)-Di		<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Iron (Fe)-Disso	lved	<0.010		0.01	mg/L	26-MAY-19	27-MAY-19	MMS2
	Lead (Pb)-Diss	olved	<0.000050		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Lithium (Li)-Dis	ssolved	0.0015		0.001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Magnesium (M	g)-Dissolved	15.8		0.1	mg/L	26-MAY-19	27-MAY-19	MMS2
	Manganese (M		<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Molybdenum (N		0.000369		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Nickel (Ni)-Diss		<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Potassium (K)-		1.20		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Selenium (Se)-		<0.000050		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Silicon (Si)-Dis		2.50		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Silver (Ag)-Diss		<0.000010		0.00001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Sodium (Na)-D		4.31 0.0842		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2 MMS2
	Strontium (Sr)- Thallium (TI)-D		<0.00010		0.0002 0.00001	mg/L mg/L	26-MAY-19 26-MAY-19	27-MAY-19 27-MAY-19	MMS2
	Tin (Sn)-Dissol		<0.00010		0.00001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Titanium (Ti)-D		<0.010		0.001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Uranium (U)-Di		0.000242		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Vanadium (V)-l		<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Zinc (Zn)-Disso		<0.0010		0.001	mg/L	26-MAY-19	27-MAY-19	MMS2
	` ,	Water by CVAAS or CVAFS							
	•	cury Filtration Location	LAB					28-MAY-19	EB3
	Mercury (Hg)-D	•	<0.0000050		0.00000 5	mg/L	28-MAY-19	28-MAY-19	EB3
	Diss Ra (low) in	Water by CRC ICPMS			3				
	Beryllium (Be)-	_	<0.000020		0.00002	mg/L	26-MAY-19	27-MAY-19	MMS2
	•	als Filtration Location	LAB		0.0000	9. =		26-MAY-19	EM2
	Total Metals in Wat								
		ater by CRC ICPMS							
	Aluminum (AI)-		0.0061		0.003	mg/L		27-MAY-19	LVD
	Antimony (Sb)-		<0.00010		0.0001	mg/L		27-MAY-19	LVD
	Arsenic (As)-To		0.00052		0.0001	mg/L		27-MAY-19	LVD
	Barium (Ba)-To	otal	0.206		0.0001	mg/L		27-MAY-19	LVD
	Bismuth (Bi)-To	otal	<0.000050		0.00005	mg/L		27-MAY-19	LVD
	Boron (B)-Tota	l	<0.010		0.01	mg/L		27-MAY-19	LVD
	Cadmium (Cd)	-Total	<0.0000050		0.00000 5	mg/L		27-MAY-19	LVD
	Calcium (Ca)-T	⁻ otal	29.4		0.05	mg/L		27-MAY-19	LVD
									201# 4 00
								ŀ	Rev# 1.00

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-1	RG_LNLK_WS_201	190522-1055							
	CLIENT on 22-MAY-19								
Matrix:	WS								
		-4							
	Total Metals in Wa								
		Water by CRC ICPMS	<0.00010		0.0001			27 MAY 10	LVD
	Chromium (Cl Cobalt (Co)-T	•	<0.00010 <0.00010		0.0001	mg/L		27-MAY-19 27-MAY-19	LVD
	Copper (Cu)-1		<0.00010		0.0001	mg/L mg/L		27-MAY-19	LVD
	Iron (Fe)-Tota		<0.00030		0.0003	mg/L		27-MAY-19	LVD
	Lead (Pb)-Tot		<0.00050		0.00005	mg/L		27-MAY-19	LVD
	Lithium (Li)-To		0.0016		0.001	mg/L		27-MAY-19	LVD
	Magnesium (N	15.4		0.1	mg/L		27-MAY-19	LVD	
	Manganese (I		0.00237		0.0001	mg/L		27-MAY-19	LVD
	Molybdenum	•	0.000314		0.00005	mg/L		27-MAY-19	LVD
	Nickel (Ni)-To	` '	<0.00050		0.0005	mg/L		27-MAY-19	LVD
	Potassium (K)-Total	1.18		0.05	mg/L		27-MAY-19	LVD
	Selenium (Se)-Total	<0.000050		0.00005	mg/L		27-MAY-19	LVD
	Silicon (Si)-To	otal	2.31		0.1	mg/L		27-MAY-19	LVD
	Silver (Ag)-To	otal	<0.000010		0.00001	mg/L		27-MAY-19	LVD
	Sodium (Na)-	Total	3.90		0.05	mg/L		27-MAY-19	LVD
	Strontium (Sr))-Total	0.0783		0.0002	mg/L		27-MAY-19	LVD
	Thallium (TI)-		<0.000010		0.00001	mg/L		27-MAY-19	LVD
	Tin (Sn)-Total		<0.00010		0.0001	mg/L		27-MAY-19	LVD
	Titanium (Ti)-		<0.010		0.01	mg/L		27-MAY-19	LVD
	Uranium (U)-1		0.000220		0.00001	mg/L		27-MAY-19	LVD
	Vanadium (V)		<0.00050		0.0005	mg/L		27-MAY-19	LVD
	Zinc (Zn)-Tota		<0.0030		0.003	mg/L		27-MAY-19	LVD
	, ,	in Water by CRC ICPMS	<0.000020		0.00002	ma/l		27 MAV 10	LVD
	Beryllium (Be)- 1 Otal	<0.000020		0.00002	mg/L		27-MAY-19	LVD
	Hardness Hardness (as	(2(03)	136		0.5	mg/L		28-MAY-19	
 L2278104-2	<u> </u>	190522-1055 FB-HG	130		0.5	IIIg/L		20-1017-19	
	CLIENT on 22-MAY-19	-							
		10.55							
Matrix:	WS								
	Mercury (Hg)-	-Total	<0.00050		0.0005	ug/L		28-MAY-19	MA2
 L2278104-5	, , ,		-0.0000		0.0000	ug/ L		20 100 110	1717 (2
	RG_EROL_WS_20								
	CLIENT on 22-MAY-19	10 13.10							
Matrix:	WS								
	Dissolved Metals i								
		Is in Water by CRC ICPMS							
		tals Filtration Location	LAB		0.000		00.14337.45	26-MAY-19	EM2
	Aluminum (Al	•	<0.0030		0.003	mg/L	26-MAY-19	27-MAY-19	MMS2
	Antimony (Sb		<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Arsenic (As)-[0.00011		0.0001	mg/L	26-MAY-19	27-MAY-19 27-MAY-19	MMS2
	Barium (Ba)-[Bismuth (Bi)-[0.106 <0.000050		0.0001 0.00005	mg/L	26-MAY-19 26-MAY-19	27-MAY-19 27-MAY-19	MMS2 MMS2
	Boron (B)-Dis		<0.0000		0.00003	mg/L mg/L	26-MAY-19	27-MAY-19	MMS2
	Cadmium (Cd		0.000078		0.00000	mg/L	26-MAY-19	27-MAY-19	MMS2
					5				
	Calcium (Ca)-		63.1		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Chromium (C		0.00011		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Cobalt (Co)-D	rissolved	<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
									Rev# 1.00
								r	1.00

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-5	RG_EROL_WS_20 ²	190522-1310							
Sample Date: C	CLIENT on 22-MAY-19								
	VS								
	Dissolved Metals i	n Water							
		s in Water by CRC ICPMS							
	Copper (Cu)-E	-	<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Iron (Fe)-Diss		<0.010		0.01	mg/L	26-MAY-19	27-MAY-19	MMS2
	Lead (Pb)-Dis		<0.000050		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Lithium (Li)-Di		0.0051		0.001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Magnesium (N	Mg)-Dissolved	15.1		0.1	mg/L	26-MAY-19	27-MAY-19	MMS2
	Manganese (N	Mn)-Dissolved	0.00170		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Molybdenum ((Mo)-Dissolved	0.000717		0.00005	mg/L	26-MAY-19	28-MAY-19	ACYH
	Nickel (Ni)-Dis		<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Potassium (K)		0.529		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Selenium (Se)		0.00339		0.00005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Silicon (Si)-Dis		2.28		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2
	Silver (Ag)-Dis		<0.000010		0.00001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Sodium (Na)-I		3.69 0.188		0.05	mg/L	26-MAY-19	27-MAY-19	MMS2 MMS2
	Strontium (Sr)		<0.000010		0.0002 0.00001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Thallium (TI)-[Tin (Sn)-Disso		<0.00010		0.00001	mg/L mg/L	26-MAY-19 26-MAY-19	27-MAY-19 27-MAY-19	MMS2
	Titanium (Ti)-I		<0.00010		0.0001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Uranium (U)-E		0.000658		0.00001	mg/L	26-MAY-19	27-MAY-19	MMS2
	Vanadium (V)		<0.00050		0.0005	mg/L	26-MAY-19	27-MAY-19	MMS2
	Zinc (Zn)-Diss		< 0.0010		0.001	mg/L	26-MAY-19	27-MAY-19	MMS2
	` ,	Water by CVAAS or CVAFS				9. =			
	•	rcury Filtration Location	LAB					28-MAY-19	EB3
	Mercury (Hg)-	-	<0.0000050		0.00000	mg/L	28-MAY-19	28-MAY-19	EB3
		2.00000	0.000000		5	9. =	20 112 11		
	Diss. Be (low) in	n Water by CRC ICPMS							
	Beryllium (Be))-Dissolved	<0.000020		0.00002	mg/L	26-MAY-19	27-MAY-19	MMS2
	Dissolved Met	tals Filtration Location	LAB					26-MAY-19	EM2
	Routine for Teck C	Coal							
	Phosphorus (P)								
	Phosphorus (F	P)-Total	0.0023		0.002	mg/L		29-MAY-19	RZF
	Ion Balance		96.8		-100	%		30-MAY-19	
	рН		8.30		0.1	рН		30-MAY-19	RMS
	ORP		365		-1000	mV		28-MAY-19	RGB
	Turbidity								
	Turbidity		0.29		0.1	NTU		24-MAY-19	RGB
	Total Suspende	d Solids							
	Total Suspend		<1.0		1	mg/L		29-MAY-19	EDT
	Total Dissolved					-			
	Total Dissolve		221	DLHC	20	mg/L		28-MAY-19	LT2
	Sulfate in Water	by IC				· ·			
	Sulfate (SO4)	•	30.3		0.3	mg/L		24-MAY-19	RMS
	` ,	e-Dissolved (as P)				J			
		ate-Dissolved (as P)	<0.0010		0.001	mg/L		24-MAY-19	RZF
		by IC (Low Level)				3· -			
	Nitrite (as N)	., (LOW LEVE!)	0.0016		0.001	mg/L		24-MAY-19	RMS
		by IC (Low Level)	2.0010						5
	Nitrate in Water Nitrate (as N)	by 10 (LOW Level)	0.341		0.005	mg/L		24-MAY-19	RMS
	Ion Balance Cal	culation	5.5.1						
	ion Daiance Cal	Caration							
									Rev# 1.00
								Г	₹ ₩ 1.00

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-5	RG_EROL_WS_201	90522-1310							
Sample Date:	CLIENT on 22-MAY-19 (
Matrix:	WS								
	Routine for Teck Co	oal							
	Ion Balance Calc								
	Cation - Anion		-1.6			%		30-MAY-19	
	Anion Sum	24.4	4.72			meg/L		30-MAY-19	
	Cation Sum		4.56			meg/L		30-MAY-19	
	Fluoride in Wate	r by IC							
	Fluoride (F)	. 5, 15	0.129		0.02	mg/L		24-MAY-19	RMS
	Electrical Condu	ctivity (EC)				•			
	Conductivity (@		412		2	uS/cm		30-MAY-19	RMS
	Chloride in Wate								
	Chloride (CI)	•	3.48		0.5	mg/L		24-MAY-19	RMS
	Bromide in Wate	r by IC (Low Level)							
	Bromide (Br)	,	<0.050		0.05	mg/L		24-MAY-19	RMS
	Ammonia, Total ((as N)							
	Ammonia as N	• ,	0.0099		0.005	mg/L		31-MAY-19	LWY
	Alkalinity (Specie	es) by Manual Titration							
	Alkalinity, Bica	rbonate (as CaCO3)	198		1	mg/L		30-MAY-19	RMS
	Alkalinity, Carb	oonate (as CaCO3)	<1.0		1	mg/L		30-MAY-19	RMS
	Alkalinity, Hydr	roxide (as CaCO3)	<1.0		1	mg/L		30-MAY-19	RMS
	Alkalinity, Tota	l (as CaCO3)	198		1	mg/L		30-MAY-19	RMS
	Acidity by Autom	natic Titration							
	Acidity (as Ca0	CO3)	<1.0		1	mg/L		29-MAY-19	CH3
	Tatal Kialdala	NPt	0.007		0.05			04 MAN/ 40	0.01
	Total Kjeldahl I	<u> </u>	0.087		0.05	mg/L		31-MAY-19	SCL
	Total Organic (1.42		0.5	mg/L		28-MAY-19	HSC
	Dissolved Orga		1.18		0.5	mg/L		28-MAY-19	HSC
	Mercury (Hg)-T		<0.00050		0.0005	ug/L		28-MAY-19	MA2
	Total Metals in Wat								
	Aluminum (Al)	Vater by CRC ICPMS	0.0035		0.003	mg/L		27-MAY-19	LVD
	Antimony (Sb)-		<0.00010		0.003	mg/L		27-MAY-19	LVD
	Arsenic (As)-To		0.00020		0.0001	mg/L		27-MAY-19	LVD
	Barium (Ba)-To		0.109		0.0001	mg/L		27-MAY-19	LVD
	Bismuth (Bi)-To		<0.000050		0.00005	mg/L		27-MAY-19	LVD
	Boron (B)-Tota		<0.010		0.01	mg/L		27-MAY-19	LVD
	Cadmium (Cd)		0.0000061		0.00000	mg/L		27-MAY-19	LVD
	Coloium (Co) T	Fotal	62.2		5	ma/l		27 MAY 10	LVD
	Calcium (Ca)-1 Chromium (Cr)		63.2 0.00053		0.05 0.0001	mg/L mg/L		27-MAY-19 27-MAY-19	LVD LVD
	Cobalt (Co)-To		<0.00033		0.0001	mg/L		27-MAY-19	LVD
	Copper (Cu)-To		<0.00010		0.0001	mg/L		27-MAY-19	LVD
	Iron (Fe)-Total		0.017		0.003	mg/L		27-MAY-19	LVD
	Lead (Pb)-Tota		<0.00050		0.00005	mg/L		27-MAY-19	LVD
	Lithium (Li)-To		0.0050		0.001	mg/L		27-MAY-19	LVD
	Magnesium (M		15.5		0.1	mg/L		27-MAY-19	LVD
	Manganese (M		0.00364		0.0001	mg/L		27-MAY-19	LVD
	Molybdenum (I		0.000699		0.00005	mg/L		27-MAY-19	LVD
	Nickel (Ni)-Tota	al	<0.00050		0.0005	mg/L		27-MAY-19	LVD
	Potassium (K)-		0.523		0.05	mg/L		27-MAY-19	LVD
	Selenium (Se)-	-Total	0.00299		0.00005	mg/L		27-MAY-19	LVD
								F	Rev# 1.00

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2278104-5	RG_EROL_WS_20	0190522-1310							
	CLIENT on 22-MAY-19								
	WS								
		lata.							
	Total Metals in W								
	Silicon (Si)-T	Water by CRC ICPMS	2.12		0.1	mg/L		27-MAY-19	LVD
	Silver (Ag)-T		<0.000010		0.00001	mg/L		27-MAY-19	LVD
	Sodium (Na)		3.26		0.05	mg/L		27-MAY-19	LVD
	Strontium (S		0.166		0.0002	mg/L		27-MAY-19	LVD
	Thallium (TI)		<0.000010		0.00001	mg/L		27-MAY-19	LVD
	Tin (Sn)-Tota		<0.00010		0.0001	mg/L		27-MAY-19	LVD
	Titanium (Ti)	-Total	<0.010		0.01	mg/L		27-MAY-19	LVD
	Uranium (U)-	-Total	0.000634		0.00001	mg/L		27-MAY-19	LVD
	Vanadium (V		<0.00050		0.0005	mg/L		27-MAY-19	LVD
	Zinc (Zn)-Tot	tal	<0.0030		0.003	mg/L		27-MAY-19	LVD
		in Water by CRC ICPMS							
	Beryllium (Be	e)-Total	<0.000020		0.00002	mg/L		27-MAY-19	LVD
	Hardness								
	Hardness (as	<u> </u>	220		0.5	mg/L		28-MAY-19	
L2278104-6		0190522-1310_FB-HG							
Sample Date:	CLIENT on 22-MAY-19	9 @ 13:10							
Matrix:	WS								
	Mercury (Hg))-Total	<0.00050		0.0005	ug/L		28-MAY-19	MA2
	, , ,	<u> </u>							
									Rev# 1.00

REGIONAL EFFECTS PRO

L2278104 CONTD.... PAGE 8 of 9

Methodology Reference

Methodology Reference (In-House Standard **ALS Test Code Test Description** Operating Procedures which Generally Follow:) ACIDITY-PCT-CL Acidity by Automatic Titration APHA 2310 Acidity NO2-L-IC-N-CL Nitrite in Water by IC (Low Level) EPA 300.1 (mod) NO3-L-IC-N-CL Nitrate in Water by IC (Low Level) EPA 300.1 (mod) F-IC-N-CL Fluoride in Water by IC EPA 300.1 (mod) HARDNESS-CALC-VA Hardness **APHA 2340B** HG-D-CVAA-VA Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod) PH-CL pΗ APHA 4500 H-Electrode APHA 4500-P PHOSPHORUS PO4-DO-L-COL-CL Orthophosphate-Dissolved (as P) SO4-IC-N-CL Sulfate in Water by IC EPA 300.1 (mod) CL-IC-N-CL Chloride in Water by IC EPA 300.1 (mod) TSS-L-CL **Total Suspended Solids** APHA 2540 D-Gravimetric Diss. Be (low) in Water by CRC ICPMS BE-D-L-CCMS-VA APHA 3030B/6020A (mod) BR-L-IC-N-CL Bromide in Water by IC (Low Level) EPA 300.1 (mod) EC-L-PCT-CL Electrical Conductivity (EC) **APHA 2510B** ALK-MAN-CL Alkalinity (Species) by Manual Titration APHA 2320 ALKALINITY BE-T-L-CCMS-VA Total Be (Low) in Water by CRC ICPMS EPA 200.2/6020A (mod) MET-D-CCMS-VA Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod) MET-T-CCMS-VA Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) SOLIDS-TDS-CL **Total Dissolved Solids** APHA 2540 C APHA 4500-NORG (TKN) TKN-L-F-CL Total Kjeldahl Nitrogen ORP-CL Oxidation redution potential by elect. **ASTM D1498** APHA 4500-P PHOSPHORUS P-T-L-COL-CL Phosphorus (P)-Total APHA 1030E

APHA 5310 B-Instrumental

EPA 1631 REV. E

APHA 1030E

APHA 2130 B-Nephelometer

APHA 5310 TOTAL ORGANIC CARBON (TOC)

TECKCOAL-IONBAL-CL Ion Balance Calculation
C-DIS-ORG-LOW-CL Dissolved Organic Carbon

TURBIDITY-CL Turbidity

C-TOT-ORG-LOW-CL Total Organic Carbon

HG-T-U-CVAF-VA Total Mercury in Water by CVAFS (Ultra)

IONBALANCE-BC-CL Ion Balance Calculation

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

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

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

Date Received: 24-MAY-19

Report Date: 04-JUN-19 16:29 (MT)

Version: FINAL REV. 2

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2279040
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-12 - 5

Legal Site Desc:

My

Lyudmyla Shvets, B.Sc. Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298 ALS CANADA LTD Part of the ALS Group An ALS Limited Company



L2279040 CONTD.... PAGE 2 of 8

ALS ENVIRONMENTAL ANALYTICAL REPORT

04-JUN-19 16:29 (MT) Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L2279040-1 WS 23-MAY-19 09:00 RG_G013_WS_20 190523-0900	L2279040-2 WS 23-MAY-19 09:00 RG_GO13_WS_20 190523-0900 FB- HG		
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (@ 25C) (uS/cm)	1070			
	Hardness (as CaCO3) (mg/L)	564			
	pH (pH)	8.29			
	ORP (mV)	427			
	Total Suspended Solids (mg/L)	4.7			
	Total Dissolved Solids (mg/L)	694			
	Turbidity (NTU)	7.34			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.7			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	241			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	241			
	Ammonia as N (mg/L)	0.0108			
	Bromide (Br) (mg/L)	0.27			
	Chloride (CI) (mg/L)	36.1			
	Fluoride (F) (mg/L)	0.18			
	Ion Balance (%)	91.2			
	Nitrate (as N) (mg/L)	1.05			
	Nitrite (as N) (mg/L)	<0.0050			
	Total Kjeldahl Nitrogen (mg/L)	0.094			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0038			
	Sulfate (SO4) (mg/L)	334			
	Anion Sum (meq/L)	12.9			
	Cation Sum (meq/L)	11.7			
	Cation - Anion Balance (%)	-4.6			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.74			
	Total Organic Carbon (mg/L)	0.78			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0371			
	Antimony (Sb)-Total (mg/L)	0.00042			
	Arsenic (As)-Total (mg/L)	0.00022			
	Barium (Ba)-Total (mg/L)	0.101			
	Beryllium (Be)-Total (ug/L)	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050			
	Boron (B)-Total (mg/L)	0.029			
	Cadmium (Cd)-Total (ug/L)	0.0081			

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

L2279040 CONTD.... PAGE 3 of 8

ALS ENVIRONMENTAL ANALYTICAL REPORT

04-JUN-19 16:29 (MT) Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L2279040-1 WS 23-MAY-19 09:00 RG_GO13_WS_20 190523-0900	L2279040-2 WS 23-MAY-19 09:00 RG_GO13_WS_20 190523-0900 FB- HG		
Grouping	Analyte	-			
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)	121			
	Chromium (Cr)-Total (mg/L)	0.00011			
	Cobalt (Co)-Total (ug/L)	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050			
	Iron (Fe)-Total (mg/L)	0.074			
	Lead (Pb)-Total (mg/L)	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0293			
	Magnesium (Mg)-Total (mg/L)	71.1			
	Manganese (Mn)-Total (mg/L)	0.0157			
	Mercury (Hg)-Total (ug/L)	0.00060	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.00231			
	Nickel (Ni)-Total (mg/L)	0.00104			
	Potassium (K)-Total (mg/L)	1.94			
	Selenium (Se)-Total (ug/L)	69.8			
	Silicon (Si)-Total (mg/L)	2.90			
	Silver (Ag)-Total (mg/L)	<0.000010			
	Sodium (Na)-Total (mg/L)	8.99			
	Strontium (Sr)-Total (mg/L)	0.424			
	Thallium (TI)-Total (mg/L)	0.000013			
	Tin (Sn)-Total (mg/L)	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010			
	Uranium (U)-Total (mg/L)	0.00348			
	Vanadium (V)-Total (mg/L)	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.0045			
Dissolved Metals	Dissolved Mercury Filtration Location	LAB			
	Dissolved Metals Filtration Location	LAB			
	Aluminum (Al)-Dissolved (mg/L)	0.0049			
	Antimony (Sb)-Dissolved (mg/L)	0.00044			
	Arsenic (As)-Dissolved (mg/L)	0.00016			
	Barium (Ba)-Dissolved (mg/L)	0.0990			
	Beryllium (Be)-Dissolved (ug/L)	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.024			
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050			
	Calcium (Ca)-Dissolved (mg/L)	119			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10			

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

L2279040 CONTD.... PAGE 4 of 8

ALS ENVIRONMENTAL ANALYTICAL REPORT

04-JUN-19 16:29 (MT) Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L2279040-1 WS 23-MAY-19 09:00 RG_G013_WS_20 190523-0900	L2279040-2 WS 23-MAY-19 09:00 RG_GO13_WS_20 190523-0900 FB- HG		
Grouping	Analyte				
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050			
	Iron (Fe)-Dissolved (mg/L)	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0294			
	Magnesium (Mg)-Dissolved (mg/L)	64.9			
	Manganese (Mn)-Dissolved (mg/L)	0.0105			
	Mercury (Hg)-Dissolved (mg/L)	<0.000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00228			
	Nickel (Ni)-Dissolved (mg/L)	0.00100			
	Potassium (K)-Dissolved (mg/L)	2.07			
	Selenium (Se)-Dissolved (ug/L)	86.6			
	Silicon (Si)-Dissolved (mg/L)	2.78			
	Silver (Ag)-Dissolved (mg/L)	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	9.59			
	Strontium (Sr)-Dissolved (mg/L)	0.418			
	Thallium (TI)-Dissolved (mg/L)	0.000011			
	Tin (Sn)-Dissolved (mg/L)	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00347			
	Vanadium (V)-Dissolved (mg/L)	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010			

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

L2279040 CONTD.... PAGE 5 of 8 04-JUN-19 16:29 (MT)

Version: FINAL REV. 2

Qualifier Description

SFPL Sample was Filtered and Preserved at the laboratory - DOC, DIS METALS LAB FILTERED/PRESERVED

QC	Samp	les w	ith (Quali	fiers (& (Comments:
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QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2279040-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2279040-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2279040-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2279040-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2279040-1
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2279040-1
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2279040-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2279040-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2279040-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2279040-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2279040-1
Matrix Spike	Aluminum (Al)-Total	MS-B	L2279040-1
Matrix Spike	Arsenic (As)-Total	MS-B	L2279040-1
Matrix Spike	Barium (Ba)-Total	MS-B	L2279040-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2279040-1
Matrix Spike	Iron (Fe)-Total	MS-B	L2279040-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2279040-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2279040-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2279040-1
Matrix Spike	Titanium (Ti)-Total	MS-B	L2279040-1
Matrix Spike	Ammonia as N	MS-B	L2279040-1

Qualifiers for Individual Parameters Listed:

Qualificis io	i iliulividual i alailleters Listeu.
Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The

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carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL

Water

Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

metal reference electrode employed, in miv

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

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically

after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined

colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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

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

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

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

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

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

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

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

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl

Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

Laboratory Definition Code Laboratory Location

CL ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

VA ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

REP-Lentic 19-12 - 5

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result Qualifier	Units RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water					
Batch R4653065 WG3063812-11 LCS Acidity (as CaCO3)			106.0	%	85-115	30-MAY-19
WG3063812-10 MB Acidity (as CaCO3)			<1.0	mg/L	2	30-MAY-19
ALK-MAN-CL	Water					
Batch R4653055 WG3063840-11 LCS Alkalinity, Total (as CaCC	O3)		99.3	%	85-115	30-MAY-19
WG3063840-10 MB Alkalinity, Total (as CaCC			<1.0	mg/L	1	30-MAY-19
BE-D-L-CCMS-VA	Water					
Batch R4646589 WG3058816-2 LCS Beryllium (Be)-Dissolved			98.1	%	80-120	28-MAY-19
WG3058816-1 MB Beryllium (Be)-Dissolved		LF	<0.000020	mg/L	0.00002	28-MAY-19
BE-T-L-CCMS-VA	Water					
Batch R4645810 WG3059574-2 LCS			97.8	%		
Beryllium (Be)-Total WG3059574-1 MB Beryllium (Be)-Total			<0.000020	mg/L	80-120 0.00002	28-MAY-19 28-MAY-19
BR-L-IC-N-CL	Water					
Batch R4644755 WG3059401-10 LCS						
Bromide (Br)			99.2	%	85-115	24-MAY-19
WG3059401-9 MB Bromide (Br)			<0.050	mg/L	0.05	24-MAY-19
C-DIS-ORG-LOW-CL	Water					
Batch R4651166 WG3062909-6 LCS Dissolved Organic Carbo	on		84.4	%	80-120	29-MAY-19
WG3062909-5 MB Dissolved Organic Carbo			<0.50	mg/L	0.5	29-MAY-19
C-TOT-ORG-LOW-CL	Water					



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL Batch R4651166	Water							
WG3062909-6 LCS Total Organic Carbon			88.0		%		80-120	29-MAY-19
WG3062909-5 MB Total Organic Carbon			<0.50		mg/L		0.5	29-MAY-19
CL-IC-N-CL	Water							
Batch R4644755 WG3059401-10 LCS Chloride (CI)			99.2		%		90-110	24-MAY-19
WG3059401-9 MB Chloride (CI)			<0.50		mg/L		0.5	24-MAY-19
EC-L-PCT-CL	Water							
Batch R4653055								
WG3063840-11 LCS Conductivity (@ 25C)			103.9		%		90-110	30-MAY-19
WG3063840-10 MB Conductivity (@ 25C)			<2.0		uS/cm		2	30-MAY-19
F-IC-N-CL	Water							
Batch R4644755 WG3059401-10 LCS Fluoride (F)			102.3		%		90-110	24-MAY-19
WG3059401-9 MB Fluoride (F)			<0.020		mg/L		0.02	24-MAY-19
HG-D-CVAA-VA	Water							
Batch R4650432								
WG3062778-7 DUP Mercury (Hg)-Dissolved		L2279040-1 <0.000050	<0.000005	C RPD-NA	mg/L	N/A	20	30-MAY-19
WG3062778-6 LCS Mercury (Hg)-Dissolved			100.7		%		80-120	30-MAY-19
WG3062778-5 MB Mercury (Hg)-Dissolved			<0.000005	SC .	mg/L		0.000005	30-MAY-19
HG-T-U-CVAF-VA	Water							
Batch R4652963								
WG3064149-2 LCS Mercury (Hg)-Total			88.8		%		80-120	31-MAY-19
WG3064149-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	31-MAY-19
MET-D-CCMS-VA	Water							



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est	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4646589								
WG3058816-2 LCS			407.7		0.4			
Aluminum (Al)-Dissolve			107.7		%		80-120	28-MAY-19
Antimony (Sb)-Dissolve	d		95.7		%		80-120	28-MAY-19
Arsenic (As)-Dissolved			100.7		%		80-120	28-MAY-19
Barium (Ba)-Dissolved			107.3		%		80-120	28-MAY-19
Bismuth (Bi)-Dissolved			101.5		%		80-120	28-MAY-19
Boron (B)-Dissolved			94.1		%		80-120	28-MAY-19
Cadmium (Cd)-Dissolve	ed		102.1		%		80-120	28-MAY-19
Calcium (Ca)-Dissolved	l		97.7		%		80-120	28-MAY-19
Chromium (Cr)-Dissolve	ed		103.0		%		80-120	28-MAY-19
Cobalt (Co)-Dissolved			101.6		%		80-120	28-MAY-19
Iron (Fe)-Dissolved			99.96		%		80-120	28-MAY-19
Lead (Pb)-Dissolved			102.9		%		80-120	28-MAY-19
Lithium (Li)-Dissolved			95.9		%		80-120	28-MAY-19
Magnesium (Mg)-Disso	lved		97.6		%		80-120	28-MAY-19
Manganese (Mn)-Disso	lved		105.3		%		80-120	28-MAY-19
Molybdenum (Mo)-Diss	olved		99.0		%		80-120	28-MAY-19
Nickel (Ni)-Dissolved			100.8		%		80-120	28-MAY-19
Potassium (K)-Dissolve	d		110.4		%		80-120	28-MAY-19
Selenium (Se)-Dissolve	d		100.3		%		80-120	28-MAY-19
Silicon (Si)-Dissolved			108.7		%		60-140	28-MAY-19
Silver (Ag)-Dissolved			98.8		%		80-120	28-MAY-19
Sodium (Na)-Dissolved			106.4		%		80-120	28-MAY-19
Strontium (Sr)-Dissolve	d		98.0		%		80-120	28-MAY-19
Thallium (TI)-Dissolved			101.7		%		80-120	28-MAY-19
Tin (Sn)-Dissolved			98.9		%		80-120	28-MAY-19
Titanium (Ti)-Dissolved			99.97		%		80-120	28-MAY-19
Uranium (U)-Dissolved			100.9		%		80-120	28-MAY-19
Vanadium (V)-Dissolve	d		102.6		%		80-120	28-MAY-19
Zinc (Zn)-Dissolved			101.3		%		80-120	28-MAY-19
WG3058816-1 MB		LF						
Aluminum (Al)-Dissolve	d		<0.0010		mg/L		0.001	28-MAY-19
Antimony (Sb)-Dissolve	d		<0.00010		mg/L		0.0001	28-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4646	589							
WG3058816-1 M		LF						
Bismuth (Bi)-Dissol			<0.000050		mg/L		0.00005	28-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-MAY-19
Cadmium (Cd)-Diss			<0.00005	С	mg/L		0.000005	28-MAY-19
Calcium (Ca)-Disso			<0.050		mg/L		0.05	28-MAY-19
Chromium (Cr)-Diss			<0.00010		mg/L		0.0001	28-MAY-19
Cobalt (Co)-Dissolv	ed		<0.00010		mg/L		0.0001	28-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-MAY-19
Lead (Pb)-Dissolve	d		<0.000050		mg/L		0.00005	28-MAY-19
Lithium (Li)-Dissolve	ed		<0.0010		mg/L		0.001	28-MAY-19
Magnesium (Mg)-D	issolved		< 0.0050		mg/L		0.005	28-MAY-19
Manganese (Mn)-D	issolved		<0.00010		mg/L		0.0001	28-MAY-19
Molybdenum (Mo)-I	Dissolved		<0.000050		mg/L		0.00005	28-MAY-19
Nickel (Ni)-Dissolve	ed		< 0.00050		mg/L		0.0005	28-MAY-19
Potassium (K)-Diss	olved		< 0.050		mg/L		0.05	28-MAY-19
Selenium (Se)-Diss	olved		<0.000050		mg/L		0.00005	28-MAY-19
Silicon (Si)-Dissolve	ed		< 0.050		mg/L		0.05	28-MAY-19
Silver (Ag)-Dissolve	ed		<0.000010		mg/L		0.00001	28-MAY-19
Sodium (Na)-Dissol	ved		< 0.050		mg/L		0.05	28-MAY-19
Strontium (Sr)-Disse	olved		<0.00020		mg/L		0.0002	28-MAY-19
Thallium (TI)-Dissol	ved		<0.000010		mg/L		0.00001	28-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-MAY-19
Titanium (Ti)-Dissol	ved		< 0.00030		mg/L		0.0003	28-MAY-19
Uranium (U)-Dissol	ved		<0.000010		mg/L		0.00001	28-MAY-19
Vanadium (V)-Disso	olved		<0.00050		mg/L		0.0005	28-MAY-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-MAY-19
Batch R4647	134							
WG3061071-2 LC	cs							
Aluminum (Al)-Diss	olved		102.8		%		80-120	29-MAY-19
Antimony (Sb)-Diss	olved		95.3		%		80-120	29-MAY-19
Arsenic (As)-Dissol	ved		101.8		%		80-120	29-MAY-19
Barium (Ba)-Dissolv	ved .		113.2		%		80-120	29-MAY-19
Bismuth (Bi)-Dissol	Bismuth (Bi)-Dissolved		108.6		%		80-120	29-MAY-19
Boron (B)-Dissolved	t		98.5		%		80-120	29-MAY-19
Cadmium (Cd)-Diss	solved		104.2		%		80-120	29-MAY-19



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Test Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water							
Batch R4647134							
WG3061071-2 LCS							
Calcium (Ca)-Dissolved		103.9		%		80-120	29-MAY-19
Chromium (Cr)-Dissolved		105.4		%		80-120	29-MAY-19
Cobalt (Co)-Dissolved		103.3		%		80-120	29-MAY-19
Copper (Cu)-Dissolved		101.3		%		80-120	29-MAY-19
Iron (Fe)-Dissolved		96.2		%		80-120	29-MAY-19
Lead (Pb)-Dissolved		101.5		%		80-120	29-MAY-19
Lithium (Li)-Dissolved		100.0		%		80-120	29-MAY-19
Magnesium (Mg)-Dissolved		102.2		%		80-120	29-MAY-19
Manganese (Mn)-Dissolved		103.7		%		80-120	29-MAY-19
Molybdenum (Mo)-Dissolved		104.4		%		80-120	29-MAY-19
Nickel (Ni)-Dissolved		101.7		%		80-120	29-MAY-19
Potassium (K)-Dissolved		106.3		%		80-120	29-MAY-19
Selenium (Se)-Dissolved		101.4		%		80-120	29-MAY-19
Silicon (Si)-Dissolved		104.7		%		60-140	29-MAY-19
Silver (Ag)-Dissolved		102.6		%		80-120	29-MAY-19
Sodium (Na)-Dissolved		107.0		%		80-120	29-MAY-19
Strontium (Sr)-Dissolved		101.6		%		80-120	29-MAY-19
Thallium (TI)-Dissolved		101.5		%		80-120	29-MAY-19
Tin (Sn)-Dissolved		100.5		%		80-120	29-MAY-19
Titanium (Ti)-Dissolved		101.5		%		80-120	29-MAY-19
Uranium (U)-Dissolved		95.2		%		80-120	29-MAY-19
Vanadium (V)-Dissolved		107.1		%		80-120	29-MAY-19
Zinc (Zn)-Dissolved		100.9		%		80-120	29-MAY-19
WG3061071-1 MB	LF						
Aluminum (AI)-Dissolved		<0.0010		mg/L		0.001	29-MAY-19
Antimony (Sb)-Dissolved		<0.00010		mg/L		0.0001	29-MAY-19
Arsenic (As)-Dissolved		<0.00010		mg/L		0.0001	29-MAY-19
Barium (Ba)-Dissolved		<0.00010		mg/L		0.0001	29-MAY-19
Bismuth (Bi)-Dissolved		<0.000050		mg/L		0.00005	29-MAY-19
Boron (B)-Dissolved		<0.010		mg/L		0.01	29-MAY-19
Cadmium (Cd)-Dissolved		<0.0000050	С	mg/L		0.000005	29-MAY-19
Calcium (Ca)-Dissolved		<0.050		mg/L		0.05	29-MAY-19
Chromium (Cr)-Dissolved		<0.00010		mg/L		0.0001	29-MAY-19
Cobalt (Co)-Dissolved		< 0.00010		mg/L		0.0001	29-MAY-19



Workorder: L2279040 Report Date: 04-JUN-19 Page 6 of 12

Test Ma	trix Reference	Result Qualifier	Units	RPD	Limit	Analyzed			
MET-D-CCMS-VA W	ater								
Batch R4647134									
WG3061071-1 MB	LF		_						
Copper (Cu)-Dissolved		<0.00020	mg/L		0.0002	29-MAY-19			
Iron (Fe)-Dissolved		<0.010	mg/L		0.01	29-MAY-19			
Lead (Pb)-Dissolved		<0.000050	mg/L		0.00005	29-MAY-19			
Lithium (Li)-Dissolved		<0.0010	mg/L		0.001	29-MAY-19			
Magnesium (Mg)-Dissolved		<0.0050	mg/L		0.005	29-MAY-19			
Manganese (Mn)-Dissolved		<0.00010	mg/L		0.0001	29-MAY-19			
Molybdenum (Mo)-Dissolved		<0.000050	mg/L		0.00005	29-MAY-19			
Nickel (Ni)-Dissolved		<0.00050	mg/L		0.0005	29-MAY-19			
Potassium (K)-Dissolved		<0.050	mg/L		0.05	29-MAY-19			
Selenium (Se)-Dissolved		<0.000050	mg/L		0.00005	29-MAY-19			
Silicon (Si)-Dissolved		<0.050	mg/L		0.05	29-MAY-19			
Silver (Ag)-Dissolved		<0.000010	mg/L		0.00001	29-MAY-19			
Sodium (Na)-Dissolved		<0.050	mg/L		0.05	29-MAY-19			
Strontium (Sr)-Dissolved		<0.00020	mg/L		0.0002	29-MAY-19			
Thallium (TI)-Dissolved		<0.000010	mg/L		0.00001	29-MAY-19			
Tin (Sn)-Dissolved		<0.00010	mg/L		0.0001	29-MAY-19			
Titanium (Ti)-Dissolved		<0.00030	mg/L		0.0003	29-MAY-19			
Uranium (U)-Dissolved		<0.000010	mg/L		0.00001	29-MAY-19			
Vanadium (V)-Dissolved		<0.00050	mg/L		0.0005	29-MAY-19			
Zinc (Zn)-Dissolved		<0.0010	mg/L		0.001	29-MAY-19			
MET-T-CCMS-VA W	ater								
Batch R4645810									
WG3059574-2 LCS Aluminum (Al)-Total		102.1	%		80-120	28-MAY-19			
Antimony (Sb)-Total		101.9	%		80-120	28-MAY-19			
Arsenic (As)-Total		100.4	%						
Barium (Ba)-Total		103.0	%		80-120	28-MAY-19			
Bismuth (Bi)-Total		99.0	%		80-120 80-120	28-MAY-19			
Boron (B)-Total						28-MAY-19			
Cadmium (Cd)-Total		93.5	%		80-120	28-MAY-19			
,		100.0	%		80-120	28-MAY-19			
Calcium (Ca)-Total		97.2 100.6	%		80-120	28-MAY-19			
, ,	Chromium (Cr)-Total		%		80-120	28-MAY-19			
Cobalt (Co)-Total		100.5	%		80-120	28-MAY-19			
Copper (Cu)-Total		98.0	%		80-120	28-MAY-19			



Workorder: L2279040 Report Date: 04-JUN-19 Page 7 of 12

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4645810								
WG3059574-2 LCS			00.7		0/			
Iron (Fe)-Total			99.7		%		80-120	28-MAY-19
Lead (Pb)-Total			97.6		%		80-120	28-MAY-19
Lithium (Li)-Total			92.3		%		80-120	28-MAY-19
Magnesium (Mg)-Total			99.9		%		80-120	28-MAY-19
Manganese (Mn)-Total			100.9		%		80-120	28-MAY-19
Molybdenum (Mo)-Total			103.1		%		80-120	28-MAY-19
Nickel (Ni)-Total			99.2		%		80-120	28-MAY-19
Potassium (K)-Total			98.1		%		80-120	28-MAY-19
Selenium (Se)-Total			100.0		%		80-120	28-MAY-19
Silicon (Si)-Total			104.0		%		80-120	28-MAY-19
Silver (Ag)-Total			98.1		%		80-120	28-MAY-19
Sodium (Na)-Total			99.4		%		80-120	28-MAY-19
Strontium (Sr)-Total			95.5		%		80-120	28-MAY-19
Thallium (TI)-Total			99.2		%		80-120	28-MAY-19
Tin (Sn)-Total			98.6		%		80-120	28-MAY-19
Titanium (Ti)-Total			94.5		%		80-120	28-MAY-19
Uranium (U)-Total			98.8		%		80-120	28-MAY-19
Vanadium (V)-Total			101.4		%		80-120	28-MAY-19
Zinc (Zn)-Total			99.6		%		80-120	28-MAY-19
WG3059574-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	28-MAY-19
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	28-MAY-19
Cadmium (Cd)-Total			<0.0000050	C	mg/L		0.000005	28-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	28-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	28-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	28-MAY-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-MAY-19



Page 8 of 12

Workorder: L2279040 Report Date: 04-JUN-19

Test Matrix Reference Result Qualifier Units **RPD** Limit Analyzed MET-T-CCMS-VA Water Batch R4645810 WG3059574-1 MB Magnesium (Mg)-Total < 0.0050 mg/L 0.005 28-MAY-19 Manganese (Mn)-Total < 0.00010 mg/L 0.0001 28-MAY-19 Molybdenum (Mo)-Total < 0.000050 mg/L 0.00005 28-MAY-19 Nickel (Ni)-Total < 0.00050 mg/L 0.0005 28-MAY-19 Potassium (K)-Total < 0.050 mg/L 0.05 28-MAY-19 Selenium (Se)-Total < 0.000050 mg/L 0.00005 28-MAY-19 Silicon (Si)-Total < 0.10 mg/L 0.1 28-MAY-19 Silver (Ag)-Total < 0.000010 mg/L 0.00001 28-MAY-19 Sodium (Na)-Total < 0.050 mg/L 0.05 28-MAY-19 Strontium (Sr)-Total < 0.00020 mg/L 0.0002 28-MAY-19 Thallium (TI)-Total < 0.000010 mg/L 0.00001 28-MAY-19 Tin (Sn)-Total <0.00010 mg/L 0.0001 28-MAY-19 Titanium (Ti)-Total < 0.00030 mg/L 0.0003 28-MAY-19 Uranium (U)-Total < 0.000010 mg/L 0.00001 28-MAY-19 Vanadium (V)-Total < 0.00050 mg/L 0.0005 28-MAY-19 Zinc (Zn)-Total < 0.0030 mg/L 0.003 28-MAY-19 NH3-L-F-CL Water **Batch** R4653519 WG3065030-10 LCS 95.2 % Ammonia as N 85-115 01-JUN-19 WG3065030-9 MB Ammonia as N < 0.0050 mg/L 0.005 01-JUN-19 NO2-L-IC-N-CL Water **Batch** R4644755 WG3059401-10 LCS Nitrite (as N) 102.1 % 90-110 24-MAY-19 WG3059401-9 MB Nitrite (as N) < 0.0010 mg/L 0.001 24-MAY-19 NO3-L-IC-N-CL Water Batch R4644755 WG3059401-10 LCS Nitrate (as N) 99.4 % 90-110 24-MAY-19 WG3059401-9 MB < 0.0050 Nitrate (as N) mg/L 0.005 24-MAY-19 ORP-CL Water



Workorder: L2279040 Report Date: 04-JUN-19 Page 9 of 12

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	Water							
Batch R4648826 WG3061974-5 CRM ORP		CL-ORP	226		mV		210-230	29-MAY-19
P-T-L-COL-CL	Water							
Batch R4651380 WG3063247-22 LCS Phosphorus (P)-Total			105.5		%		80-120	30-MAY-19
WG3063247-21 MB Phosphorus (P)-Total			<0.0020		mg/L		0.002	30-MAY-19
PH-CL	Water							
Batch R4653055 WG3063840-11 LCS pH			7.01		рН		6.9-7.1	30-MAY-19
PO4-DO-L-COL-CL	Water							
Batch R4644179 WG3058443-13 LCS Orthophosphate-Dissolve	ed (as P)		100.0		%		80-120	25-MAY-19
WG3058443-3 MB Orthophosphate-Dissolve			<0.0010		mg/L		0.001	25-MAY-19
SO4-IC-N-CL	Water							
Batch R4644755 WG3059401-10 LCS Sulfate (SO4)			99.7		%		90-110	24-MAY-19
WG3059401-9 MB Sulfate (SO4)			<0.30		mg/L		0.3	24-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4651218								
WG3061435-8 LCS Total Dissolved Solids			94.9		%		85-115	29-MAY-19
WG3061435-7 MB Total Dissolved Solids			<10		mg/L		10	29-MAY-19
TKN-L-F-CL	Water							
Batch R4651431 WG3063294-2 LCS Total Kjeldahl Nitrogen WG3063294-5 LCS			95.2		%		75-125	30-MAY-19



Workorder: L2279040 Report Date: 04-JUN-19 Page 10 of 12

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	Water							
Batch R4651431 WG3063294-5 LCS Total Kjeldahl Nitrogen			96.7		%		75-125	30-MAY-19
WG3063294-7 LCS Total Kjeldahl Nitrogen			93.0		%		75-125	30-MAY-19
WG3063294-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	30-MAY-19
WG3063294-4 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	30-MAY-19
WG3063294-6 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	30-MAY-19
TSS-L-CL	Water							
Batch R4652806 WG3063292-2 LCS Total Suspended Solids			93.4		%		85-115	30-MAY-19
WG3063292-1 MB Total Suspended Solids			<1.0		mg/L		1	30-MAY-19
TURBIDITY-CL	Water							
Batch R4644231 WG3058720-3 DUP Turbidity		L2279040-1 7.34	7.29		NTU	0.7	15	25-MAY-19
WG3058720-2 LCS Turbidity			96.5		%		85-115	25-MAY-19
WG3058720-1 MB Turbidity			<0.10		NTU		0.1	25-MAY-19

Report Date: 04-JUN-19 Workorder: L2279040 Page 11 of 12

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard

Sample Parameter Qualifier Definitions:

LCSD Laboratory Control Sample Duplicate

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Workorder: L2279040 Report Date: 04-JUN-19 Page 12 of 12

Hold Time Exceedances:

	Sample						
ALS Product Description	ID ⁻	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	l by elect.						
	1	23-MAY-19 09:00	29-MAY-19 15:10	0.25	150	hours	EHTR-FM
рН							
	1	23-MAY-19 09:00	30-MAY-19 16:00	0.25	175	hours	EHTR-FM
amand 9 Ovalities Definities							

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2279040 were received on 24-MAY-19 09:00.

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

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

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

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

Date Received: 28-MAY-19

Report Date: 05-JUN-19 08:39 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2280498
Project P.O. #: VP000616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REDSIDE SHINER

Legal Site Desc:

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Lyudmyla Shvets, B.Sc. Account Manager

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L2280498 CONTD.... PAGE 2 of 17

05-JUN-19 08:39 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-1 WS 27-MAY-19 10:45 RG_G013_WS_20 190527-1045	L2280498-2 WS 27-MAY-19 12:40 RG_ERWSF_WS_ 20190527-1240	L2280498-3 WS 27-MAY-19 14:00 RG_STPD_WS_20 190527-1400	L2280498-4 WS 27-MAY-19 14:30 RG_FBLANK_WS_ 20190527-1430	L2280498-5 WS 27-MAY-19 14:30 RG_TRIP_WS_201 90527-1430
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1030	491	407	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	574	233	215	<0.50	
	pH (pH)	8.20	8.15	8.15	4.26	4.31
	ORP (mV)	273	442	448	489	456
	Total Suspended Solids (mg/L)	8.1	9.8	1.9	<1.0	<1.0
	Total Dissolved Solids (mg/L)	723	280 DLHC	DLHC 234	<10	<10
	Turbidity (NTU)	16.8	5.12	0.75	<0.10	<0.10
Anions and	Acidity (as CaCO3) (mg/L)	4.2	2.6	1.6	1.5	2.2
Nutrients	Alkalinity, Disambanata (as CaCO2) (mg/l)					
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	230	205	155	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	230	205	155	<1.0	<1.0
	Ammonia as N (mg/L)	0.0098	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	0.218	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	32.0	30.6	2.86	<0.50	<0.50
	Fluoride (F) (mg/L)	0.170	0.087	0.159	<0.020	<0.020
	Ion Balance (%)	101	105	98.9	0.0	0.0
	Nitrate (as N) (mg/L)	0.786	0.0591	0.596	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	0.0033	0.0018	0.0070	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.196	0.270	0.314	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0017	0.0026	0.0015	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0136	0.0233	0.0082	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	300	10.1	60.9	<0.30	<0.30
	Anion Sum (meq/L)	11.8	5.18	4.50	<0.10	<0.10
	Cation Sum (meq/L)	11.9	5.42	4.45	<0.10	<0.10
	Cation - Anion Balance (%)	0.6	2.3	-0.6	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.64	3.40	0.91	<0.50	
	Total Organic Carbon (mg/L)	1.74	3.36	0.97	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.133	0.0373	0.0126	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00034	0.00014	0.00011	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00027	0.00053	0.00017	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.111	0.0524	0.0962	<0.00010	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.025	0.014	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0163	0.0109	0.0074	<0.0050	<0.0050

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-6 WS 27-MAY-19 12:00 RG_ER_WS_2019 0527-1200	L2280498-7 WS 27-MAY-19 14:00 RG_GC_WS_2019 0527-1400	L2280498-8 WS 27-MAY-19 15:30 RG_EROL_WS_20 190527-1530	L2280498-9 WS 27-MAY-19 15:45 RG_DUP_WS_201 90527-1545	L2280498-10 WS 27-MAY-19 10:45 RG_GO13_WS_20 190527-1045 FB- HG
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	234	196	384	403	
	Hardness (as CaCO3) (mg/L)	116	95.2	213	210	
	pH (pH)	8.05	7.87	8.30	8.34	
	ORP (mV)	371	406	396	383	
	Total Suspended Solids (mg/L)	7.7	4.3	<1.0	1.1	
	Total Dissolved Solids (mg/L)	DLHC 132	DLHC 116	DLHC 213	DLHC 229	
	Turbidity (NTU)	6.99	3.90	0.31	0.29	
Anions and	Acidity (as CaCO3) (mg/L)	2.1	2.3	2.2	2.3	
Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)					
	Alkalinity, Carbonate (as CaCO3) (mg/L)	104	85.2	191	179	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	2.0	
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Ammonia as N (mg/L)	104	85.2	191	181	
	Bromide (Br) (mg/L)	0.0094	<0.0050	0.0903	0.0057	
	Chloride (Cl) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Fluoride (F) (mg/L)	2.24	1.25	2.74	3.69	
	.,	0.071	0.057	0.100	0.121	
	Ion Balance (%)	94.4	98.8	103	99.0	
	Nitrate (as N) (mg/L)	0.222	0.188	0.200	0.312	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0012	0.0015	
	Total Kjeldahl Nitrogen (mg/L)	0.087	0.100	0.146	0.087	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0077	0.0072	0.0078	0.0044	
	Sulfate (SO4) (mg/L)	21.0	13.2	17.6	30.4	
	Anion Sum (meq/L)	2.61	2.03	4.29	4.39	
	Cation Sum (meq/L)	2.46	2.01	4.41	4.34	
	Cation - Anion Balance (%)	-2.9	-0.6	1.4	-0.5	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.40	1.85	0.56	0.72	
Total Metals	Total Organic Carbon (mg/L)	1.58	2.10	0.69	0.78	
i Otal Wetais	Aluminum (Al)-Total (mg/L)	0.0885	0.0777	0.0081	0.0032	
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00042	0.00029	0.00014	0.00014	
	Barium (Ba)-Total (mg/L)	0.0337	0.0378	0.108	0.107	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0095	0.0067	0.0091	0.0088	

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

L2280498-11 L2280498-12 L2280498-13 L2280498-14 L2280498-15 Sample ID Description WS WS WS WS WS 27-MAY-19 27-MAY-19 27-MAY-19 27-MAY-19 27-MAY-19 Sampled Date 12:40 14:00 Sampled Time 14:00 14:30 12:00 RG_ERWSF_WS_ RG STPD WS 20 RG_FBLANK_WS_ RG ER WS 2019 RG GC WS 2019 Client ID 20190527-1240 190527-1400 FB-20190527-1430 0527-1200 FB-HG 0527-1400 FB-HG FB-HG HG FB-HG Grouping **Analyte WATER Physical Tests** Conductivity (@ 25C) (uS/cm) Hardness (as CaCO3) (mg/L) pH (pH) ORP (mV) Total Suspended Solids (mg/L) Total Dissolved Solids (mg/L) Turbidity (NTU) Anions and Acidity (as CaCO3) (mg/L) **Nutrients** Alkalinity, Bicarbonate (as CaCO3) (mg/L) Alkalinity, Carbonate (as CaCO3) (mg/L) Alkalinity, Hydroxide (as CaCO3) (mg/L) Alkalinity, Total (as CaCO3) (mg/L) Ammonia as N (mg/L) Bromide (Br) (mg/L) Chloride (CI) (mg/L) Fluoride (F) (mg/L) Ion Balance (%) Nitrate (as N) (mg/L) Nitrite (as N) (mg/L) Total Kjeldahl Nitrogen (mg/L) Orthophosphate-Dissolved (as P) (mg/L) Phosphorus (P)-Total (mg/L) Sulfate (SO4) (mg/L) Anion Sum (meq/L) Cation Sum (meq/L) Cation - Anion Balance (%) Dissolved Organic Carbon (mg/L) Organic / **Inorganic Carbon** Total Organic Carbon (mg/L) **Total Metals** Aluminum (Al)-Total (mg/L) Antimony (Sb)-Total (mg/L) Arsenic (As)-Total (mg/L) Barium (Ba)-Total (mg/L) Beryllium (Be)-Total (ug/L) Bismuth (Bi)-Total (mg/L) Boron (B)-Total (mg/L) Cadmium (Cd)-Total (ug/L)

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

L2280498-16 L2280498-17 Sample ID Description WS WS 27-MAY-19 27-MAY-19 Sampled Date 15:30 15:45 Sampled Time RG_EROL_WS_20 RG DUP WS 201 Client ID 190527-1530 FB-90527-1545 FB-HG HG Grouping **Analyte WATER** Conductivity (@ 25C) (uS/cm) **Physical Tests** Hardness (as CaCO3) (mg/L) pH (pH) ORP (mV) Total Suspended Solids (mg/L) Total Dissolved Solids (mg/L) Turbidity (NTU) Anions and Acidity (as CaCO3) (mg/L) **Nutrients** Alkalinity, Bicarbonate (as CaCO3) (mg/L) Alkalinity, Carbonate (as CaCO3) (mg/L) Alkalinity, Hydroxide (as CaCO3) (mg/L) Alkalinity, Total (as CaCO3) (mg/L) Ammonia as N (mg/L) Bromide (Br) (mg/L) Chloride (CI) (mg/L) Fluoride (F) (mg/L) Ion Balance (%) Nitrate (as N) (mg/L) Nitrite (as N) (mg/L) Total Kjeldahl Nitrogen (mg/L) Orthophosphate-Dissolved (as P) (mg/L) Phosphorus (P)-Total (mg/L) Sulfate (SO4) (mg/L) Anion Sum (meq/L) Cation Sum (meq/L) Cation - Anion Balance (%) Dissolved Organic Carbon (mg/L) Organic / **Inorganic Carbon** Total Organic Carbon (mg/L) **Total Metals** Aluminum (Al)-Total (mg/L) Antimony (Sb)-Total (mg/L) Arsenic (As)-Total (mg/L) Barium (Ba)-Total (mg/L) Beryllium (Be)-Total (ug/L) Bismuth (Bi)-Total (mg/L) Boron (B)-Total (mg/L) Cadmium (Cd)-Total (ug/L)

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-1 WS 27-MAY-19 10:45 RG_G013_WS_20 190527-1045	L2280498-2 WS 27-MAY-19 12:40 RG_ERWSF_WS_ 20190527-1240	L2280498-3 WS 27-MAY-19 14:00 RG_STPD_WS_20 190527-1400	L2280498-4 WS 27-MAY-19 14:30 RG_FBLANK_WS_ 20190527-1430	L2280498-5 WS 27-MAY-19 14:30 RG_TRIP_WS_201 90527-1430
Grouping	Analyte					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	118	72.8	53.9	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	0.00024	0.00033	0.00017	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	0.15	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.130	0.488	0.037	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	0.000110	0.000123	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0302	0.0023	0.0062	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	71.9	15.3	18.0	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.0340	0.00747	0.00469	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	0.00131	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00211	0.000479	0.000985	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.00121	0.00078	<0.00050	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	2.07	1.37	0.476	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	62.4	0.611	6.29	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	2.76	2.65	1.11	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.00010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	9.35	16.9	3.27	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.444	0.138	0.187	<0.00020	<0.00020
	Thallium (TI)-Total (mg/L)	0.000016	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00311	0.000485	0.000930	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.00078	0.00067	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0038	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	LAB	
	Dissolved Metals Filtration Location	LAB	LAB	LAB	LAB	LAB
	Aluminum (Al)-Dissolved (mg/L)	0.0045	0.0033	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00032	0.00015	<0.00010	<0.00010	
	Arsenic (As)-Dissolved (mg/L)	0.00020	0.00046	0.00017	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.102	0.0492	0.0932	<0.00010	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	0.024	0.014	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.0052	0.0053	<0.0050	<0.0050	
	Calcium (Ca)-Dissolved (mg/L)	115	69.7	54.7	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00021	0.00011	<0.00010	10.000
	Cobalt (Co)-Dissolved (ug/L)	0.12	<0.10	<0.10	<0.10	

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

L2280498-7 L2280498-9 L2280498-10 Sample ID L2280498-6 L2280498-8 Description WS WS WS WS WS 27-MAY-19 Sampled Date 27-MAY-19 27-MAY-19 27-MAY-19 27-MAY-19 Sampled Time 12:00 14:00 15:30 15:45 10:45 RG ER WS 2019 RG GC WS 2019 RG EROL WS 20 RG DUP WS 201 RG GO13 WS 20 Client ID 0527-1200 0527-1400 190527-1530 90527-1545 190527-1045 FB-HG Grouping **Analyte** WATER **Total Metals** Calcium (Ca)-Total (mg/L) 30.3 24.6 62.4 58.4 Chromium (Cr)-Total (mg/L) 0.00030 0.00017 0.00028 0.00025 Cobalt (Co)-Total (ug/L) <0.10 < 0.10 < 0.10 < 0.10 Copper (Cu)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 < 0.00050 Iron (Fe)-Total (mg/L) 0.110 0.080 0.025 0.020 Lead (Pb)-Total (mg/L) 0.000191 0.000105 < 0.000050 < 0.000050 Lithium (Li)-Total (mg/L) 0.0014 0.0012 0.0039 0.0040 Magnesium (Mg)-Total (mg/L) 9.45 7.96 15.2 15.1 Manganese (Mn)-Total (mg/L) 0.0104 0.00797 0.00437 0.00384 Mercury (Hg)-Total (ug/L) 0.00073 0.00097 < 0.00050 < 0.00050 < 0.00050 Molybdenum (Mo)-Total (mg/L) 0.000614 0.000541 0.000361 0.000619 Nickel (Ni)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 < 0.00050 Potassium (K)-Total (mg/L) 0.534 0.515 0.490 0.534 Selenium (Se)-Total (ug/L) 0.544 0.570 2.52 2.68 Silicon (Si)-Total (mg/L) 2.47 2.24 2.24 2.94 Silver (Ag)-Total (mg/L) < 0.000010 < 0.000010 <0.000010 < 0.000010 Sodium (Na)-Total (mg/L) 2.92 1.93 3.20 3.14 Strontium (Sr)-Total (mg/L) 0.127 0.0819 0.133 0.150 Thallium (TI)-Total (mg/L) < 0.000010 < 0.000010 < 0.000010 < 0.000010 Tin (Sn)-Total (mg/L) < 0.00010 < 0.00010 < 0.00010 < 0.00010 Titanium (Ti)-Total (mg/L) < 0.010 < 0.010 < 0.010 < 0.010 Uranium (U)-Total (mg/L) 0.000650 0.000464 0.000514 0.000547 Vanadium (V)-Total (mg/L) < 0.00050 < 0.00050 < 0.00050 < 0.00050 Zinc (Zn)-Total (mg/L) < 0.0030 < 0.0030 0.0059 < 0.0030 Dissolved Mercury Filtration Location **Dissolved Metals** LAB LAB LAB LAB Dissolved Metals Filtration Location LAB LAB LAB LAB Aluminum (Al)-Dissolved (mg/L) 0.0096 0.0115 < 0.0030 < 0.0030 Antimony (Sb)-Dissolved (mg/L) < 0.00010 < 0.00010 < 0.00010 < 0.00010 Arsenic (As)-Dissolved (mg/L) 0.00035 0.00027 0.00015 0.00014 Barium (Ba)-Dissolved (mg/L) 0.0316 0.0366 0.102 0.101 Beryllium (Be)-Dissolved (ug/L) < 0.020 < 0.020 < 0.020 < 0.020 Bismuth (Bi)-Dissolved (mg/L) < 0.000050 < 0.000050 < 0.000050 < 0.000050 Boron (B)-Dissolved (mg/L) < 0.010 < 0.010 < 0.010 < 0.010 Cadmium (Cd)-Dissolved (ug/L) < 0.0050 < 0.0050 0.0071 0.0086 Calcium (Ca)-Dissolved (mg/L) 30.8 25.2 61.0 61.0 Chromium (Cr)-Dissolved (mg/L) < 0.00010 < 0.00010 0.00024 0.00022 Cobalt (Co)-Dissolved (ug/L) < 0.10 < 0.10 < 0.10 < 0.10

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

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Crouping		Sample ID Description Sampled Date Sampled Time Client ID	L2280498-11 WS 27-MAY-19 12:40 RG_ERWSF_WS_ 20190527-1240 FB-HG	L2280498-12 WS 27-MAY-19 14:00 RG_STPD_WS_20 190527-1400 FB- HG	L2280498-13 WS 27-MAY-19 14:30 RG_FBLANK_WS_ 20190527-1430 FB-HG	L2280498-14 WS 27-MAY-19 12:00 RG_ER_WS_2019 0527-1200 FB-HG	L2280498-15 WS 27-MAY-19 14:00 RG_GC_WS_2019 0527-1400 FB-HG
Total Metals	Grouping	Analyte					
Chromium (Cr)-Total (mg/L) Cobat (Co)-Total (ug/L) Copper (Cu)-Total (mg/L)	WATER						
Cobalt (Co)-Total (ug/L) Coper (Cu)-Total (mg/L) Iron (Fe)-Total (mg/L) Lead (Pt)-Total (mg/L) Lithium (Li)-Total (mg/L) Magnesium (Mo)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (ug/L) Molybdenum (Mo)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (Ni)-Total (mg/L) Salenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Sodium (Na)-Total (mg/L) Thalilium (Ti)-Total (mg/L) Thalilium (Ti)-Total (mg/L) Uranium (O)-Total (mg/L) Uranium (O)-Total (mg/L) Vanadium (V)-Total (mg/L) Vanadium (V)-Total (mg/L) Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (Ai)-Dissolved (mg/L) Bernium (Ba)-Dissolved (mg/L) Bernium (Ba)-Dissolved (mg/L) Bernium (Be)-Dissolved (mg/L) Bernium (Co)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Cd)-Dissolved (mg/L) Calcium (Cd)-Dissolved (mg/L) Chromium (Cf)-Dissolved (mg/L)	Total Metals	Calcium (Ca)-Total (mg/L)					
Copper (Cu)-Total (mg/L) Iron (Fe)-Total (mg/L) Lead (Pb)-Total (mg/L) Lithium (Li)-Total (mg/L) Magnesum (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Fig)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Nicke (Mi)-Total (mg/L) Potassium (K)-Total (mg/L) Silcen (Si)-Total (mg/L) Silcen (Si)-Total (mg/L) Silcen (Si)-Total (mg/L) Silcen (Si)-Total (mg/L) Silcen (Ma)-Total (mg/L) Thallum (Ti)-Total (mg/L) Thallum (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Tin (Sn)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (Y)-Total (mg/L) Zinc (Zn)-Total (mg/L) Artimony (Si)-Dissolved (mg/L) Artimony (Si)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Barium (Ca)-Dissolved (mg/L) Baron (Ga)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Chromium (Cr)-Total (mg/L)					
Iron (Fe)-Total (mg/L) Lithium (Li)-Total (mg/L) Lithium (Li)-Total (mg/L) Magnassum (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (mg/L) Molybednum (Mo)-Total (mg/L) Molybednum (Molybednum (Mo)-Total (mg/L) Molybednum (Molybednum (Mo)-Total (mg/L) Molybednum (Molybednum (Mol		Cobalt (Co)-Total (ug/L)					
Lead (Pb)-Total (mg/L)		Copper (Cu)-Total (mg/L)					
Lithium (Li)-Total (mg/L) Magnesium (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (mg/L) Mercury (Hg)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (mg/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Antimony (Sb)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Cadmitum (Cd)-Dissolved (mg/L) Cadmitum (Cd)-Dissolved (mg/L) Cadmitum (Cd)-Dissolved (mg/L) Cadmitum (Cd)-Dissolved (mg/L) Calcium (Cd)-Dissolved (mg/L) Chromium (Cf)-Dissolved (mg/L)		Iron (Fe)-Total (mg/L)					
Magnesium (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (mg/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Siliver (Ag)-Total (mg/L) Siliver (Ag)-Total (mg/L) Silver (Ag)-Total (mg/L) Thallium (Ti)-Total (mg/L) Trailium (Ti)-Total (mg/L) Trailium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Uranium (U)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Cadmium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L)		Lead (Pb)-Total (mg/L)					
Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (ug/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Tin (Sn)-Total (mg/L) Tin (Sn)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Berylium (Be)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Lithium (Li)-Total (mg/L)					
Mercury (Hg)-Total (ug/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (mg/L) Silicon (Si)-Total (mg/L) Silicon (Si)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sp-Total (mg/L) Thallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Dissolved Metals Piltration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Ba)-Dissolved (mg/L) Beryllium (Ba)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cf)-Dissolved (mg/L) Chromium (Cf)-Dissolved (mg/L)		Magnesium (Mg)-Total (mg/L)					
Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sp)-Total (mg/L) Ttallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Tianium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Vanadium (V)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Baryllium (Be)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Be)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (C7)-Dissolved (mg/L)		Manganese (Mn)-Total (mg/L)					
Nickel (Ni)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Siliver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)-Total (mg/L) Selenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Aluminum (Al)-Dissolved (mg/L) Artsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Molybdenum (Mo)-Total (mg/L)					
Selenium (Se)-Total (ug/L) Silicon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Ti)-Total (mg/L) Titanium (Ti)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Cadmium (Cd)-Dissolved (ug/L) Cadmium (Cd)-Dissolved (ug/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Nickel (Ni)-Total (mg/L)					
Siltcon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Tl)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Potassium (K)-Total (mg/L)					
Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (TI)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Selenium (Se)-Total (ug/L)					
Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Thallium (Ti)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Silicon (Si)-Total (mg/L)					
Strontium (Sr)-Total (mg/L) Thallium (Tl)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Silver (Ag)-Total (mg/L)					
Thallium (TI)-Total (mg/L) Tin (Sn)-Total (mg/L) Uranium (U)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (AI)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Sodium (Na)-Total (mg/L)					
Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Strontium (Sr)-Total (mg/L)					
Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Thallium (TI)-Total (mg/L)					
Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Tin (Sn)-Total (mg/L)					
Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Metals Filtration Location Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Titanium (Ti)-Total (mg/L)					
Zinc (Zn)-Total (mg/L) Dissolved Metals Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Uranium (U)-Total (mg/L)					
Dissolved Metals Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Vanadium (V)-Total (mg/L)					
Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Zinc (Zn)-Total (mg/L)					
Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)	Dissolved Metals	Dissolved Mercury Filtration Location					
Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Dissolved Metals Filtration Location					
Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Aluminum (Al)-Dissolved (mg/L)					
Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Antimony (Sb)-Dissolved (mg/L)					
Beryllium (Be)-Dissolved (ug/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Arsenic (As)-Dissolved (mg/L)					
Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Barium (Ba)-Dissolved (mg/L)					
Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Beryllium (Be)-Dissolved (ug/L)					
Cadmium (Cd)-Dissolved (ug/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Bismuth (Bi)-Dissolved (mg/L)					
Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L)		Boron (B)-Dissolved (mg/L)					
Chromium (Cr)-Dissolved (mg/L)		Cadmium (Cd)-Dissolved (ug/L)					
		Calcium (Ca)-Dissolved (mg/L)					
Cobalt (Co)-Dissolved (ug/L)		Chromium (Cr)-Dissolved (mg/L)					
		Cobalt (Co)-Dissolved (ug/L)					

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-16 WS 27-MAY-19 15:30 RG_EROL_WS_20 190527-1530 FB- HG	L2280498-17 WS 27-MAY-19 15:45 RG_DUP_WS_201 90527-1545 FB-HG		
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)				
	Chromium (Cr)-Total (mg/L)				
	Cobalt (Co)-Total (ug/L)				
	Copper (Cu)-Total (mg/L)				
	Iron (Fe)-Total (mg/L)				
	Lead (Pb)-Total (mg/L)				
	Lithium (Li)-Total (mg/L)				
	Magnesium (Mg)-Total (mg/L)				
	Manganese (Mn)-Total (mg/L)				
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)				
	Nickel (Ni)-Total (mg/L)				
	Potassium (K)-Total (mg/L)				
	Selenium (Se)-Total (ug/L)				
	Silicon (Si)-Total (mg/L)				
	Silver (Ag)-Total (mg/L)				
	Sodium (Na)-Total (mg/L)				
	Strontium (Sr)-Total (mg/L)				
	Thallium (TI)-Total (mg/L)				
	Tin (Sn)-Total (mg/L)				
	Titanium (Ti)-Total (mg/L)				
	Uranium (U)-Total (mg/L)				
	Vanadium (V)-Total (mg/L)				
	Zinc (Zn)-Total (mg/L)				
Dissolved Metals	Dissolved Mercury Filtration Location				
	Dissolved Metals Filtration Location				
	Aluminum (AI)-Dissolved (mg/L)				
	Antimony (Sb)-Dissolved (mg/L)				
	Arsenic (As)-Dissolved (mg/L)				
	Barium (Ba)-Dissolved (mg/L)				
	Beryllium (Be)-Dissolved (ug/L)				
	Bismuth (Bi)-Dissolved (mg/L)				
	Boron (B)-Dissolved (mg/L)				
	Cadmium (Cd)-Dissolved (ug/L)				
	Calcium (Ca)-Dissolved (mg/L)				
	Chromium (Cr)-Dissolved (mg/L)				
	Cobalt (Co)-Dissolved (ug/L)				

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

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05-JUN-19 08:39 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-1 WS 27-MAY-19 10:45 RG_GO13_WS_20 190527-1045	L2280498-2 WS 27-MAY-19 12:40 RG_ERWSF_WS_ 20190527-1240	US 27-MAY-19 14:00 RG_STPD_WS_20 190527-1400	L2280498-4 WS 27-MAY-19 14:30 RG_FBLANK_WS_ 20190527-1430	L2280498-5 WS 27-MAY-19 14:30 RG_TRIP_WS_201 90527-1430
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.174	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0288	0.0023	0.0057	<0.0010	
	Magnesium (Mg)-Dissolved (mg/L)	69.7	14.3	19.0	<0.10	<0.0050
	Manganese (Mn)-Dissolved (mg/L)	0.0257	0.00146	<0.00010	<0.00010	
	Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00204	0.000512	0.000867	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.00095	0.00062	<0.00050	<0.00050	
	Potassium (K)-Dissolved (mg/L)	2.04	1.36	0.470	<0.050	<0.050
	Selenium (Se)-Dissolved (ug/L)	63.1	0.548	6.17	<0.050	
	Silicon (Si)-Dissolved (mg/L)	2.56	2.47	1.03	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.00010	
	Sodium (Na)-Dissolved (mg/L)	9.83	16.7	3.44	<0.050	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.451	0.149	0.171	<0.00020	
	Thallium (TI)-Dissolved (mg/L)	0.000013	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00298	0.000471	0.000829	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-6 WS 27-MAY-19 12:00 RG_ER_WS_2019 0527-1200	L2280498-7 WS 27-MAY-19 14:00 RG_GC_WS_2019 0527-1400	L2280498-8 WS 27-MAY-19 15:30 RG_EROL_WS_20 190527-1530	L2280498-9 WS 27-MAY-19 15:45 RG_DUP_WS_201 90527-1545	L2280498-10 WS 27-MAY-19 10:45 RG_G013_WS_20 190527-1045 FB- HG
Grouping	Analyte					110
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0013	0.0011	0.0038	0.0040	
	Magnesium (Mg)-Dissolved (mg/L)	9.42	7.86	14.7	14.0	
	Manganese (Mn)-Dissolved (mg/L)	0.00381	0.00149	0.00318	0.00252	
	Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.0000050	<0.000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000518	0.000365	0.000583	0.000586	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Potassium (K)-Dissolved (mg/L)	0.499	0.499	0.509	0.498	
	Selenium (Se)-Dissolved (ug/L)	0.418	0.566	2.25	2.49	
	Silicon (Si)-Dissolved (mg/L)	2.37	2.89	2.28	2.23	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	3.09	2.04	3.03	3.14	
	Strontium (Sr)-Dissolved (mg/L)	0.128	0.0799	0.132	0.140	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000668	0.000476	0.000504	0.000561	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	<0.0010	0.0011	<0.0010	

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-11 WS 27-MAY-19 12:40 RG_ERWSF_WS_ 20190527-1240 FB-HG	L2280498-12 WS 27-MAY-19 14:00 RG_STPD_WS_20 190527-1400 FB- HG	L2280498-13 WS 27-MAY-19 14:30 RG_FBLANK_WS_ 20190527-1430 FB-HG	L2280498-14 WS 27-MAY-19 12:00 RG_ER_WS_2019 0527-1200 FB-HG	L2280498-15 WS 27-MAY-19 14:00 RG_GC_WS_2019 0527-1400 FB-HG
Grouping	Analyte					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (ug/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (TI)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2280498-16 WS 27-MAY-19 15:30 RG_EROL_WS_20 190527-1530 FB-HG	L2280498-17 WS 27-MAY-19 15:45 RG_DUP_WS_201 90527-1545 FB-HG		
Grouping	Analyte	. 110			
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)				
	Iron (Fe)-Dissolved (mg/L)				
	Lead (Pb)-Dissolved (mg/L)				
	Lithium (Li)-Dissolved (mg/L)				
	Magnesium (Mg)-Dissolved (mg/L)				
	Manganese (Mn)-Dissolved (mg/L)				
	Mercury (Hg)-Dissolved (mg/L)				
	Molybdenum (Mo)-Dissolved (mg/L)				
	Nickel (Ni)-Dissolved (mg/L)				
	Potassium (K)-Dissolved (mg/L)				
	Selenium (Se)-Dissolved (ug/L)				
	Silicon (Si)-Dissolved (mg/L)				
	Silver (Ag)-Dissolved (mg/L)				
	Sodium (Na)-Dissolved (mg/L)				
	Strontium (Sr)-Dissolved (mg/L)				
	Thallium (TI)-Dissolved (mg/L)				
	Tin (Sn)-Dissolved (mg/L)				
	Titanium (Ti)-Dissolved (mg/L)				
	Uranium (U)-Dissolved (mg/L)				
	Vanadium (V)-Dissolved (mg/L)				
	Zinc (Zn)-Dissolved (mg/L)				

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

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Qualifiers for Sample Submission Listed:

Qualifier	Description				
SFPL	Sample was Filtered and Preserved at the laboratory - DOC/D-METAL/D-HG FILTERED AND PRESERVED AT THE LAB				
OC Samples with Qualifiers & Comments:					

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2280498-1, -2, -3, -4, -6, -7, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2280498-9
Matrix Spike	Boron (B)-Dissolved	MS-B	L2280498-9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2280498-1, -2, -3, -4, -6, -7, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2280498-9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2280498-1, -2, -3, -4, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2280498-9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2280498-9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2280498-9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2280498-1, -2, -3, -4, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2280498-9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2280498-1, -2, -3, -4, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2280498-9
Matrix Spike	Barium (Ba)-Total	MS-B	L2280498-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2280498-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2280498-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L2280498-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2280498-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

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

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

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subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL

Water

Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

with stannous chloride, and analyzed by CVAAS of CVAFS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically

after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended

hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

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

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

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

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

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 0

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C.

The increase in vial weight represents the total dissolved solids (TDS).

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

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

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

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

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

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

Williager is determined using block digestion followed by Flow injection analysis with nucleacerice detection.

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

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

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

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

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

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

 Laboratory Definition Code
 Laboratory Location

 CL
 ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

 VA
 ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

REDSIDE SHINER

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Workorder: L2280498 Report Date: 05-JUN-19 Page 1 of 14

Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test Ma	trix Reference	Result Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL W	ater					
Batch R4656522						
WG3066693-3 DUP	L2280498-6					
Acidity (as CaCO3)	2.1	1.8	mg/L	17	20	03-JUN-19
WG3066693-2 LCS			•			
Acidity (as CaCO3)		105.4	%		85-115	03-JUN-19
WG3066693-5 LCS		404.0	0/			
Acidity (as CaCO3)		104.2	%		85-115	03-JUN-19
WG3066693-1 MB		4.0	· · · · · · //		_	
Acidity (as CaCO3)		1.2	mg/L		2	03-JUN-19
WG3066693-4 MB		4.0	· · · · · · //		_	
Acidity (as CaCO3)		1.0	mg/L		2	03-JUN-19
LK-MAN-CL Wa	ater					
Batch R4656666						
WG3066728-15 DUP	L2280498-6					
Alkalinity, Total (as CaCO3)	104	93.1	mg/L	11	20	03-JUN-19
WG3066728-14 LCS						
Alkalinity, Total (as CaCO3)		99.9	%		85-115	03-JUN-19
WG3066728-13 MB						
Alkalinity, Total (as CaCO3)		<1.0	mg/L		1	03-JUN-19
BE-D-L-CCMS-VA Wa	ater					
Batch R4650852						
WG3062345-10 LCS						
Beryllium (Be)-Dissolved		94.6	%		80-120	30-MAY-19
WG3062345-9 MB	LF					
Beryllium (Be)-Dissolved		<0.000020	mg/L		0.00002	30-MAY-19
Batch R4652862						
WG3063543-2 LCS						
Beryllium (Be)-Dissolved		100.1	%		80-120	31-MAY-19
WG3063543-1 MB	LF					
Beryllium (Be)-Dissolved		<0.000020	mg/L		0.00002	31-MAY-19
E-T-L-CCMS-VA W	ater					
Batch R4651391						
WG3062303-2 LCS						
Beryllium (Be)-Total		102.2	%		80-120	30-MAY-19
WG3062303-1 MB					-	
Beryllium (Be)-Total		<0.000020	mg/L		0.00002	30-MAY-19
	-4		-			
BR-L-IC-N-CL Wa	ater					



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Test Ma	trix Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL Wa	ater						
Batch R4650451							
WG3062671-3 DUP Bromide (Br)	L2280498-5 <0.050	<0.050	RPD-NA	mg/L	N/A	20	29-MAY-19
WG3062671-2 LCS Bromide (Br)		101.3		%		85-115	29-MAY-19
WG3062671-1 MB Bromide (Br)		<0.050		mg/L		0.05	29-MAY-19
WG3062671-4 MS Bromide (Br)	L2280498-5	109.7		%		75-125	29-MAY-19
C-DIS-ORG-LOW-CL Wa	ater						
Batch R4651987							
WG3063861-3 DUP Dissolved Organic Carbon	L2280498-2 3.40	3.48		mg/L	2.4	20	30-MAY-19
WG3063861-2 LCS Dissolved Organic Carbon		99.2		%		80-120	30-MAY-19
WG3063861-1 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	30-MAY-19
WG3063861-4 MS Dissolved Organic Carbon	L2280498-2	74.7		%		70-130	30-MAY-19
Batch R4653378							
WG3064893-2 LCS Dissolved Organic Carbon		88.0		%		80-120	31-MAY-19
WG3064893-6 LCS Dissolved Organic Carbon		97.8		%		80-120	31-MAY-19
WG3064893-1 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	31-MAY-19
WG3064893-5 MB Dissolved Organic Carbon		<0.50		mg/L		0.5	31-MAY-19
_	ater			Ü			
Batch R4651987							
WG3063861-3 DUP Total Organic Carbon	L2280498-2 3.36	3.37		mg/L	0.3	20	30-MAY-19
WG3063861-2 LCS Total Organic Carbon		100.5		%		80-120	30-MAY-19
WG3063861-1 MB Total Organic Carbon		<0.50		mg/L		0.5	30-MAY-19
WG3063861-4 MS Total Organic Carbon	L2280498-2	82.9		%			



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	Water							
Batch R4653378 WG3064893-2 LCS Total Organic Carbon			93.6		%		80-120	31-MAY-19
WG3064893-6 LCS Total Organic Carbon			104.9		%		80-120	31-MAY-19
WG3064893-1 MB Total Organic Carbon			<0.50		mg/L		0.5	31-MAY-19
WG3064893-5 MB Total Organic Carbon			<0.50		mg/L		0.5	31-MAY-19
CL-IC-N-CL	Water							
Batch R4650451								
WG3062671-3 DUP Chloride (CI)		L2280498-5 <0.50	<0.50	RPD-NA	mg/L	N/A	20	29-MAY-19
WG3062671-2 LCS Chloride (CI)			99.9		%		90-110	29-MAY-19
WG3062671-1 MB Chloride (CI)			<0.50		mg/L		0.5	29-MAY-19
WG3062671-4 MS Chloride (Cl)		L2280498-5	105.1		%		75-125	29-MAY-19
EC-L-PCT-CL	Water							
Batch R4656666								
WG3066728-15 DUP Conductivity (@ 25C)		L2280498-6 234	232		uS/cm	0.9	10	03-JUN-19
WG3066728-14 LCS Conductivity (@ 25C)			106.7		%		90-110	03-JUN-19
WG3066728-13 MB Conductivity (@ 25C)			<2.0		uS/cm		2	03-JUN-19
F-IC-N-CL	Water							
Batch R4650451 WG3062671-3 DUP Fluoride (F)		L2280498-5 <0.020	<0.020	RPD-NA	mg/L	N/A	20	29-MAY-19
WG3062671-2 LCS Fluoride (F)		10.020	104.9	INI D-IVA	%	N/A	90-110	29-MAY-19
WG3062671-1 MB Fluoride (F)			<0.020		mg/L		0.02	29-MAY-19
WG3062671-4 MS Fluoride (F)		L2280498-5	109.2		%		75-125	29-MAY-19
HG-D-CVAA-VA	Water							



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Test I	Matrix	Reference	Result Q	ualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	Water							
Batch R4651720								
WG3063454-2 LCS			101.5		%		00.400	04.8487/40
Mercury (Hg)-Dissolved			101.5		70		80-120	31-MAY-19
WG3063454-1 MB Mercury (Hg)-Dissolved			<0.0000050		mg/L		0.000005	31-MAY-19
	Water				Ü			01.111.11
	water							
Batch R4657434 WG3067395-5 DUP		L2280498-8						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	04-JUN-19
WG3067395-2 LCS								
Mercury (Hg)-Total			100.6		%		80-120	04-JUN-19
WG3067395-1 MB					4			
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	04-JUN-19
WG3067395-6 MS Mercury (Hg)-Total		L2280498-9	95.7		%		70-130	04-JUN-19
, , ,			00.1		70		70-130	04-3011-13
	Water							
Batch R4650852 WG3062345-10 LCS								
Aluminum (Al)-Dissolved			100.7		%		80-120	30-MAY-19
Antimony (Sb)-Dissolved			94.9		%		80-120	30-MAY-19
Arsenic (As)-Dissolved			96.7		%		80-120	30-MAY-19
Barium (Ba)-Dissolved			98.2		%		80-120	30-MAY-19
Bismuth (Bi)-Dissolved			100.4		%		80-120	30-MAY-19
Boron (B)-Dissolved			92.9		%		80-120	30-MAY-19
Cadmium (Cd)-Dissolved			95.8		%		80-120	30-MAY-19
Calcium (Ca)-Dissolved			96.1		%		80-120	30-MAY-19
Chromium (Cr)-Dissolved			96.0		%		80-120	30-MAY-19
Cobalt (Co)-Dissolved			96.7		%		80-120	30-MAY-19
Copper (Cu)-Dissolved			94.8		%		80-120	30-MAY-19
Iron (Fe)-Dissolved			94.4		%		80-120	30-MAY-19
Lead (Pb)-Dissolved			98.2		%		80-120	30-MAY-19
Lithium (Li)-Dissolved			93.6		%		80-120	30-MAY-19
Magnesium (Mg)-Dissolve	ed		102.8		%		80-120	30-MAY-19
Manganese (Mn)-Dissolve	ed		95.4		%		80-120	30-MAY-19
Molybdenum (Mo)-Dissolv	red		98.8		%		80-120	30-MAY-19
Nickel (Ni)-Dissolved			94.4		%		80-120	30-MAY-19
Potassium (K)-Dissolved			101.9		%		80-120	30-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R465085	2							
WG3062345-10 LCS Selenium (Se)-Dissolv	od		06.0		0/		00.400	00 MAY 40
` '	eu		96.8 100.2		%		80-120	30-MAY-19
Silicon (Si)-Dissolved							60-140	30-MAY-19
Silver (Ag)-Dissolved			100.7		%		80-120	30-MAY-19
Sodium (Na)-Dissolved			103.6		%		80-120	30-MAY-19
Strontium (Sr)-Dissolv			98.6		%		80-120	30-MAY-19
Thallium (TI)-Dissolved	1		100.2		%		80-120	30-MAY-19
Tin (Sn)-Dissolved			94.8		%		80-120	30-MAY-19
Titanium (Ti)-Dissolve			95.1		%		80-120	30-MAY-19
Uranium (U)-Dissolved			96.4		%		80-120	30-MAY-19
Vanadium (V)-Dissolve	ed		98.7		%		80-120	30-MAY-19
Zinc (Zn)-Dissolved			94.3		%		80-120	30-MAY-19
WG3062345-9 MB Aluminum (Al)-Dissolv	ed	LF	<0.0010		mg/L		0.001	30-MAY-19
Antimony (Sb)-Dissolv	ed		<0.00010		mg/L		0.0001	30-MAY-19
Arsenic (As)-Dissolved	d		<0.00010		mg/L		0.0001	30-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	30-MAY-19
Bismuth (Bi)-Dissolved	d		<0.000050)	mg/L		0.00005	30-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	30-MAY-19
Cadmium (Cd)-Dissolv	/ed		<0.000005	6C	mg/L		0.000005	30-MAY-19
Calcium (Ca)-Dissolve	d		< 0.050		mg/L		0.05	30-MAY-19
Chromium (Cr)-Dissolv	ved		<0.00010		mg/L		0.0001	30-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	30-MAY-19
Copper (Cu)-Dissolved	t		<0.00020		mg/L		0.0002	30-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	30-MAY-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	30-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	30-MAY-19
Magnesium (Mg)-Diss	olved		< 0.0050		mg/L		0.005	30-MAY-19
Manganese (Mn)-Diss	olved		<0.00010		mg/L		0.0001	30-MAY-19
Molybdenum (Mo)-Dis	solved		<0.000050)	mg/L		0.00005	30-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-19
Potassium (K)-Dissolv	ed		<0.050		mg/L		0.05	30-MAY-19
Selenium (Se)-Dissolv			<0.000050)	mg/L		0.00005	30-MAY-19
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	30-MAY-19
Silver (Ag)-Dissolved			<0.000010)	mg/L		0.00001	30-MAY-19
Olivoi (rig) Dissolved			\0.00001C	•	mg/ L		0.00001	30-IVIA I - 18



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Strontium (Sr)-Dissolved <0.00020 mg/L 0.0002 30-No Thallium (Tl)-Dissolved <0.000010 mg/L 0.00001 30-No Tir (Sn)-Dissolved <0.00030 mg/L 0.0003 30-No Uranium (U)-Dissolved <0.000010 mg/L 0.00001 30-No Vanadium (V)-Dissolved <0.00050 mg/L 0.0005 30-No Zinc (Zn)-Dissolved <0.0010 mg/L 0.001 30-No Batch R4652862 WG3063543-2 LCS Aluminum (Al)-Dissolved 108.6 % 80-120 31-No Arsenic (As)-Dissolved 100.3 % 80-120 31-No Barium (Ba)-Dissolved 107.7 % 80-120 31-No Bismuth (Bi)-Dissolved 102.7 % 80-120 31-No Boron (B)-Dissolved 96.2 % 80-120 31-No Cadmium (Cd)-Dissolved 109.0 % 80-120 31-No Chromium (Cr)-Dissolved 102.7 % 80-120	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Sodium (Na)-Dissolved	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Sodium (Na)-Dissolved	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Strontium (Sr)-Dissolved <0.00020	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Thallium (TI)-Dissolved	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Tin (Sn)-Dissolved	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Titanium (Ti)-Dissolved	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Uranium (U)-Dissolved <0.000010	1AY-19 1AY-19 1AY-19 1AY-19 1AY-19
Vanadium (V)-Dissolved <0.00050	1AY-19 1AY-19 1AY-19 1AY-19
Zinc (Zn)-Dissolved <0.0010 mg/L 0.001 30-M Batch R4652862 WG3063543-2 LCS Aluminum (Al)-Dissolved 108.6 % 80-120 31-M Antimony (Sb)-Dissolved 100.3 % 80-120 31-M Arsenic (As)-Dissolved 107.7 % 80-120 31-M Barium (Ba)-Dissolved 108.2 % 80-120 31-M Bismuth (Bi)-Dissolved 102.7 % 80-120 31-M Cadmium (Cd)-Dissolved 96.2 % 80-120 31-M Cadmium (Cd)-Dissolved 109.0 % 80-120 31-M Chromium (Cr)-Dissolved 99.5 % 80-120 31-M Chromium (Cr)-Dissolved 102.7 % 80-120 31-M Copper (Cu)-Dissolved 104.8 % 80-120 31-M Copper (Cu)-Dissolved 103.9 % 80-120 31-M Iron (Fe)-Dissolved 102.7 % 80-120 31-M	1AY-19 1AY-19 1AY-19
Batch R4652862 WG3063543-2 LCS Aluminum (Al)-Dissolved 108.6 % 80-120 31-M Antimony (Sb)-Dissolved 100.3 % 80-120 31-M Arsenic (As)-Dissolved 107.7 % 80-120 31-M Barium (Ba)-Dissolved 108.2 % 80-120 31-M Bismuth (Bi)-Dissolved 102.7 % 80-120 31-M Boron (B)-Dissolved 96.2 % 80-120 31-M Cadmium (Cd)-Dissolved 109.0 % 80-120 31-M Chromium (Ca)-Dissolved 99.5 % 80-120 31-M Chromium (Cr)-Dissolved 102.7 % 80-120 31-M Cobalt (Co)-Dissolved 104.8 % 80-120 31-M Copper (Cu)-Dissolved 103.9 % 80-120 31-M Iron (Fe)-Dissolved 102.7 % 80-120 31-M	1AY-19 1AY-19
WG3063543-2 LCS Aluminum (Al)-Dissolved 108.6 % 80-120 31-M Antimony (Sb)-Dissolved 100.3 % 80-120 31-M Arsenic (As)-Dissolved 107.7 % 80-120 31-M Barium (Ba)-Dissolved 108.2 % 80-120 31-M Bismuth (Bi)-Dissolved 102.7 % 80-120 31-M Boron (B)-Dissolved 96.2 % 80-120 31-M Cadmium (Cd)-Dissolved 109.0 % 80-120 31-M Calcium (Ca)-Dissolved 99.5 % 80-120 31-M Chromium (Cr)-Dissolved 102.7 % 80-120 31-M Cobalt (Co)-Dissolved 104.8 % 80-120 31-M Iron (Fe)-Dissolved 102.7 % 80-120 31-M Iron (Fe)-Dissolved 102.7 % 80-120 31-M	1AY-19
Aluminum (Al)-Dissolved 108.6 % 80-120 31-M Antimony (Sb)-Dissolved 100.3 % 80-120 31-M Arsenic (As)-Dissolved 107.7 % 80-120 31-M Barium (Ba)-Dissolved 108.2 % 80-120 31-M Bismuth (Bi)-Dissolved 102.7 % 80-120 31-M Boron (B)-Dissolved 96.2 % 80-120 31-M Cadmium (Cd)-Dissolved 109.0 % 80-120 31-M Chromium (Ca)-Dissolved 99.5 % 80-120 31-M Chromium (Cr)-Dissolved 102.7 % 80-120 31-M Copper (Cu)-Dissolved 103.9 % 80-120 31-M Iron (Fe)-Dissolved 102.7 % 80-120 31-M	1AY-19
Antimony (Sb)-Dissolved 100.3 % 80-120 31-N Arsenic (As)-Dissolved 107.7 % 80-120 31-N Barium (Ba)-Dissolved 108.2 % 80-120 31-N Bismuth (Bi)-Dissolved 102.7 % 80-120 31-N Boron (B)-Dissolved 96.2 % 80-120 31-N Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N Iron (Fe)-Dissolved 10	1AY-19
Arsenic (As)-Dissolved 107.7 % 80-120 31-N Barium (Ba)-Dissolved 108.2 % 80-120 31-N Bismuth (Bi)-Dissolved 102.7 % 80-120 31-N Boron (B)-Dissolved 96.2 % 80-120 31-N Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	
Barium (Ba)-Dissolved 108.2 % 80-120 31-N Bismuth (Bi)-Dissolved 102.7 % 80-120 31-N Boron (B)-Dissolved 96.2 % 80-120 31-N Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Bismuth (Bi)-Dissolved 102.7 % 80-120 31-N Boron (B)-Dissolved 96.2 % 80-120 31-N Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	
Boron (B)-Dissolved 96.2 % 80-120 31-N Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Cadmium (Cd)-Dissolved 109.0 % 80-120 31-N Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Calcium (Ca)-Dissolved 99.5 % 80-120 31-N Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Chromium (Cr)-Dissolved 102.7 % 80-120 31-N Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Cobalt (Co)-Dissolved 104.8 % 80-120 31-N Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Copper (Cu)-Dissolved 103.9 % 80-120 31-N Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
Iron (Fe)-Dissolved 102.7 % 80-120 31-N	1AY-19
	1AY-19
Lead (Pb)-Dissolved 103.6 % 80-120 31-N	1AY-19
	1AY-19
Lithium (Li)-Dissolved 99.1 % 80-120 31-N	1AY-19
Magnesium (Mg)-Dissolved 105.4 % 80-120 31-N	1AY-19
Manganese (Mn)-Dissolved 106.3 % 80-120 31-N	1AY-19
Molybdenum (Mo)-Dissolved 105.2 % 80-120 31-N	1AY-19
Nickel (Ni)-Dissolved 106.6 % 80-120 31-N	1AY-19
Potassium (K)-Dissolved 106.7 % 80-120 31-N	1AY-19
Selenium (Se)-Dissolved 101.8 % 80-120 31-M	1AY-19
Silicon (Si)-Dissolved 103.7 % 60-140 31-M	1AY-19
Silver (Ag)-Dissolved 104.7 % 80-120 31-M	1AY-19
Sodium (Na)-Dissolved 110.5 % 80-120 31-N	1AY-19
Strontium (Sr)-Dissolved 107.9 % 80-120 31-N	1AY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4652862								
WG3063543-2 LCS			400.0		0/			
Thallium (TI)-Dissolved			102.3		%		80-120	31-MAY-19
Tin (Sn)-Dissolved			103.5 105.8		%		80-120	31-MAY-19
Titanium (Ti)-Dissolved			105.8				80-120	31-MAY-19
Uranium (U)-Dissolved			105.5		%		80-120	31-MAY-19
Vanadium (V)-Dissolved			107.6		%		80-120	31-MAY-19
Zinc (Zn)-Dissolved			107.3		%		80-120	31-MAY-19
WG3063543-1 MB Aluminum (Al)-Dissolved		LF	<0.0010		mg/L		0.001	31-MAY-19
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Bismuth (Bi)-Dissolved			<0.000050)	mg/L		0.00005	31-MAY-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	31-MAY-19
Cadmium (Cd)-Dissolved			<0.000005	6C	mg/L		0.000005	31-MAY-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	31-MAY-19
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	31-MAY-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	31-MAY-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	31-MAY-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	31-MAY-19
Magnesium (Mg)-Dissolve	ed		<0.0050		mg/L		0.005	31-MAY-19
Manganese (Mn)-Dissolve			<0.00010		mg/L		0.0001	31-MAY-19
Molybdenum (Mo)-Dissolv	ved		<0.000050)	mg/L		0.00005	31-MAY-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	31-MAY-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	31-MAY-19
Selenium (Se)-Dissolved			<0.000050)	mg/L		0.00005	31-MAY-19
Silicon (Si)-Dissolved			< 0.050		mg/L		0.05	31-MAY-19
Silver (Ag)-Dissolved			<0.000010)	mg/L		0.00001	31-MAY-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	31-MAY-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	31-MAY-19
Thallium (TI)-Dissolved			<0.000010)	mg/L		0.00001	31-MAY-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	31-MAY-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	31-MAY-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4652862								
WG3063543-1 MB Uranium (U)-Dissolved		LF	<0.000010		ma/l		0.00001	24 MAY 40
Vanadium (V)-Dissolved			<0.00050		mg/L		0.00001	31-MAY-19
Zinc (Zn)-Dissolved			<0.00030		mg/L mg/L		0.0005	31-MAY-19
			<0.0010		IIIg/∟		0.001	31-MAY-19
MET-T-CCMS-VA	Water							
Batch R4651391 WG3062303-2 LCS								
WG3062303-2 LCS Aluminum (Al)-Total			109.1		%		80-120	30-MAY-19
Antimony (Sb)-Total			106.9		%		80-120	30-MAY-19
Arsenic (As)-Total			106.5		%		80-120	30-MAY-19
Barium (Ba)-Total			113.9		%		80-120	30-MAY-19
Bismuth (Bi)-Total			110.6		%		80-120	30-MAY-19
Boron (B)-Total			99.3		%		80-120	30-MAY-19
Cadmium (Cd)-Total			106.7		%		80-120	30-MAY-19
Calcium (Ca)-Total			101.2		%		80-120	30-MAY-19
Chromium (Cr)-Total			109.8		%		80-120	30-MAY-19
Cobalt (Co)-Total			106.0		%		80-120	30-MAY-19
Copper (Cu)-Total			103.8		%		80-120	30-MAY-19
Iron (Fe)-Total			98.8		%		80-120	30-MAY-19
Lead (Pb)-Total			103.5		%		80-120	30-MAY-19
Lithium (Li)-Total			102.6		%		80-120	30-MAY-19
Magnesium (Mg)-Total			105.9		%		80-120	30-MAY-19
Manganese (Mn)-Total			108.9		%		80-120	30-MAY-19
Molybdenum (Mo)-Total			106.4		%		80-120	30-MAY-19
Nickel (Ni)-Total			106.9		%		80-120	30-MAY-19
Potassium (K)-Total			107.5		%		80-120	30-MAY-19
Selenium (Se)-Total			112.9		%		80-120	30-MAY-19
Silicon (Si)-Total			109.6		%		80-120	30-MAY-19
Silver (Ag)-Total			110.2		%		80-120	30-MAY-19
Sodium (Na)-Total			99.4		%		80-120	30-MAY-19
Strontium (Sr)-Total			102.0		%		80-120	30-MAY-19
Thallium (TI)-Total			104.3		%		80-120	30-MAY-19
Tin (Sn)-Total			104.2		%		80-120	30-MAY-19
Titanium (Ti)-Total			105.5		%		80-120	30-MAY-19
Uranium (U)-Total			102.0		%		80-120	30-MAY-19



Workorder: L2280498 Report Date: 05-JUN-19

Page 9 of 14

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4651391								
WG3062303-2 LCS			407.0		0.4			
Vanadium (V)-Total			107.8		%		80-120	30-MAY-19
Zinc (Zn)-Total			109.2		%		80-120	30-MAY-19
WG3062303-1 MB Aluminum (Al)-Total			<0.0030		mg/L		0.003	30-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Bismuth (Bi)-Total			<0.000050)	mg/L		0.00005	30-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	30-MAY-19
Cadmium (Cd)-Total			<0.000005	SC .	mg/L		0.000005	30-MAY-19
Calcium (Ca)-Total			< 0.050		mg/L		0.05	30-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	30-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	30-MAY-19
Lead (Pb)-Total			<0.000050)	mg/L		0.00005	30-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	30-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	30-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Molybdenum (Mo)-Total			<0.000050)	mg/L		0.00005	30-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	30-MAY-19
Potassium (K)-Total			< 0.050		mg/L		0.05	30-MAY-19
Selenium (Se)-Total			<0.000050)	mg/L		0.00005	30-MAY-19
Silicon (Si)-Total			<0.10		mg/L		0.1	30-MAY-19
Silver (Ag)-Total			<0.000010)	mg/L		0.00001	30-MAY-19
Sodium (Na)-Total			< 0.050		mg/L		0.05	30-MAY-19
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	30-MAY-19
Thallium (TI)-Total			<0.000010)	mg/L		0.00001	30-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	30-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	30-MAY-19
Uranium (U)-Total			<0.000010)	mg/L		0.00001	30-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	30-MAY-19
Zinc (Zn)-Total			< 0.0030		mg/L		0.003	30-MAY-19

NH3-L-F-CL Water



Workorder: L2280498 Report Date: 05-JUN-19 Page 10 of 14

Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL		Water						_	
Batch R4 WG3066145-12 Ammonia as N	654407 DUP		L2280498-4 <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	03-JUN-19
WG3066145-10 Ammonia as N	LCS			98.7		%		85-115	03-JUN-19
WG3066145-6 Ammonia as N	LCS			100.7		%		85-115	03-JUN-19
WG3066145-5 Ammonia as N	МВ			<0.0050		mg/L		0.005	03-JUN-19
WG3066145-9 Ammonia as N	MB			0.0.0004		mg/L			03-JUN-19
WG3066145-11 Ammonia as N	MS		L2280498-4	100.1		%		75-125	03-JUN-19
NO2-L-IC-N-CL		Water							
Batch R4 WG3062671-3 Nitrite (as N)	650451 DUP		L2280498-5 <0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20 MAY 40
WG3062671-2 Nitrite (as N)	LCS		\0.0010	102.8	KPD-NA	111g/L %	IN/A	90-110	29-MAY-19 29-MAY-19
WG3062671-1 Nitrite (as N)	МВ			<0.0010		mg/L		0.001	29-MAY-19
WG3062671-4 Nitrite (as N)	MS		L2280498-5	107.7		%		75-125	29-MAY-19
NO3-L-IC-N-CL		Water							
Batch R4	650451								
WG3062671-3 Nitrate (as N)	DUP		L2280498-5 <0.0050	<0.0050	RPD-NA	mg/L	N/A	20	29-MAY-19
WG3062671-2 Nitrate (as N)	LCS			100.0		%		90-110	29-MAY-19
WG3062671-1 Nitrate (as N)	MB			<0.0050		mg/L		0.005	29-MAY-19
WG3062671-4 Nitrate (as N)	MS		L2280498-5	105.1		%		75-125	29-MAY-19
ORP-CL		Water							
Batch R4	655009								
WG3066587-5 ORP	CRM		CL-ORP	221		mV		210-230	03-JUN-19
WG3066587-6 ORP	DUP		L2280498-7 406	419	J	mV	12.4	15	03-JUN-19



Workorder: L2280498 Report Date: 05-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	Water							
Batch R4654027 WG3065686-22 LCS Phosphorus (P)-Total			103.7		%		80-120	31-MAY-19
WG3065686-21 MB Phosphorus (P)-Total			<0.0020		mg/L		0.002	31-MAY-19
PH-CL	Water							
Batch R4656666 WG3066728-15 DUP pH	i	L2280498-6 8.05	8.05	J	рН	0.00	0.2	03-JUN-19
WG3066728-14 LCS pH			6.99		рН		6.9-7.1	03-JUN-19
PO4-DO-L-COL-CL	Water							
Batch R4651439 WG3062056-18 LCS Orthophosphate-Dissol			106.3		%		80-120	29-MAY-19
WG3062056-17 MB Orthophosphate-Dissol	ved (as P)		<0.0010		mg/L		0.001	29-MAY-19
SO4-IC-N-CL	Water							
Batch R4650451 WG3062671-3 DUP Sulfate (SO4)		L2280498-5 <0.30	<0.30	RPD-NA	mg/L	N/A	20	29-MAY-19
WG3062671-2 LCS Sulfate (SO4)			100.7		%		90-110	29-MAY-19
WG3062671-1 MB Sulfate (SO4)			<0.30		mg/L		0.3	29-MAY-19
WG3062671-4 MS Sulfate (SO4)		L2280498-5	109.2		%		75-125	29-MAY-19
SOLIDS-TDS-CL	Water							
Batch R4654421 WG3064813-14 LCS Total Dissolved Solids			96.6		%		85-115	01-JUN-19
WG3064813-13 MB Total Dissolved Solids			<10		mg/L		10	01-JUN-19
TKN-L-F-CL	Water							
Batch R4653955 WG3065563-12 DUP Total Kjeldahl Nitrogen WG3065563-11 LCS		L2280498-9 0.087	0.083		mg/L	5.5	20	02-JUN-19



Workorder: L2280498 Report Date: 05-JUN-19 Page 12 of 14

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed		
TKN-L-F-CL	Water									
Batch R4653955										
WG3065563-11 LCS Total Kjeldahl Nitrogen			92.0		%		75-125	02-JUN-19		
WG3065563-14 LCS Total Kjeldahl Nitrogen			90.8		%		75-125	02-JUN-19		
WG3065563-2 LCS Total Kjeldahl Nitrogen			90.9		%		75-125	02-JUN-19		
WG3065563-5 LCS Total Kjeldahl Nitrogen			91.8		%		75-125	02-JUN-19		
WG3065563-8 LCS Total Kjeldahl Nitrogen			90.7		%		75-125	02-JUN-19		
WG3065563-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUN-19		
WG3065563-10 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUN-19		
WG3065563-13 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUN-19		
WG3065563-4 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUN-19		
WG3065563-7 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUN-19		
TSS-L-CL	Water									
Batch R4653174										
WG3064541-10 LCS Total Suspended Solids			97.2		%		85-115	31-MAY-19		
WG3064541-9 MB Total Suspended Solids			<1.0		mg/L		1	31-MAY-19		
TURBIDITY-CL	Water									
Batch R4652366										
WG3063857-2 LCS Turbidity			97.0		%		85-115	30-MAY-19		
WG3063857-1 MB Turbidity			<0.10		NTU		0.1	30-MAY-19		

Workorder: L2280498 Report Date: 05-JUN-19 Page 13 of 14

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

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

Workorder: L2280498 Report Date: 05-JUN-19 Page 14 of 14

Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	ll by elect.						
	1	27-MAY-19 10:45	03-JUN-19 14:30	0.25	172	hours	EHTR-FM
	2	27-MAY-19 12:40	03-JUN-19 14:30	0.25	170	hours	EHTR-FM
	3	27-MAY-19 14:00	03-JUN-19 14:30	0.25	168	hours	EHTR-FM
	4	27-MAY-19 14:30	03-JUN-19 14:30	0.25	168	hours	EHTR-FM
	5	27-MAY-19 14:30	03-JUN-19 14:30	0.25	168	hours	EHTR-FM
	6	27-MAY-19 12:00	03-JUN-19 14:30	0.25	170	hours	EHTR-FM
	7	27-MAY-19 14:00	03-JUN-19 14:30	0.25	168	hours	EHTR-FM
	8	27-MAY-19 15:30	03-JUN-19 14:30	0.25	167	hours	EHTR-FM
	9	27-MAY-19 15:45	03-JUN-19 14:30	0.25	167	hours	EHTR-FM
pН							
	1	27-MAY-19 10:45	03-JUN-19 09:00	0.25	166	hours	EHTR-FM
	2	27-MAY-19 12:40	03-JUN-19 09:00	0.25	164	hours	EHTR-FM
	3	27-MAY-19 14:00	03-JUN-19 09:00	0.25	163	hours	EHTR-FM
	4	27-MAY-19 14:30	03-JUN-19 09:00	0.25	162	hours	EHTR-FM
	5	27-MAY-19 14:30	03-JUN-19 09:00	0.25	162	hours	EHTR-FM
	6	27-MAY-19 12:00	03-JUN-19 09:00	0.25	165	hours	EHTR-FM
	7	27-MAY-19 14:00	03-JUN-19 09:00	0.25	163	hours	EHTR-FM
	8	27-MAY-19 15:30	03-JUN-19 09:00	0.25	162	hours	EHTR-FM
	9	27-MAY-19 15:45	03-JUN-19 09:00	0.25	161	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2280498 were received on 28-MAY-19 09:15.

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

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

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

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

Date Received: 04-JUN-19

Report Date: 11-JUN-19 16:37 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2284959
Project P.O. #: VPO00616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-LENTIC 19-12

Legal Site Desc:

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Lyudmyla Shvets, B.Sc. Account Manager

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L2284959 CONTD.... PAGE 2 of 8

ALS ENVIRONMENTAL ANALYTICAL REPORT

11-JUN-19 16:37 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L2284959-1 WS 03-JUN-19 09:30 RG_STPD_WS_20 190603-0930	L2284959-2 WS 03-JUN-19 12:00 RG_ER_WS_2019 0603-1200	
Grouping	Analyte			
WATER	•			
Physical Tests	Conductivity (@ 25C) (uS/cm)	409	189	
	Hardness (as CaCO3) (mg/L)	205	86.5	
	pH (pH)	8.29	8.08	
	ORP (mV)	469	362	
	Total Suspended Solids (mg/L)	<1.0	15.4	
	Total Dissolved Solids (mg/L)	DLHC 223	102	
	Turbidity (NTU)	0.90	15.0	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.2	1.1	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	159	80.2	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	3.2	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	162	80.2	
	Ammonia as N (mg/L)	0.0192	0.0245	
	Bromide (Br) (mg/L)	<0.050	<0.050	
	Chloride (CI) (mg/L)	2.45	1.32	
	Fluoride (F) (mg/L)	0.171	0.055	
	Ion Balance (%)	97.2	94.6	
	Nitrate (as N) (mg/L)	0.640	0.146	
	Nitrite (as N) (mg/L)	0.0055	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.375	0.207	
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0026	0.0056	
	Sulfate (SO4) (mg/L)	48.2	13.1	
	Anion Sum (meq/L)	4.37	1.93	
	Cation Sum (meq/L)	4.25	1.82	
	Cation - Anion Balance (%)	-1.4	-2.8	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.28	1.11	
	Total Organic Carbon (mg/L)	1.37	1.53	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0053	0.350	
	Antimony (Sb)-Total (mg/L)	0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00019	0.00045	
	Barium (Ba)-Total (mg/L)	0.0929	0.0255	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0149	0.0068	

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

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	Sample ID Description Sampled Date Sampled Time Client ID	L2284959-1 WS 03-JUN-19 09:30 RG_STPD_WS_20 190603-0930	L2284959-2 WS 03-JUN-19 12:00 RG_ER_WS_2019 0603-1200		
Grouping	Analyte				
WATER					
Total Metals	Calcium (Ca)-Total (mg/L)	56.8	27.7		
	Chromium (Cr)-Total (mg/L)	0.00030	0.00054		
	Cobalt (Co)-Total (ug/L)	<0.10	0.23		
	Copper (Cu)-Total (mg/L)	<0.00050	0.00068		
	Iron (Fe)-Total (mg/L)	0.021	0.352		
	Lead (Pb)-Total (mg/L)	<0.000050	0.000435		
	Lithium (Li)-Total (mg/L)	0.0062	0.0011		
	Magnesium (Mg)-Total (mg/L)	15.2	6.73		
	Manganese (Mn)-Total (mg/L)	0.00676	0.0147		
	Mercury (Hg)-Total (ug/L)	<0.00050	0.00103		
	Molybdenum (Mo)-Total (mg/L)	0.000984	0.000461		
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00055		
	Potassium (K)-Total (mg/L)	0.534	0.472		
	Selenium (Se)-Total (ug/L)	5.67	0.092		
	Silicon (Si)-Total (mg/L)	1.87	2.60		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	2.91	1.80		
	Strontium (Sr)-Total (mg/L)	0.166	0.107		
	Thallium (TI)-Total (mg/L)	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.000854	0.000582		
	Vanadium (V)-Total (mg/L)	<0.00050	0.00071		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030		
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB		
	Dissolved Metals Filtration Location	LAB	LAB		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	0.0147		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	0.00014	0.00031		
	Barium (Ba)-Dissolved (mg/L)	0.0879	0.0218		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0104	0.0053		
	Calcium (Ca)-Dissolved (mg/L)	56.1	25.2		
	Chromium (Cr)-Dissolved (mg/L)	0.00012	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10		

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

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ALS ENVIRONMENTAL ANALYTICAL REPORT

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	Sample ID Description Sampled Date Sampled Time Client ID	L2284959-1 WS 03-JUN-19 09:30 RG_STPD_WS_20 190603-0930	L2284959-2 WS 03-JUN-19 12:00 RG_ER_WS_2019 0603-1200		
Grouping	Analyte				
WATER					
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0058	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	15.8	5.70		
	Manganese (Mn)-Dissolved (mg/L)	0.00016	0.00451		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000983	0.000506		
	Nickel (Ni)-Dissolved (mg/L)	0.00057	<0.00050		
	Potassium (K)-Dissolved (mg/L)	0.516	0.434		
	Selenium (Se)-Dissolved (ug/L)	5.64	0.116		
	Silicon (Si)-Dissolved (mg/L)	1.81	2.01		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	2.95	1.81		
	Strontium (Sr)-Dissolved (mg/L)	0.167	0.104		
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000800	0.000549		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0017	0.0224		

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

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					3 OI O
	Reference I	nformatio	n	11-JUN-19 16:	` '
Qualifiare for Samuel				Version:	FINAL
Qualifier Tor Sampi	e Submission Listed:				
	Description				
SFPL	Sample was Filtered and Preserved at the laborator	ry - DOC/D-META	L/D-HG FILTERED AND PRI	ESERVED AT TH	HE LAB
QC Samples with Qua	lifiers & Comments:				
QC Type Description	Parameter	Qualifier	Applies to Sample Number	·(s)	
Method Blank	Aluminum (AI)-Dissolved	В	L2284959-1, -2		
Method Blank	Chromium (Cr)-Dissolved	MB-LOR	L2284959-2		
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2284959-1		
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2284959-1, -2		
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2284959-2		
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2284959-1		
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2284959-1, -2		
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2284959-2		
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2284959-1		
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2284959-1, -2		
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2284959-2		
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2284959-1		
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2284959-1, -2		
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2284959-1		
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2284959-1, -2		
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2284959-2		
Matrix Spike	Barium (Ba)-Total	MS-B	L2284959-1, -2		
Matrix Spike	Calcium (Ca)-Total	MS-B	L2284959-1, -2		
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2284959-1, -2		
Matrix Spike	Strontium (Sr)-Total	MS-B	L2284959-1, -2		
Qualifiers for Individ	ual Parameters Listed:				
Qualifier Desc	ription				
B Meth	od Blank exceeds ALS DQO. Associated sample resul	Its which are ~ Lir	mit of Reporting or > 5 times h	nlank level are co	nsidered
- IVICUI	ou bluin onoccus ald byo. Associated salliple lesul	no willon are 🔪 🗀	THE OF INOPORTING OF A DELITION I	manik iovoi ait 60	/ ISIGOI GU

Qualifier	Description
В	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

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

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

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

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

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

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

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

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

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

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

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

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL

Water

Total Organic Carbon

APHA 5310 TOTAL ORGANIC CARBON (TOC)

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

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.

TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

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

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

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

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

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

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

HARDNESS-CALC-VA Water Hardness APHA 2340B

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Reference Information

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al.

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

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

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

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

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

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

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

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

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

APHA 4500 H-Electrode

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TURBIDITY-CL Water **Turbidity** APHA 2130 B-Nephelometer

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

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

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

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

Chain of Custody Numbers:

Reference Information

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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Workorder: L2284959 Report Date: 11-JUN-19 Page 1 of 14

Client: Teck Coal Ltd.

421 Pine Avenue

Sparwood BC V0B 2G0

Contact: Cait Good

Test	Matrix	Reference	Result Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	Water						
Batch R4663639							
WG3073547-5 LCS Acidity (as CaCO3)			101.2	%		85-115	10-JUN-19
WG3073547-4 MB Acidity (as CaCO3)			<1.0	mg/L		2	10-JUN-19
ALK-MAN-CL	Water						
Batch R4663608 WG3073486-11 LCS Alkalinity, Total (as CaCO	03)		100.8	%		85-115	10-JUN-19
WG3073486-10 MB	,						
Alkalinity, Total (as CaCO	03)		<1.0	mg/L		1	10-JUN-19
BE-D-L-CCMS-VA	Water						
Batch R4660281 WG3069572-2 LCS							
Beryllium (Be)-Dissolved			99.6	%		80-120	06-JUN-19
WG3069572-1 MB Beryllium (Be)-Dissolved		LF	<0.000020	mg/L		0.00002	06-JUN-19
Batch R4661141							
WG3070334-2 LCS Beryllium (Be)-Dissolved			92.5	%		80-120	07-JUN-19
WG3070334-1 MB Beryllium (Be)-Dissolved		LF	<0.000020	mg/L		0.00002	07-JUN-19
BE-T-L-CCMS-VA	Water						
Batch R4661141							
WG3069458-2 LCS Beryllium (Be)-Total			99.1	%		80-120	07-JUN-19
WG3069458-1 MB Beryllium (Be)-Total			<0.000020	mg/L		0.00002	07-JUN-19
BR-L-IC-N-CL	Water						
Batch R4659986							
WG3069383-6 LCS Bromide (Br)			102.6	%		85-115	05-JUN-19
WG3069383-5 MB Bromide (Br)			<0.050	mg/L		0.05	05-JUN-19
C-DIS-ORG-LOW-CL	Water						



Workorder: L2284959

Report Date: 11-JUN-19

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Test	Matrix	Reference	Result (Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	Water							
Batch R4660317 WG3069773-10 LCS Dissolved Organic Carbo	on		110.6		%		80-120	10-JUN-19
WG3069773-9 MB Dissolved Organic Carbo	on		<0.50		mg/L		0.5	06-JUN-19
C-TOT-ORG-LOW-CL	Water							
Batch R4660317 WG3069773-10 LCS Total Organic Carbon			87.4		%		80-120	05-JUN-19
WG3069773-9 MB Total Organic Carbon			<0.50		mg/L		0.5	05-JUN-19
CL-IC-N-CL	Water							
Batch R4659986								
WG3069383-6 LCS Chloride (CI)			101.0		%		90-110	05-JUN-19
WG3069383-5 MB Chloride (Cl)			<0.50		mg/L		0.5	05-JUN-19
EC-L-PCT-CL	Water							
WG3073486-11 LCS Conductivity (@ 25C)			104.8		%		90-110	10-JUN-19
WG3073486-10 MB Conductivity (@ 25C)			<2.0		uS/cm		2	10-JUN-19
F-IC-N-CL	Water							
Batch R4659986								
WG3069383-6 LCS Fluoride (F)			104.3		%		90-110	05-JUN-19
WG3069383-5 MB Fluoride (F)			<0.020		mg/L		0.02	05-JUN-19
HG-D-CVAA-VA	Water							
Batch R4663103 WG3072650-3 DUP Mercury (Hg)-Dissolved		L2284959-2 <0.000050	<0.0000050	RPD-NA	mg/L	N/A	20	10-JUN-19
WG3072650-2 LCS Mercury (Hg)-Dissolved			99.3		%		80-120	10-JUN-19
WG3072650-4 MS Mercury (Hg)-Dissolved		L2284959-1	102.1		%		70-130	10-JUN-19
HG-T-U-CVAF-VA	Water							



Workorder: L2284959 Report Date: 11-JUN-19 Page 3 of 14

est N	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	Water							
Batch R4661583								
WG3071293-5 DUP		L2284959-1						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	07-JUN-19
WG3071293-2 LCS			106.6		0/		00.400	07 11 11 40
Mercury (Hg)-Total			106.6		%		80-120	07-JUN-19
WG3071293-1 MB Mercury (Hg)-Total			<0.00050		ug/L		0.0005	07-JUN-19
	Water		10.0000		~g/ =		0.0000	07-3011-13
Batch R4660281	vater							
WG3069572-2 LCS								
Aluminum (Al)-Dissolved			96.0		%		80-120	06-JUN-19
Antimony (Sb)-Dissolved			95.5		%		80-120	06-JUN-19
Arsenic (As)-Dissolved			96.0		%		80-120	06-JUN-19
Barium (Ba)-Dissolved			98.0		%		80-120	06-JUN-19
Bismuth (Bi)-Dissolved			93.8		%		80-120	06-JUN-19
Cadmium (Cd)-Dissolved			100.8		%		80-120	06-JUN-19
Calcium (Ca)-Dissolved			98.9		%		80-120	06-JUN-19
Cobalt (Co)-Dissolved			96.1		%		80-120	06-JUN-19
Copper (Cu)-Dissolved			95.8		%		80-120	06-JUN-19
Iron (Fe)-Dissolved			92.5		%		80-120	06-JUN-19
Lead (Pb)-Dissolved			97.9		%		80-120	06-JUN-19
Lithium (Li)-Dissolved			96.9		%		80-120	06-JUN-19
Magnesium (Mg)-Dissolve	d		96.0		%		80-120	06-JUN-19
Manganese (Mn)-Dissolve	d		97.0		%		80-120	06-JUN-19
Molybdenum (Mo)-Dissolve	ed		98.2		%		80-120	06-JUN-19
Nickel (Ni)-Dissolved			95.9		%		80-120	06-JUN-19
Potassium (K)-Dissolved			93.9		%		80-120	06-JUN-19
Selenium (Se)-Dissolved			101.5		%		80-120	06-JUN-19
Silicon (Si)-Dissolved			101.2		%		60-140	06-JUN-19
Silver (Ag)-Dissolved			95.4		%		80-120	06-JUN-19
Sodium (Na)-Dissolved			103.1		%		80-120	06-JUN-19
Strontium (Sr)-Dissolved			98.5		%		80-120	06-JUN-19
Thallium (TI)-Dissolved			94.5		%		80-120	06-JUN-19
Tin (Sn)-Dissolved			98.4		%		80-120	06-JUN-19
Titanium (Ti)-Dissolved			92.4		%		80-120	06-JUN-19
Uranium (U)-Dissolved			96.2		%		80-120	06-JUN-19
Vanadium (V)-Dissolved			96.9		%		80-120	06-JUN-19



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est Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA Water							
Batch R4660281							
WG3069572-2 LCS Zinc (Zn)-Dissolved		96.5		%		90 120	06-JUN-19
WG3069572-1 MB	LF	30.5		70		80-120	06-3014-19
Aluminum (Al)-Dissolved	LF	<0.0010		mg/L		0.001	06-JUN-19
Antimony (Sb)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Arsenic (As)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Barium (Ba)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Bismuth (Bi)-Dissolved		<0.000050		mg/L		0.00005	06-JUN-19
Cadmium (Cd)-Dissolved		<0.000005	С	mg/L		0.000005	06-JUN-19
Calcium (Ca)-Dissolved		<0.050		mg/L		0.05	06-JUN-19
Cobalt (Co)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Copper (Cu)-Dissolved		<0.00020		mg/L		0.0002	06-JUN-19
Iron (Fe)-Dissolved		<0.010		mg/L		0.01	06-JUN-19
Lead (Pb)-Dissolved		<0.000050		mg/L		0.00005	06-JUN-19
Lithium (Li)-Dissolved		<0.0010		mg/L		0.001	06-JUN-19
Magnesium (Mg)-Dissolved		< 0.0050		mg/L		0.005	06-JUN-19
Manganese (Mn)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Molybdenum (Mo)-Dissolved		<0.000050		mg/L		0.00005	06-JUN-19
Nickel (Ni)-Dissolved		<0.00050		mg/L		0.0005	06-JUN-19
Potassium (K)-Dissolved		< 0.050		mg/L		0.05	06-JUN-19
Selenium (Se)-Dissolved		<0.000050		mg/L		0.00005	06-JUN-19
Silicon (Si)-Dissolved		< 0.050		mg/L		0.05	06-JUN-19
Silver (Ag)-Dissolved		<0.000010		mg/L		0.00001	06-JUN-19
Sodium (Na)-Dissolved		< 0.050		mg/L		0.05	06-JUN-19
Strontium (Sr)-Dissolved		<0.00020		mg/L		0.0002	06-JUN-19
Thallium (TI)-Dissolved		<0.000010		mg/L		0.00001	06-JUN-19
Tin (Sn)-Dissolved		<0.00010		mg/L		0.0001	06-JUN-19
Titanium (Ti)-Dissolved		<0.00030		mg/L		0.0003	06-JUN-19
Uranium (U)-Dissolved		<0.000010		mg/L		0.00001	06-JUN-19
Vanadium (V)-Dissolved		<0.00050		mg/L		0.0005	06-JUN-19
Zinc (Zn)-Dissolved		<0.0010		mg/L		0.001	06-JUN-19
Batch R4661141							
WG3070334-2 LCS Aluminum (Al)-Dissolved		100.7		0/_		00.400	07 1111 40
Antimony (Sb)-Dissolved		98.8		%		80-120	07-JUN-19
Antimony (Sb)-Dissolved Arsenic (As)-Dissolved		98.2		%		80-120 80-120	07-JUN-19 07-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R46611	41							
WG3070334-2 LC			00.0		0/			
Barium (Ba)-Dissolve			96.3		%		80-120	07-JUN-19
Bismuth (Bi)-Dissolve	ea		96.8		%		80-120	07-JUN-19
Boron (B)-Dissolved	. L d		93.1		%		80-120	07-JUN-19
Cadmium (Cd)-Disso			99.4		%		80-120	07-JUN-19
Calcium (Ca)-Dissolv			96.5		%		80-120	07-JUN-19
Chromium (Cr)-Disso			94.7		%		80-120	07-JUN-19
Cobalt (Co)-Dissolve			100.0		%		80-120	07-JUN-19
Copper (Cu)-Dissolv	ed		98.1		%		80-120	07-JUN-19
Iron (Fe)-Dissolved			98.1		%		80-120	07-JUN-19
Lead (Pb)-Dissolved			97.2		%		80-120	07-JUN-19
Lithium (Li)-Dissolve			94.9		%		80-120	07-JUN-19
Magnesium (Mg)-Dis			93.6		%		80-120	07-JUN-19
Manganese (Mn)-Dis			100.7		%		80-120	07-JUN-19
Molybdenum (Mo)-D			102.3		%		80-120	07-JUN-19
Nickel (Ni)-Dissolved			98.2		%		80-120	07-JUN-19
Potassium (K)-Disso			98.1		%		80-120	07-JUN-19
Selenium (Se)-Disso			99.0		%		80-120	07-JUN-19
Silicon (Si)-Dissolved			107.2		%		60-140	07-JUN-19
Silver (Ag)-Dissolved	I		97.7		%		80-120	07-JUN-19
Sodium (Na)-Dissolv	ed		101.3		%		80-120	07-JUN-19
Strontium (Sr)-Disso	lved		99.8		%		80-120	07-JUN-19
Thallium (TI)-Dissolv	ed		97.1		%		80-120	07-JUN-19
Tin (Sn)-Dissolved			99.2		%		80-120	07-JUN-19
Titanium (Ti)-Dissolv	red		105.0		%		80-120	07-JUN-19
Uranium (U)-Dissolve	ed		93.0		%		80-120	07-JUN-19
Vanadium (V)-Dissol	ved		100.7		%		80-120	07-JUN-19
Zinc (Zn)-Dissolved			102.5		%		80-120	07-JUN-19
WG3070334-1 MB		LF		_				
Aluminum (Al)-Disso			0.0010	В	mg/L		0.001	07-JUN-19
Antimony (Sb)-Disso			<0.00010		mg/L		0.0001	07-JUN-19
Arsenic (As)-Dissolve			<0.00010		mg/L		0.0001	07-JUN-19
Barium (Ba)-Dissolve			<0.00010		mg/L		0.0001	07-JUN-19
Bismuth (Bi)-Dissolve	ed		<0.00005	50	mg/L		0.00005	07-JUN-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	07-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R46	61141							
WG3070334-1	MB	LF		_				
Cadmium (Cd)-D			<0.000005	6C	mg/L		0.000005	07-JUN-19
Calcium (Ca)-Dis			<0.050		mg/L		0.05	07-JUN-19
Chromium (Cr)-E			<0.00010		mg/L		0.0001	07-JUN-19
Cobalt (Co)-Diss			<0.00010		mg/L		0.0001	07-JUN-19
Copper (Cu)-Dis			<0.00020		mg/L		0.0002	07-JUN-19
Iron (Fe)-Dissolv			<0.010		mg/L		0.01	07-JUN-19
Lead (Pb)-Dissol	ved		<0.000050)	mg/L		0.00005	07-JUN-19
Lithium (Li)-Disso	olved		<0.0010		mg/L		0.001	07-JUN-19
Magnesium (Mg)	-Dissolved		< 0.0050		mg/L		0.005	07-JUN-19
Manganese (Mn))-Dissolved		<0.00010		mg/L		0.0001	07-JUN-19
Molybdenum (Mo	o)-Dissolved		<0.000050)	mg/L		0.00005	07-JUN-19
Nickel (Ni)-Disso	lved		<0.00050		mg/L		0.0005	07-JUN-19
Potassium (K)-D	issolved		< 0.050		mg/L		0.05	07-JUN-19
Selenium (Se)-D	issolved		<0.000050)	mg/L		0.00005	07-JUN-19
Silicon (Si)-Disso	olved		< 0.050		mg/L		0.05	07-JUN-19
Silver (Ag)-Disso	lved		<0.000010)	mg/L		0.00001	07-JUN-19
Sodium (Na)-Dis	solved		< 0.050		mg/L		0.05	07-JUN-19
Strontium (Sr)-Di	issolved		<0.00020		mg/L		0.0002	07-JUN-19
Thallium (TI)-Dis	solved		<0.000010)	mg/L		0.00001	07-JUN-19
Tin (Sn)-Dissolve	ed		<0.00010		mg/L		0.0001	07-JUN-19
Titanium (Ti)-Dis	solved		<0.00030		mg/L		0.0003	07-JUN-19
Uranium (U)-Diss	solved		<0.000010)	mg/L		0.00001	07-JUN-19
Vanadium (V)-Di	ssolved		<0.00050		mg/L		0.0005	07-JUN-19
Zinc (Zn)-Dissolv	ved		<0.0010		mg/L		0.001	07-JUN-19
Batch R46	662888							
	LCS		101.0		0/		00.100	00 11111 15
Aluminum (Al)-D			101.2		%		80-120	08-JUN-19
Antimony (Sb)-D			99.0		%		80-120	08-JUN-19
Arsenic (As)-Diss			98.8		%		80-120	08-JUN-19
Barium (Ba)-Diss			101.5		%		80-120	08-JUN-19
Bismuth (Bi)-Diss			99.8		%		80-120	08-JUN-19
Boron (B)-Dissol			96.1		%		80-120	08-JUN-19
Cadmium (Cd)-D			100.5		%		80-120	08-JUN-19
Calcium (Ca)-Dis	ssolved		99.7		%		80-120	08-JUN-19



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Test	Matrix	Reference	Result (Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R466288	8							
WG3071513-2 LCS								
Chromium (Cr)-Dissolv			99.3		%		80-120	08-JUN-19
Cobalt (Co)-Dissolved			99.0		%		80-120	08-JUN-19
Copper (Cu)-Dissolved	d		96.5		%		80-120	08-JUN-19
Iron (Fe)-Dissolved			96.4		%		80-120	08-JUN-19
Lead (Pb)-Dissolved			97.8		%		80-120	08-JUN-19
Lithium (Li)-Dissolved			96.8		%		80-120	08-JUN-19
Magnesium (Mg)-Diss	olved		95.2		%		80-120	08-JUN-19
Manganese (Mn)-Diss			97.3		%		80-120	08-JUN-19
Molybdenum (Mo)-Dis	solved		97.5		%		80-120	08-JUN-19
Nickel (Ni)-Dissolved			97.8		%		80-120	08-JUN-19
Potassium (K)-Dissolv	red		101.8		%		80-120	08-JUN-19
Selenium (Se)-Dissolv	red		99.6		%		80-120	08-JUN-19
Silicon (Si)-Dissolved			102.8		%		60-140	08-JUN-19
Silver (Ag)-Dissolved			97.6		%		80-120	08-JUN-19
Sodium (Na)-Dissolved	d		99.2		%		80-120	08-JUN-19
Strontium (Sr)-Dissolve	ed		97.7		%		80-120	08-JUN-19
Thallium (TI)-Dissolved	d		98.2		%		80-120	08-JUN-19
Tin (Sn)-Dissolved			97.2		%		80-120	08-JUN-19
Titanium (Ti)-Dissolve	d		98.0		%		80-120	08-JUN-19
Uranium (U)-Dissolved	d		102.2		%		80-120	08-JUN-19
Vanadium (V)-Dissolve	ed		100.1		%		80-120	08-JUN-19
Zinc (Zn)-Dissolved			97.3		%		80-120	08-JUN-19
WG3071513-1 MB		LF						
Aluminum (Al)-Dissolv	red		<0.0010		mg/L		0.001	08-JUN-19
Antimony (Sb)-Dissolv	red		<0.00010		mg/L		0.0001	08-JUN-19
Arsenic (As)-Dissolved	t		<0.00010		mg/L		0.0001	08-JUN-19
Barium (Ba)-Dissolved	i		<0.00010		mg/L		0.0001	08-JUN-19
Bismuth (Bi)-Dissolved	t		<0.000050		mg/L		0.00005	08-JUN-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-JUN-19
Cadmium (Cd)-Dissolv	ved		<0.0000050		mg/L		0.000005	08-JUN-19
Calcium (Ca)-Dissolve	ed		<0.050		mg/L		0.05	08-JUN-19
Chromium (Cr)-Dissolv	ved		0.00020	MB-LOR	mg/L		0.0001	08-JUN-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-19
Copper (Cu)-Dissolved	d		<0.00020		mg/L		0.0002	08-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	Water							
Batch R4662888								
WG3071513-1 MB		LF						
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-JUN-19
Lead (Pb)-Dissolved			<0.000050)	mg/L		0.00005	08-JUN-19
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	08-JUN-19
Magnesium (Mg)-Dissolve	ed		<0.0050		mg/L		0.005	08-JUN-19
Manganese (Mn)-Dissolve	ed		<0.00010		mg/L		0.0001	08-JUN-19
Molybdenum (Mo)-Dissolv	⁄ed		<0.000050)	mg/L		0.00005	08-JUN-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-JUN-19
Potassium (K)-Dissolved			< 0.050		mg/L		0.05	08-JUN-19
Selenium (Se)-Dissolved			<0.000050)	mg/L		0.00005	08-JUN-19
Silicon (Si)-Dissolved			< 0.050		mg/L		0.05	08-JUN-19
Silver (Ag)-Dissolved			<0.000010)	mg/L		0.00001	08-JUN-19
Sodium (Na)-Dissolved			< 0.050		mg/L		0.05	08-JUN-19
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	08-JUN-19
Thallium (TI)-Dissolved			<0.000010)	mg/L		0.00001	08-JUN-19
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	08-JUN-19
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	08-JUN-19
Uranium (U)-Dissolved			<0.000010)	mg/L		0.00001	08-JUN-19
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	08-JUN-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-JUN-19
MET-T-CCMS-VA	Water							
Batch R4661141								
WG3069458-2 LCS								
Aluminum (AI)-Total			105.6		%		80-120	07-JUN-19
Antimony (Sb)-Total			105.1		%		80-120	07-JUN-19
Arsenic (As)-Total			102.5		%		80-120	07-JUN-19
Barium (Ba)-Total			99.0		%		80-120	07-JUN-19
Bismuth (Bi)-Total			98.4		%		80-120	07-JUN-19
Boron (B)-Total			94.1		%		80-120	07-JUN-19
Cadmium (Cd)-Total			98.0		%		80-120	07-JUN-19
Calcium (Ca)-Total			99.8		%		80-120	07-JUN-19
Chromium (Cr)-Total			99.6		%		80-120	07-JUN-19
Cobalt (Co)-Total			101.0		%		80-120	07-JUN-19
Copper (Cu)-Total			101.8		%		80-120	07-JUN-19
Iron (Fe)-Total			98.0		%		80-120	07-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4661141								
WG3069458-2 LCS			00.4		0/			
Lead (Pb)-Total			99.4		%		80-120	07-JUN-19
Lithium (Li)-Total			100.2		%		80-120	07-JUN-19
Magnesium (Mg)-Total			99.2		%		80-120	07-JUN-19
Manganese (Mn)-Total			103.3		%		80-120	07-JUN-19
Molybdenum (Mo)-Total			104.0		%		80-120	07-JUN-19
Nickel (Ni)-Total			101.0		%		80-120	07-JUN-19
Potassium (K)-Total			102.8		%		80-120	07-JUN-19
Selenium (Se)-Total			102.4		%		80-120	07-JUN-19
Silicon (Si)-Total			110.8		%		80-120	07-JUN-19
Silver (Ag)-Total			102.4		%		80-120	07-JUN-19
Sodium (Na)-Total			105.6		%		80-120	07-JUN-19
Strontium (Sr)-Total			102.2		%		80-120	07-JUN-19
Thallium (TI)-Total			98.4		%		80-120	07-JUN-19
Tin (Sn)-Total			100.3		%		80-120	07-JUN-19
Titanium (Ti)-Total			101.3		%		80-120	07-JUN-19
Uranium (U)-Total			98.2		%		80-120	07-JUN-19
Vanadium (V)-Total			102.8		%		80-120	07-JUN-19
Zinc (Zn)-Total			101.9		%		80-120	07-JUN-19
WG3069458-1 MB								
Aluminum (AI)-Total			<0.0030		mg/L		0.003	07-JUN-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Bismuth (Bi)-Total			<0.00005	0	mg/L		0.00005	07-JUN-19
Boron (B)-Total			<0.010		mg/L		0.01	07-JUN-19
Cadmium (Cd)-Total			<0.00000	5C	mg/L		0.000005	07-JUN-19
Calcium (Ca)-Total			< 0.050		mg/L		0.05	07-JUN-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-JUN-19
Iron (Fe)-Total			<0.010		mg/L		0.01	07-JUN-19
Lead (Pb)-Total			<0.00005	0	mg/L		0.00005	07-JUN-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-JUN-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-JUN-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch R4661141								
WG3069458-1 MB Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-JUN-19
Molybdenum (Mo)-Total			<0.00010		mg/L		0.0001	07-JUN-19 07-JUN-19
Nickel (Ni)-Total			<0.00050		mg/L			07-JUN-19 07-JUN-19
Potassium (K)-Total			<0.050		mg/L		0.0005 0.05	07-JUN-19 07-JUN-19
Selenium (Se)-Total			<0.00050		mg/L		0.0005	07-JUN-19 07-JUN-19
Silicon (Si)-Total			<0.10		mg/L		0.00003	07-JUN-19 07-JUN-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	07-JUN-19 07-JUN-19
Sodium (Na)-Total			<0.050		mg/L		0.00001	07-JUN-19 07-JUN-19
Strontium (Sr)-Total			<0.00020		mg/L			
Thallium (TI)-Total			<0.00020		mg/L		0.0002	07-JUN-19
Tin (Sn)-Total			<0.00010		•		0.00001	07-JUN-19
, ,			<0.00010		mg/L		0.0001	07-JUN-19
Titanium (Ti)-Total					mg/L		0.0003	07-JUN-19
Uranium (U)-Total Vanadium (V)-Total			<0.000010 <0.00050		mg/L		0.00001	07-JUN-19
			<0.00030		mg/L		0.0005	07-JUN-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-JUN-19
NH3-L-F-CL	Water							
Batch R4663746								
WG3073877-6 LCS Ammonia as N			100.4		%		85-115	10-JUN-19
			100.4		76		00-110	10-JUN-19
WG3073877-5 MB Ammonia as N			<0.0050		mg/L		0.005	10-JUN-19
NO2-L-IC-N-CL	Water				•			
Batch R4659986	Water							
WG3069383-6 LCS								
Nitrite (as N)			102.7		%		90-110	05-JUN-19
WG3069383-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	05-JUN-19
NO3-L-IC-N-CL	Water							
Batch R4659986								
WG3069383-6 LCS								
Nitrate (as N)			101.4		%		90-110	05-JUN-19
WG3069383-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	05-JUN-19
ORP-CL	Water							



Workorder: L2284959 Report Date: 11-JUN-19 Page 11 of 14

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	Water							
Batch R4663272 WG3073457-5 CRM ORP		CL-ORP	221		mV		210-230	10-JUN-19
P-T-L-COL-CL	Water							
Batch R4661866 WG3071733-10 LCS Phosphorus (P)-Total			104.3		%		80-120	08-JUN-19
WG3071733-9 MB Phosphorus (P)-Total			<0.0020		mg/L		0.002	08-JUN-19
PH-CL	Water							
Batch R4663608 WG3073486-11 LCS pH			7.00		рН		6.9-7.1	10-JUN-19
PO4-DO-L-COL-CL	Water							
Batch R4660176 WG3068707-16 LCS Orthophosphate-Dissolv	ed (as P)		101.0		%		80-120	05-JUN-19
WG3068707-4 MB Orthophosphate-Dissolv	ed (as P)		<0.0010		mg/L		0.001	05-JUN-19
SO4-IC-N-CL	Water							
Batch R4659986 WG3069383-6 LCS Sulfate (SO4)			101.9		%		00.440	05 1111 40
WG3069383-5 MB Sulfate (SO4)			<0.30		mg/L		90-110	05-JUN-19 05-JUN-19
SOLIDS-TDS-CL	Water				-			
Batch R4661605 WG3069450-14 LCS								
Total Dissolved Solids			94.7		%		85-115	06-JUN-19
WG3069450-13 MB Total Dissolved Solids			<10		mg/L		10	06-JUN-19
TKN-L-F-CL	Water							
Batch R4662410 WG3072380-10 LCS Total Kjeldahl Nitrogen WG3072380-2 LCS			92.4		%		75-125	07-JUN-19



Workorder: L2284959 Report

Report Date: 11-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	Water							
Batch R4662410 WG3072380-2 LCS Total Kjeldahl Nitrogen			92.5		%		75-125	07-JUN-19
WG3072380-6 LCS Total Kjeldahl Nitrogen			92.6		%		75-125	07-JUN-19
WG3072380-1 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-JUN-19
WG3072380-5 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-JUN-19
WG3072380-9 MB Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	07-JUN-19
TSS-L-CL	Water							
Batch R4661216 WG3069523-14 LCS Total Suspended Solids			109.2		%		85-115	06-JUN-19
WG3069523-13 MB Total Suspended Solids			<1.0		mg/L		1	06-JUN-19
TURBIDITY-CL	Water							
Batch R4660813								
WG3070154-2 LCS Turbidity			97.5		%		85-115	06-JUN-19
WG3070154-1 MB Turbidity			<0.10		NTU		0.1	06-JUN-19

Workorder: L2284959 Report Date: 11-JUN-19 Page 13 of 14

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
В	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Workorder: L2284959 Report Date: 11-JUN-19 Page 14 of 14

Hold Time Exceedances:

	Sample						
ALS Product Description	ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potentia	al by elect.						
	1	03-JUN-19 09:30	10-JUN-19 08:20	0.25	167	hours	EHTR-FM
	2	03-JUN-19 12:00	10-JUN-19 08:20	0.25	164	hours	EHTR-FM
рН							
	1	03-JUN-19 09:30	10-JUN-19 16:00	0.25	174	hours	EHTR-FM
	2	03-JUN-19 12:00	10-JUN-19 16:00	0.25	172	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.

EHTR: Exceeded ALS recommended hold time prior to sample receipt.

EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes. Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2284959 were received on 04-JUN-19 09:35.

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

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

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

Teck

COC ID: REP-Lentic 19-12 TURNAROUND TIME: PROJECT/CLIENT INFO LABORATORY Facility Name / Job# Regional Effects Program (REP) Lab Name ALS Colgary Excel PDF EDD Project Manager Cait Good Lab Contact Lyudmyla Shvets Entail lyudmyla.shvets@alsglobal.com Email cait.good@teck.com Address 2559 29 Street NE Address 421 Pine Avenue City Colpary City BC Province AB Spanyood Province V0B 2G0 Postal Code T1Y 7B5 Canada Postal Code Canada Country Country Phone Number 250-425-8202 Phone Number 1 403 407 1794 VPO 616180 SAMPLE DETAILS Filtered - Fr Field, In Lab. Fig Stell & Lab. N. News ANALYSIS REQUESTED Ν 112504 IINQ3 Hazardous Material (Yes/No) PECKCOAL-MET-T-VA TECKCOAL-ROUTINE LS_Package-TKN/FOC TECKCOAL-MET-D ALS_Package-DOC IG-T-U-CVAR-VA Field Time G=Grab : # Qf Matrix C=Comp Cont. Sample ID Sample Location Date (24hr) RG_STPD_W5_20190603-0930 RG STPD WS No 03-June-19 0930 G 7 Х Х Х RG_ER_WS_20190603-1200 RG ER ws 09-June-19 1200 $\overline{\mathbf{G}}$ 7 Х No RELINQUISHED BY/AFFILIATION ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS ACCEPTED BY/AFFILIATION For Sample RG_DUP_WS_20190507-1300 there are 2 bottles labelled as dissolved metals. One of these bottles was acidified. Could the bottles be tested to see which one was acidified and could a total metals sample be collected from the general sample? AND OF BOTTLES RETURNED/DESCRIPTION 7-1 Regular (default) x Sampler's Name Mobile# Priority (2-3 husiness days) - 50% surcharge Emergency (1 Business Day) - 100% surcharge Sampler's Signature Date/Time For Entergency <1 Day, ASAP or Weekend - Contact ALS



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

Date Received: 20-JUN-19

Report Date: 03-JUL-19 16:40 (MT)

Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2295901Project P.O. #: VPO00616180

Job Reference: REGIONAL EFFECTS PROGRAM

C of C Numbers: REP-Lentic 19-10

Legal Site Desc:

Lyudmyla Shvets, B.Sc.

Account Manager

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ADDRESS: 2559 29 Street NE, Calgary, AB T1Y 7B5 Canada | Phone: +1 403 291 9897 | Fax: +1 403 291 0298

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ALS LABORATORY GROUP CHEMICAL ANALYSIS REPORT

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2295901-9	RG_ER_WS_201906	319-1100							
Sample Date:	CLIENT on 19-JUN-19 @) 11:00							
Matrix:	WS								
	Routine for Teck Co	pal							
	Phosphorus (P)-	Total							
	Phosphorus (P)-Total	0.0061		0.002	mg/L		24-JUN-19	NK1
	Ion Balance		107		-100	%		28-JUN-19	
	ORP		413		-1000	mV		25-JUN-19	RMS
	рН		8.09		0.1	pН		27-JUN-19	RMS
	Turbidity								
	Turbidity		5.32		0.1	NTU		21-JUN-19	RGB
	Total Suspended								
	Total Suspende	ed Solids	5.2		1	mg/L		25-JUN-19	EDT
	Total Dissolved S		444	D. 110	40	,			
	Total Dissolved		114	DLHC	13	mg/L		24-JUN-19	LT2
	Sulfate in Water	by IC	16.5		0.2	ma/l		20-JUN-19	SND
	Sulfate (SO4)	Dissolved (se D)	16.5		0.3	mg/L		Z0-JUN-19	טווט
	Orthophosphate-	e-Dissolved (as P)	<0.0010		0.001	mg/L		20-JUN-19	RZF
	Nitrite in Water b	, ,	10.0010		0.001	liig/L		20 0011 10	'\Z'
	Nitrite (as N)	y ic (Low Level)	0.0014		0.001	mg/L		20-JUN-19	SND
	Nitrate in Water I	ov IC (Low Level)							
	Nitrate (as N)	, , (,	0.122		0.005	mg/L		20-JUN-19	SND
	Ion Balance Calc	ulation							
	Cation - Anion	Balance	3.3			%		28-JUN-19	
	Anion Sum		2.12			meq/L		28-JUN-19	
	Cation Sum		2.27			meq/L		28-JUN-19	
	Fluoride in Water	r by IC	0.050		0.00			00 11 11 40	OND
	Fluoride (F)		0.058		0.02	mg/L		20-JUN-19	SND
	Electrical Condu- Conductivity (@	•	204		2	uS/cm		27-JUN-19	RMS
	Chloride in Wate		204		_	uo/ciii		27-0014-10	TAMO
	Chloride (CI)	i by ic	1.35		0.5	mg/L		20-JUN-19	SND
	` ,	r by IC (Low Level)							
	Bromide (Br)	, (,	<0.050		0.05	mg/L		20-JUN-19	SND
	Ammonia, Total (as N)							
	Ammonia as N		<0.0050		0.005	mg/L		25-JUN-19	LWY
		es) by Manual Titration							
		rbonate (as CaCO3)	86.6		1	mg/L		27-JUN-19	RMS
		onate (as CaCO3)	<1.0 <1.0		1	mg/L		27-JUN-19	RMS RMS
	Alkalinity, Hydr Alkalinity, Tota	oxide (as CaCO3)	86.6		1	mg/L mg/L		27-JUN-19 27-JUN-19	RMS
	Acidity by Autom	,	00.0		'	g/L		2, 3014-10	1.1110
	Acidity by Autom Acidity (as CaC		<1.0		1	mg/L		27-JUN-19	RMS
	Dissolved Metals in								
	Hardness								
	Hardness (as 0	CaCO3)	108		0.5	mg/L		26-JUN-19	
		in Water by CRC ICPMS							
		als Filtration Location	LAB					24-JUN-19	EM2
	Aluminum (Al)-		0.0107		0.003	mg/L	24-JUN-19	25-JUN-19	KBD
	Antimony (Sb)- Arsenic (As)-D		<0.00010 0.00032		0.0001	mg/L mg/L	24-JUN-19 24-JUN-19	25-JUN-19 25-JUN-19	KBD KBD
	Aiscilio (As)-D	IOOO! YOU	0.0002		0.0001	ilig/L	2- 0014-13	20 0014-19	מטא
			1	1	1	1	1	1	Rev# 1.00

ALS LABORATORY GROUP CHEMICAL ANALYSIS REPORT

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2295901-9	RG_ER_WS_201906	519-1100							
	: CLIENT on 19-JUN-19								
Matrix:	WS	2 11.00							
IVIALITA.									
	Dissolved Metals in								
		in Water by CRC ICPMS			0.0004	,,	04 11 11 40	05 11 11 40	LADD
	Barium (Ba)-Di		0.0306		0.0001	mg/L	24-JUN-19	25-JUN-19	KBD
	Bismuth (Bi)-D		<0.000050		0.00005	mg/L	24-JUN-19	25-JUN-19	KBD
	Boron (B)-Diss		<0.010		0.01	mg/L	24-JUN-19	25-JUN-19	KBD
	Cadmium (Cd)	-DISSOIVED	<0.0000050		0.00000	mg/L	24-JUN-19	25-JUN-19	KBD
	Calcium (Ca)-E	Dissolved	29.6		0.05	mg/L	24-JUN-19	25-JUN-19	KBD
	Chromium (Cr)	-Dissolved	<0.00010		0.0001	mg/L	24-JUN-19	25-JUN-19	KBD
	Cobalt (Co)-Dis	ssolved	<0.00010		0.0001	mg/L	24-JUN-19	25-JUN-19	KBD
	Copper (Cu)-D	issolved	<0.00050		0.0005	mg/L	24-JUN-19	25-JUN-19	KBD
	Iron (Fe)-Disso	lved	<0.010		0.01	mg/L	24-JUN-19	25-JUN-19	KBD
	Lead (Pb)-Diss		<0.000050		0.00005	mg/L	24-JUN-19	25-JUN-19	KBD
	Lithium (Li)-Dis		0.0011		0.001	mg/L	24-JUN-19	25-JUN-19	KBD
	Magnesium (M		8.36		0.1	mg/L	24-JUN-19	25-JUN-19	KBD
	Manganese (M		0.00012		0.0001	mg/L	24-JUN-19	25-JUN-19	KBD
	Molybdenum (I	,	0.000528		0.00005	mg/L	24-JUN-19	25-JUN-19	KBD
	Nickel (Ni)-Diss		<0.00050		0.0005	mg/L	24-JUN-19	25-JUN-19	KBD
	Potassium (K)-		0.437		0.05	mg/L	24-JUN-19	25-JUN-19	KBD
	Selenium (Se)-		0.000349		0.00005	mg/L	24-JUN-19	25-JUN-19	KBD
	Silicon (Si)-Dis		1.96		0.05	mg/L	24-JUN-19	25-JUN-19	KBD
	Silver (Ag)-Diss		<0.000010		0.00001	mg/L	24-JUN-19	25-JUN-19	KBD
	Sodium (Na)-D		2.21		0.05	mg/L	24-JUN-19 24-JUN-19	25-JUN-19	KBD
	Strontium (Sr)- Thallium (TI)-D		0.114 <0.000010		0.0002 0.00001	mg/L	24-JUN-19 24-JUN-19	25-JUN-19 25-JUN-19	KBD KBD
	Tin (Sn)-Dissol		<0.00010		0.00001	mg/L mg/L	24-JUN-19 24-JUN-19	25-JUN-19 25-JUN-19	KBD
	Titanium (Ti)-D		<0.010		0.001	mg/L	24-JUN-19	25-JUN-19	KBD
	Uranium (U)-Di		0.000580		0.00001	mg/L	24-JUN-19	25-JUN-19	KBD
	Vanadium (V)-		<0.00050		0.0005	mg/L	24-JUN-19	25-JUN-19	KBD
	Zinc (Zn)-Disso		<0.0010		0.001	mg/L	24-JUN-19	25-JUN-19	KBD
		Water by CVAAS or CVAFS				9. =			
	_	cury Filtration Location	LAB					26-JUN-19	SD3
	Mercury (Hg)-D	-	<0.0000050		0.00000	mg/L	26-JUN-19	27-JUN-19	OC1
	-				5				
	` ,	Water by CRC ICPMS	10.000000		0.00000	4	04 11 11 46	05 1111 40	KEE
	Beryllium (Be)-		<0.000020		0.00002	mg/L	24-JUN-19	25-JUN-19	KBD
	Dissolved Meta	als Filtration Location	LAB					24-JUN-19	EM2
	Mercury (Hg)-T	⁻ otal	0.00075		0.0005	ug/L		26-JUN-19	MA2
	Dissolved Orga		1.22		0.5	mg/L		25-JUN-19	EL5
	Total Kjeldahl i		<0.25	TKNI	0.25	mg/L		29-JUN-19	APH
	Total Organic (· ·	1.09	113131	0.23	mg/L		25-JUN-19	EL5
	Total Metals in Wat		1.05		0.5	my/L		20-00IN-18	LLU
		er /ater by CRC ICPMS							
	Aluminum (AI)-		0.0698		0.003	mg/L		25-JUN-19	KBD
	Antimony (Sb)-		<0.0098		0.003	mg/L		25-JUN-19	KBD
	Arsenic (As)-To		0.00038		0.0001	mg/L		25-JUN-19	KBD
	Barium (Ba)-To		0.0318		0.0001	mg/L		25-JUN-19	KBD
	Bismuth (Bi)-To		<0.00050		0.00005	mg/L		25-JUN-19	KBD
	Boron (B)-Tota		<0.010		0.01	mg/L		25-JUN-19	KBD
	Cadmium (Cd)		0.0000071		0.00000	mg/L		25-JUN-19	KBD
	- ()				5	J			
							1		Rev# 1.00

ALS LABORATORY GROUP CHEMICAL ANALYSIS REPORT

Lab ID	Sample ID	Test Description	Result	Qualifier	D.L.	Units	Extracted	Analyzed	Ву
L2295901-9	RG_ER_WS_20190	619-1100							
	CLIENT on 19-JUN-19 (
	WS								
	Total Metals in Wa	ter							
		Vater by CRC ICPMS							
	Calcium (Ca)-		29.8		0.05	mg/L		25-JUN-19	KBD
	Chromium (Cr		0.00019		0.0001	mg/L		25-JUN-19	KBD
	Cobalt (Co)-To	otal	<0.00010		0.0001	mg/L		25-JUN-19	KBD
	Copper (Cu)-T		<0.00050		0.0005	mg/L		25-JUN-19	KBD
	Iron (Fe)-Total		0.075		0.01	mg/L		25-JUN-19	KBD
	Lead (Pb)-Tota		0.000280		0.00005	mg/L		25-JUN-19	KBD
	Lithium (Li)-To		0.0013		0.001	mg/L		25-JUN-19	KBD
	Magnesium (M		7.93		0.1	mg/L		25-JUN-19	KBD
	Manganese (M		0.00671		0.0001	mg/L		25-JUN-19	KBD
	Molybdenum (Nickel (Ni)-Tot		0.000535 <0.00050		0.00005 0.0005	mg/L mg/L		25-JUN-19 25-JUN-19	KBD KBD
	Potassium (K)		0.468		0.0003	mg/L		25-JUN-19 25-JUN-19	KBD
	Selenium (Se)		0.000403		0.0005	mg/L		25-JUN-19	KBD
	Silicon (Si)-To		2.19		0.0000	mg/L		25-JUN-19	KBD
	Silver (Ag)-Tot		<0.000010		0.00001	mg/L		25-JUN-19	KBD
	Sodium (Na)-T		2.17		0.05	mg/L		25-JUN-19	KBD
	Strontium (Sr)	-Total	0.110		0.0002	mg/L		25-JUN-19	KBD
	Thallium (TI)-T	⁻ otal	<0.000010		0.00001	mg/L		25-JUN-19	KBD
	Tin (Sn)-Total		<0.00010		0.0001	mg/L		25-JUN-19	KBD
	Titanium (Ti)-1		<0.010		0.01	mg/L		25-JUN-19	KBD
	Uranium (U)-T		0.000622		0.00001	mg/L		25-JUN-19	KBD
	Vanadium (V)-		<0.00050		0.0005	mg/L		25-JUN-19	KBD
	Zinc (Zn)-Tota		0.0048		0.003	mg/L		25-JUN-19	KBD
	Total Be (Low) i Beryllium (Be)	n Water by CRC ICPMS -Total	<0.000020		0.00002	mg/L		25-JUN-19	KBD
	Deryman (De)	- Total	10.000020		0.00002	mg/L		25-0014-15	NDD
								F	Rev# 1.00

REGIONAL EFFECTS PRO

L2295901 CONTD.... PAGE 5 of 6

Methodology Reference

Methodology Reference (In-House Standard **ALS Test Code Test Description** Operating Procedures which Generally Follow:) ACIDITY-PCT-CL Acidity by Automatic Titration APHA 2310 Acidity NO2-L-IC-N-CL Nitrite in Water by IC (Low Level) EPA 300.1 (mod) NO3-L-IC-N-CL Nitrate in Water by IC (Low Level) EPA 300.1 (mod) F-IC-N-CL Fluoride in Water by IC EPA 300.1 (mod) HARDNESS-CALC-VA Hardness **APHA 2340B** HG-D-CVAA-VA Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod) PH-CL pΗ APHA 4500 H-Electrode APHA 4500-P PHOSPHORUS PO4-DO-L-COL-CL Orthophosphate-Dissolved (as P) SO4-IC-N-CL Sulfate in Water by IC EPA 300.1 (mod) CL-IC-N-CL Chloride in Water by IC EPA 300.1 (mod) TSS-L-CL **Total Suspended Solids** APHA 2540 D-Gravimetric Dissolved Metals in Water by CRC ICPMS MET-D-CCMS-CL APHA 3030B/6020A (mod) BE-D-L-CCMS-VA Diss. Be (low) in Water by CRC ICPMS APHA 3030B/6020A (mod) BR-L-IC-N-CL Bromide in Water by IC (Low Level) EPA 300.1 (mod) EC-L-PCT-CL Electrical Conductivity (EC) **APHA 2510B** ALK-MAN-CL Alkalinity (Species) by Manual Titration APHA 2320 ALKALINITY BE-T-L-CCMS-VA Total Be (Low) in Water by CRC ICPMS EPA 200.2/6020A (mod) MET-D-CCMS-VA Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod) MET-T-CCMS-VA Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) SOLIDS-TDS-CL **Total Dissolved Solids** APHA 2540 C TKN-L-F-CL APHA 4500-NORG (TKN) Total Kjeldahl Nitrogen ORP-CL Oxidation redution potential by elect. **ASTM D1498** APHA 4500-P PHOSPHORUS P-T-L-COL-CL Phosphorus (P)-Total TECKCOAL-IONBAL-CL Ion Balance Calculation **APHA 1030E** C-DIS-ORG-LOW-CL Dissolved Organic Carbon APHA 5310 B-Instrumental

APHA 2130 B-Nephelometer

EPA 1631 REV. E APHA 1030E

APHA 5310 TOTAL ORGANIC CARBON (TOC)

C-TOT-ORG-LOW-CL Total Organic Carbon

TURBIDITY-CL

HG-T-U-CVAF-VA Total Mercury in Water by CVAFS (Ultra)

Turbidity

IONBALANCE-BC-CL Ion Balance Calculation

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

Sample Parameter Qualifier key listed:

Qualifier	Description
RRV	Reported Result Verified By Repeat Analysis
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

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1. SAMPLE SET

AAE Tech Services Inc. (AAE) was contracted by Minnow Environmental to provide otolith processing and age estimation services for samples collected under Project 19-12. This included 56 Redside Shiner whole heads as the primary sample and 56 Redside Shiner pectoral fins as the secondary sample. A full data spreadsheet, including sample ID, structure type, ageing process used, and age estimation results is provided.

2. AGEING METHOD: OTOLITHS

The primary samples of whole head Redside Shiners were used to determine age estimation over the secondary pectoral fin samples. Lapillus otolith pairs for Redside Shiner samples were extracted from the whole heads and placed into individual enumerated sample envelopes.

All otoliths in this sample set were analyzed using the "Sectioning" method. This method is used primarily for larger otoliths with a deep sulcus or irregular shape. This method was selected only after the "Read Whole" method (non-destructive, often used in smaller otoliths) was found to be inaccurate.

OTOLITH PREPARATION

Otolith pairs were examined under magnification and evaluated for any issues related to structural integrity (e.g. cracks, fractures, chips, pieces missing) and deformation (crystallization, misshapen lobes). One otolith is selected for processing and is embedded in Cold Cure epoxy resin. Samples are cured for 48 hours before sectioning. Samples are marked for sectioning under magnification using a fine tip marker to identify the nucleus (centre) and section plane (cut edge to be examined) for each otolith. Using the marks as a guide, a Buehler Isomet low speed dual-blade saw is used to cut a single section, with the section plane passing through the nucleus. This surface is then polished with a series of lapping film (30, 12, and 0.3 microns) to improve clarity of the section plane.

To carry out age estimation, an otolith section is submerged in water under magnification with the polished surface facing up.

AGE ESTIMATION

Annuli are counted outward from the nucleus. Checking (false-annuli) is common in many species, including Redside Shiner, in particular within the first 1-3 years of growth. Annuli are assessed for density (contrast between summer and winter growth), clarity (ability to differentiate individual annuli) and continuity (e.g. segmentation, merging, fading). Photographs under magnification are taken of each sample for reference and revision. Ages are recorded with a Confidence Index (CI) based on the condition of the otolith, annuli assessment, and the confidence of the reader in the age recorded, as described in Table 1.



Table 1. Confidence Index (CI) table; applied to each age estimate, reflecting the reader's confidence in the age recorded.

Confidence	Abbreviati	Qualitative Meaning	Quantitative Meaning
Index (CI)	on		
Good	G	Pattern very clear with no	Reader would always get
		interpretational problems	the same age
Fairly Good	FG	Pattern is clear with few easy	Reader would get the same
		interpretational problems	age most of the time for
			fish <20 years
Fair	F	Pattern is fairly clear with some	Reader would be within one
		areas presenting easy and moderate	year most of the time for
		interpretational problems	fish <20 years
Fairly Poor	FP	Pattern is fairly unclear, presenting	Reader would be within 2-3
		a number of difficult interpretational	years for fish <20 years
		problems	
Poor	P	Pattern is very unclear, presenting	Reader has little confidence
		significant interpretational problems	in repeatability of age

3. AGEING RESULTS

Age estimates were provided in August, 2019 based on the otolith samples extracted from the whole heads provided.

Redside Shiner age estimates ranged from one to five years of age, with a modal age of three years. CI values were fair, with most recorded as F, and some instances of FG and FP samples. Some checking within the first three years was observed, as well as lack of clarity in some samples.

Samples were photographed under magnification for reference and revision. Representative photographs of are presented in Section 5.

4. QA/QC PROTOCOL

AAE's QA/QC protocols have been developed in consultation with Fisheries and Oceans Canada ageing experts to ensure accurate age estimations while addressing potential issues related to confidence index, reader bias, and human error. For this project, due to the low number of samples to be aged, 100% of the samples were initially aged independently by two fisheries biologists, followed by a third biologists as ages between the initial two biologists differed. For this species, there was difficulty confidently identifying the true annuli as checking was evident throughout the otoliths. A third biologist read the samples independently of the original two. The results were then discussed with all biologist and together the final ages were determined.





Figure 1. Representative photo of a 1 year old Redside Shiner (Lapillus otolith section).



Figure 2. Representative photo of a 2 year old Redside Shiner (Lapillus otolith section).





Figure 3. Representative photo of a 3 year old Redside Shiner (Lapillus otolith section).



Figure 4. Representative photo of a 4 year old Redside Shiner (Lapillus otolith section).





Figure 5. Representative photo of a 5 year old Redside Shiner (Lapillus otolith section).



Ageing Results



FISH AGE ESTIMATION SUMMARY REPORT - PROJECT 19-12

Prepared for MINNOW ENVIRONMENTAL

August 19, 2019

Sample ID	Species	Date Caught	Structure	Method	Primary Ager	Age Estimate	CI	OAOC Ager 1	OAOC Age Estimat	e CI	OAOC Ager 2	QAQC Age Estimate	CI	Final Age Estimate	Notes	Picture (Y/N)
RG_LNLK-RSC-11-OT_20190517	<u> </u>	17-May-19	Otolith	Section	CC	4	F	TB	2	F	ML ML	2	F	2	110000	Y
RG LNLK-RSC-12-OT 20190517		17-May-19	Otolith	Section	CC	3	FG	ТВ	3	F	ML	3	F	3		Y
RG_LNLK-RSC-13-OT_20190517	Redside Shiner	17-May-19	Otolith	Section	CC	4	F	TB	2	F	ML	2	F	2		Y
RG_LNLK-RSC-14-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	4	F	TB	3	FG	ML	3	FG	3		Y
RG LNLK-RSC-15-OT 20190520	Redside Shiner	20-May-19	Otolith	Section	CC	6	F	ТВ	4	FG	ML	4	FG	4		Υ
RG_LNLK-RSC-16-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	3	F	ТВ	2	F	ML	2	F	2		Y
RG_LNLK-RSC-17-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	3	FG	TB	3	F	ML	3	F	3		Y
RG_LNLK-RSC-18-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	5	F	ТВ	2	F	ML	2	F	2		Y
RG_LNLK-RSC-19-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	3	F	ТВ	3	FG	ML	3	FG	3		Υ
RG_LNLK-RSC-20-OT_20190520	Redside Shiner	20-May-19	Otolith	Section	CC	5	F	ТВ	3	FG	ML	3	FG	3		Y
RG_STPD-RSC-01-OT_20190515	Redside Shiner	15-May-19	Otolith	Section	CC	4	FG	TB	2	F	ML	2	F	2		Υ
RG_STPD-RSC-02-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	4	FG	TB	3	F	ML	3	F	3		Y
RG_STPD-RSC-03-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	3	F	TB	3	F	ML	3	F	3		Υ
RG_STPD-RSC-04-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	4	F	ТВ	2	F	ML	2	F	2		Y
RG_STPD-RSC-05-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	4	FG	ТВ	2	F	ML	2	F	2		Υ
RG_STPD-RSC-06-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	4	FG	TB	4	FG	ML	4	FG	4		Y
RG_STPD-RSC-07-OT_20190524	Redside Shiner	24-May-19	Otolith	Section	CC	3	FP	TB	1	FP	ML	1	FP	1		Υ
RG_STPD-RSC-08-OT_20190530	Redside Shiner	30-May-19	Otolith	Section	CC	2	F	TB	2	F	ML	2	F	2		Y
RG_STPD-RSC-09-OT_20190530	Redside Shiner	30-May-19	Otolith	Section	CC	3	FG	TB	2	FP	ML	2	FP	2		Y
RG_STPD-RSC-10-OT_20190530	Redside Shiner	30-May-19	Otolith	Section	CC	4	FG	TB	3	FG	ML	3	FG	3		Y
RG_STPD-RSC-11-OT_20190531	Redside Shiner	31-May-19	Otolith	Section	CC	4	F	TB	3	F	ML	3	F	3		Y
RG_STPD-RSC-12-OT_20190531	Redside Shiner	31-May-19	Otolith	Section	CC	4	FG	TB	4	FG	ML	3	FG	3		Υ
RG_STPD-RSC-13-OT_20190601	Redside Shiner	01-Jun-19	Otolith	Section	CC	4	FG	TB	3	F	ML	3	F	3		Y
RG_STPD-RSC-14-OT_20190604	Redside Shiner	04-Jun-19	Otolith	Section	CC	4	FG	TB	3	F	ML	3	F	3		Y
RG_STPD-RSC-15-OT_20190604	Redside Shiner	04-Jun-19	Otolith	Section	CC	4	F	TB	3	FG	ML	3	FG	3		Y
RG_STPD-RSC-16-OT_20190604	Redside Shiner	04-Jun-19	Otolith	Section	CC	3	FG	TB	2	F	ML	2	F	2		Y
RG_ERIMF-RSC-04-OT_20190515	Redside Shiner	15-May-19	Otolith	Section	CC	5	F	TB	3	F	ML	3	F	3		Y
RG_ERIMF-RSC-05-OT_20190517	Redside Shiner	17-May-19	Otolith	Section	CC	5	FG	TB	3	F	ML	3	F	3		Y
RG_ERIMF-RSC-06-OT_20190521	Redside Shiner	21-May-19	Otolith	Section	CC	4	FG	TB	3	F	ML	3	F	2		Y
RG_ERIMF-RSC-07-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	5	F	TB	3	F	ML	3	F	3		Y
RG_ERIMF-RSC-08-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	6	F	TB	5	FG	ML	5	FG	5		Y
RG_ERIMF-RSC-09-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	4	F	TB	3	F	ML	3	F	3		Y
RG_ERIMF-RSC-10-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	6	FG	TB	5	FG	ML	5	FG	5		Y
RG_ERIMF-RSC-11-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	5	F	TB	3	F	ML	2	F	3		Y
RG_ERIMF-RSC-12-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	3	FP	TB	2	FP	ML	1	FP	2		Υ
RG_ERIMF-RSC-13-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	4	F	TB	2	F	ML	2	F	2		Y
RG_ERIMF-RSC-14-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	4	F	TB	3	FP	ML	3	FP	3		Υ
RG_ERIMF-RSC-15-OT_20190523	Redside Shiner	23-May-19	Otolith	Section	CC	5	FG	TB	2	F	ML	2	F	2		Υ
RG_ERIMF-RSC-16-OT_20190523		23-May-19	Otolith	Section	CC	3	F	TB	1	FP	ML	1	FP	1		Υ
RG_ERWSF-RSC-01-OT_20190524		24-May-19	Otolith	Section	CC	6	FP	ТВ	4	F	ML	4	F	4		Y
RG_ERWSF-RSC-02-OT_20190529		29-May-19	Otolith	Section	CC	5	FP	TB	3	FG	ML	3	FG	3		Y
RG_ERWSF-RSC-03-OT_20190530		30-May-19	Otolith	Section	CC	5	FG	ТВ	3	F	ML	3	F	3		Y
RG_ER-RSC-01-OT_20190613	Redside Shiner	13-Jun-19	Otolith	Section	CC	5	FG	TB	3	FG	ML	3	FG	3		Y
RG_ER-RSC-02-OT_20190613	Redside Shiner	13-Jun-19	Otolith	Section	CC	5	FG	TB	3	F	ML	3	F	3		Y
RG_ER-RSC-03-OT_20190614	Redside Shiner	14-Jun-19	Otolith	Section	CC	3	FP	TB	1	FP	ML	1	FP	1		Υ
RG_ER-RSC-04-OT_20190622	Redside Shiner	22-Jun-19	Otolith	Section	CC	6	FP	TB	4	F	ML	4	F	4		Y
RG_ER-RSC-05-OT_20190622	Redside Shiner	22-Jun-19	Otolith	Section	CC	3	FG	TB	3	FG	ML	3	FG	3		Y
RG_ER-RSC-06-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	2	FP	TB	2	F	ML	2	F	2		Y
RG_ER-RSC-07-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	2	FP	TB	1	FP	ML	1	FP	1		Y
RG_ER-RSC-08-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	3	FP	TB	3	F	ML	3	F	3		Y
RG_ER-RSC-09-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	4	FP	TB	2	F	ML	2	F	2		Y
RG_ER-RSC-10-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	3	FP	TB	3	F	ML	3	F	3		Y
RG_ER-RSC-11-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	4	F	TB	2	FP	ML	2	FP	2		Y
RG_ER-RSC-12-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	7	F	TB	4	F	ML	4	F	4		Y
RG_ER-RSC-13-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	4	FP	TB	2	FP	ML	1	FP	1		Y
RG_ER-RSC-14-OT_20190624	Redside Shiner	24-Jun-19	Otolith	Section	CC	/	FP	TB	3	F	ML	3	F	3		Y



17 December 2020 1896296-008-R-Rev0

APPENDIX E

Tissue Chemistry Reports

Appendix E: Comparison of Tissue Results between Analytical Methods

Consistent with previous monitoring programs, subsamples of dorsal muscle tissue and residual ovaries were submitted for chemical analysis at the Saskatchewan Research Council (SRC; Saskatoon, SK). Total selenium was measured by high resolution inductively coupled plasma mass spectrometry (HR ICP-MS). Moisture content was measured by freeze drying. As an alternative to standard HR ICP-MS methods, use of laser ablation ICP-MS at TrichAnalytics (Saanichton, BC) was investigated because analysis of a smaller sample size is possible using this method (i.e., <5 mg dw). This alternative method required method validation to confirm that measurements are comparable to those using HR ICP-MS. To support method validation, samples of dorsal muscle and residual ovaries from field-collected fish were split and analyzed by SRC and TrichAnalytics.

Dorsal muscle and residual ovary samples that were split and analysed for selenium by SRC and TrichAnalytics showed good agreement of results for both tissue types between analytical methods (Figure E-1; correlation coefficient = 0.99 for muscle and 0.96 for ovary). Split dorsal muscle samples ranged from 30 to 1,340 mg wet weight, with percentage moisture ranging from 66 to 83% and split residual ovary samples ranged from 11 to 664 mg wet weight with percentage moisture ranging from 29 to 78% (Table E.1). For reported concentrations more than 10× the method detection limit¹, the relative percent difference between laboratory split measurements of selenium was on average 14% (range 0-39%) for muscle samples and 17% (range 0-128%) for ovary samples (Table E.1). Three of 56 split ovary samples had a relative percentage difference greater than 40%, which the BC MOE recommends as a data quality objective for tissue laboratory duplicates.

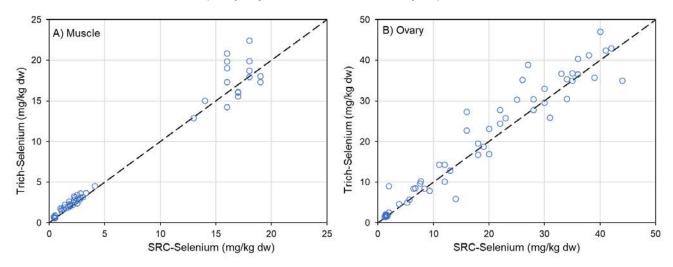


Figure E-1: Comparison of selenium concentrations in dorsal muscle (A) and residual ovary (B) of redside shiner analyzed by SRC and TrichAnalytics. Dashed line is a 1:1 relationship.

BC MOE (2015) recommends that relative percent difference be calculated for values >10× the method detection limit when comparing laboratory tissue duplicates. BC MOE recommends a data quality objective of ≤40% for all metals except strontium. Method detection limits for this RSC study were as follows: SRC 0.01-0.5 mg/kg dw muscle, 0.02-0.5 mg/kg dw ovary; TrichAnalytics 0.17 mg/kg dw muscle, 0.2-1.5 mg/kg dw ovary.



Table E.1: Relative Percent Difference between Redside Shiner Dorsal Muscle and Ovary Samples Analyzed by SRC and TrichAnalytics

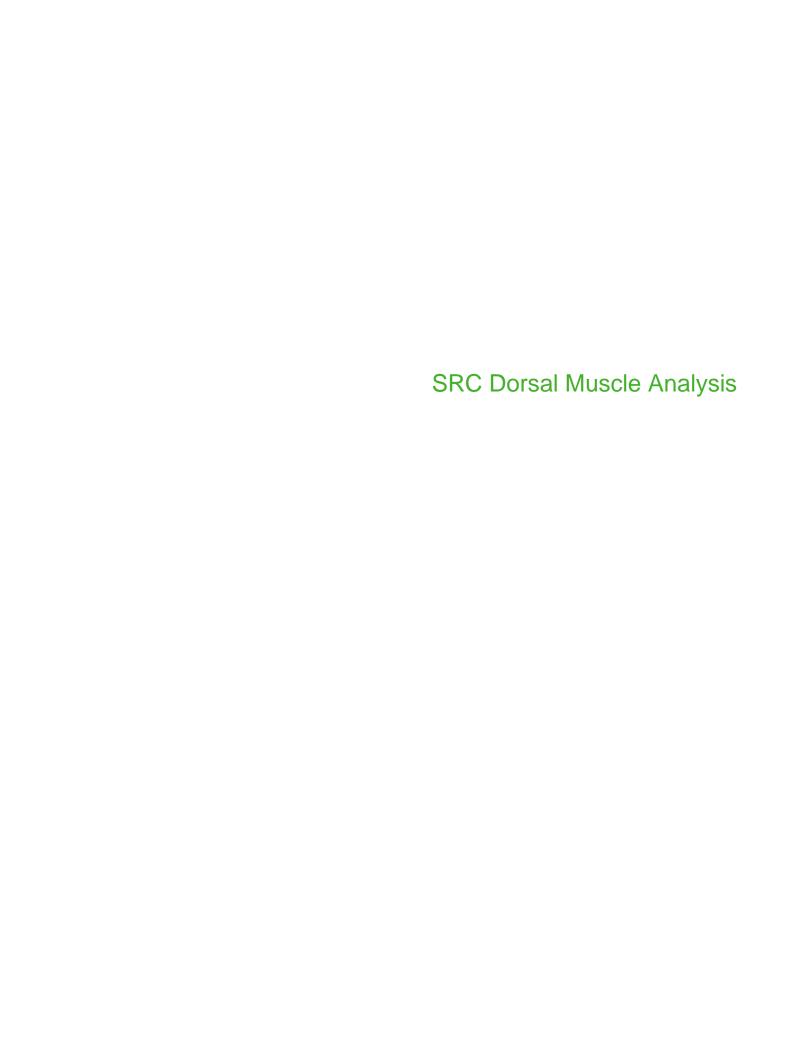
	Dorsal Mu					Ovary Selenium DL							
	Selenium DL RPD (%)						Sel	RPD (%)					
Sample Description	μg/g μg/g		μg/g	μg/g	>10X DL	Sample Description	μg/g	μg/g	μg/g	μg/g	>10X DL		
	SRC	Trich	SRC	Trich			SRC	Trich	SRC	Trich			
RG_ERIMF-RSC-04-M_20190515	2.2	2.8	0.5	0.17	NC	RG_ERIMF-RSC-04-O_20190515	7.6	9.7	0.5	0.2	24		
RG_ERIMF-RSC-05-M_20190517	2.1	2.2	0.5	0.17	NC	RG_ERIMF-RSC-05-O_20190517	9.3	7.9	0.5	0.2	16		
RG_ERIMF-RSC-06-M_20190521	1	1.8	0.5	0.17	NC	RG_ERIMF-RSC-06-O_20190521	3.8	4.7	0.5	0.2	NC		
RG_ERIMF-RSC-07-M_20190523	1.1	1.4	0.5	0.17	NC	RG_ERIMF-RSC-07-O_20190523	5.7	5.8	0.05	0.2	0.95		
RG_ERIMF-RSC-08-M_20190523	2.8	3.6	0.5	0.17	NC	RG_ERIMF-RSC-08-O_20190523	12	14.4	0.05	0.2	18		
RG_ERIMF-RSC-09-M_20190523	1.3	1.7	0.05	0.17	25	RG_ERIMF-RSC-09-O_20190523	7.7	10.3	0.05	0.2	29		
RG_ERIMF-RSC-10-M_20190523	1.9	2.1	0.5	0.17	NC	RG_ERIMF-RSC-10-O_20190523	2	9.1	0.05	0.2	128		
RG_ERIMF-RSC-11-M_20190523	1.8	2.3	0.5	0.17	NC	RG_ERIMF-RSC-11-O_20190523	12	10.2	0.5	0.2	17		
RG_ERIMF-RSC-12-M_20190523	1.8	2.6	0.5	0.17	NC	RG_ERIMF-RSC-12-O_20190523	6.7	8.5	0.5	0.2	24		
RG_ERIMF-RSC-13-M_20190523	1.4	2.2	0.5	0.17	NC	RG_ERIMF-RSC-13-O_20190523	5.3	5.0	0.5	0.2	5.6		
RG_ERIMF-RSC-14-M_20190523	4.1	4.6	0.5	0.17	NC	RG_ERIMF-RSC-14-O_20190523	20	23.2	0.5	0.2	15		
RG_ERIMF-RSC-15-M_20190523	1.1	1.7	0.5	0.17	NC	RG_ERIMF-RSC-15-O_20190523	6.4	8.4	0.5	0.2	27		
RG_ERIMF-RSC-16-M_20190523	1.4	1.9	0.05	0.17	30	RG_ERIMF-RSC-16-O_20190523	8.4	8.5	0.5	0.2	1.0		
RG_ER-RSC_01-M_20190613	1.7	1.9	0.02	0.17	13	RG_ER-RSC-01-O_20190613	22	24.4	0.02	0.2	10		
RG_ER-RSC_02-M_20190613	1.3	1.7	0.02	0.17	26	RG_ER-RSC-02-O_20190613	18	16.8	0.02	0.2	6.9		
RG_ER-RSC_03-M_20190621	3.3	3.7	0.02	0.17	11	RG_ER-RSC-03-O_20190614	25	30.3	0.05	1.53	19		
RG_ER-RSC_04-M_20190622	3	3.2	0.02	0.17	6.4	RG_ER-RSC-04-O_20190622	22	27.8	0.05	1.53	23		
RG_ER-RSC_05-M_20190622	2.5	2.4	0.01	0.17	2.8	RG_ER-RSC-05-O_20190622	27	38.9	0.05	1.53	36		
RG_ER-RSC_06-M_20190624	1.9	2.2	0.02	0.17	16	RG_ER-RSC-06-O_20190624	19	18.7	0.05	1.53	1.4		
RG_ER-RSC_07-M_20190624	2.5	3.5	0.02	0.17	32	RG_ER-RSC-07-O_20190624	14	5.9	0.05	1.53	NC		
RG_ER-RSC_08-M_20190624	2.4	2.7	0.02	0.17	12	RG_ER-RSC-08-O_20190624	36	40.4	0.05	1.53	11		
RG_ER-RSC_09-M_20190624	2.2	2.8	0.02	0.17	23	RG_ER-RSC-09-O_20190624	26	35.2	0.05	1.53	30		
RG_ER-RSC_10-M_20190624	1.7	1.9	0.02	0.17	12	RG_ER-RSC-10-O_20190624	16	27.3	0.05	1.53	52		
RG_ER-RSC_11-M_20190624	1.9	2.2	0.02	0.17	14	RG_ER-RSC-11-O_20190624	18	19.6	0.05	1.53	8.3		
RG_ER-RSC_12-M_20190624	2.8	3.1	0.01	0.17	9.4	RG_ER-RSC-12-O_20190624	38	41.3	0.05	1.53	8.3		
RG_ER-RSC_13-M_20190624	2.5	2.9	0.02	0.17	14	RG_ER-RSC-13-O_20190624	23	25.8	0.05	1.53	12		
RG_ER-RSC_14-M_20190624	2.7	2.9	0.01	0.17	5.6	RG_ER-RSC-14-O_20190624	16	22.7	0.05	1.53	35		
RG_ERWSF-RSC-01-M_20190524	2.2	3.3	0.05	0.17	39	RG_ERWSF-RSC-01-O_20190524	20	16.9	0.05	0.9	17		
RG_ERWSF-RSC-02-M_20190529	2.3	3.1	0.05	0.17	31	RG_ERWSF-RSC-02-O_20190529	13	12.9	0.05	0.2	1.1		
RG_ERWSF-RSC-03-M_20190530	2.2	2.5	0.5	0.17	NC	RG_ERWSF-RSC-03-O_20190530	11	14.3	0.05	0.2	26		
RG_LNLK-RSC-11-M_20190517	0.4	0.7	0.05	0.17	NC	RG_LNLK-RSC-11-O_20190517	1.2	1.5	0.5	0.2	NC		
RG_LNLK-RSC-12-M_20190517	<0.5 ^a	0.6	0.5	0.17	NC	RG_LNLK-RSC-12-O_20190517	1.4	1.47	0.05	0.2	NC		
RG_LNLK-RSC-13-M_20190517	0.51	0.9	0.05	0.17	NC	RG_LNLK-RSC-13-O_20190517	1.3	1.81	0.05	0.2	NC		
RG_LNLK-RSC-14-M_20190520	0.47	0.6	0.05	0.17	NC	RG_LNLK-RSC-14-O_20190520	1.4	1.71	0.05	0.2	NC		
RG_LNLK-RSC-15-M_20190520	0.53	0.7	0.05	0.17	NC	RG_LNLK-RSC-15-O_20190520	1.4	2.11	0.05	0.2	41		
RG_LNLK-RSC-16-M_20190520	0.48	0.6	0.05	0.17	NC	RG_LNLK-RSC-16-O_20190520	1.5	1.78	0.05	0.2	NC		
RG_LNLK-RSC-17-M_20190520	<0.5 ^a	0.6	0.5	0.17	NC	RG_LNLK-RSC-17-O_20190520	2	2.57	0.5	0.2	NC		
RG_LNLK-RSC-18-M_20190520	0.52	0.7	0.05	0.17	NC	RG_LNLK-RSC-18-O_20190520	1.7	1.77	0.05	0.2	NC		
RG_LNLK-RSC-19-M_20190520	0.42	0.6	0.05	0.17	NC	RG_LNLK-RSC-19-O_20190520	1.6	1.59	0.05	0.2	NC		
RG_LNLK-RSC-20-M_20190520	0.54	0.9	0.05	0.17	NC	RG_LNLK-RSC-20-O_20190520	1.6	2.0	0.05	0.2	NC		
RG_STPD-RSC-01-M_20190515	13	12.9	0.05	0.17	0.84	RG_STPD-RSC-01-O_20190515	35	36.8	0.05	0.9	5.0		
RG_STPD-RSC-02-M_20190524	17	16.1	0.05	0.17	5.7	RG_STPD-RSC-02-O_20190524	35	35	0.05	0.9	0		
RG_STPD-RSC-03-M_20190524	19	18.1	0.05	0.17	5.1	RG_STPD-RSC-03-O_20190524	31	25.9	0.05	0.9	18		
RG_STPD-RSC-04-M_20190524	16	14.3	0.05	0.17	11	RG_STPD-RSC-04-O_20190524	39	35.7	0.05	0.9	8.8		
RG_STPD-RSC-05-M_20190524	17	16.1	0.5	0.17	5.5	RG_STPD-RSC-05-O_20190524	34	30.5	0.05	0.9	11		
RG_STPD-RSC-06-M_20190524	16	17.3	0.05	0.17	8.1	RG_STPD-RSC-06-O_20190524	28	27.8	0.05	0.9	0.72		
RG_STPD-RSC-07-M_20190524	14	15.0	0.5	0.17	7.0	RG_STPD-RSC-07-O_20190524	41	42.4	0.5	0.9	3.4		
RG_STPD-RSC-08-M_20190530	17	15.6	0.5	0.17	8.9	RG_STPD-RSC-08-O_20190530	36	36.6	0.5	0.2	1.6		
RG_STPD-RSC-09-M_20190530	18	22.5	0.5	0.17	22	RG_STPD-RSC-09-O_20190530	28	30.4	0.5	0.2	8.3		
RG_STPD-RSC-10-M_20190530	16	19.0	0.5	0.17	17	RG_STPD-RSC-10-O_20190530	30	33.1	0.05	0.2	9.7		
RG_STPD-RSC-11-M_20190531	18	19.9	0.5	0.17	10.0	RG_STPD-RSC-11-O_20190531	44	35.0	0.05	0.2	23		
RG_STPD-RSC-12-M_20190531	16	20.8	0.5	0.17	26	RG_STPD-RSC-12-O_20190531	34	35.4	0.5	0.2	3.9		
RG_STPD-RSC-13-M_20190601	16	19.9	0.5	0.17	22	RG_STPD-RSC-13-O_20190601	42	43.0	0.5	0.2	2.3		
RG_STPD-RSC-14-M20190604	18	18.0	0.5	0.17	0.19	RG_STPD-RSC-14-O_20190604	30	29.6	0.5	0.8	1.4		
RG_STPD-RSC-15-M20190604	19	17.3	0.05	0.17	9.2	RG_STPD-RSC-15-O_20190604	33	36.8	0.5	0.8	11		
RG_STPD-RSC-16-M20190604	18	18.7	0.5	0.17	3.9	RG_STPD-RSC-16_0_20190604	40	47.1	0.5	0.8	16		

Notes:
a. detection limit used in RPD calculation.

% = percent; µg/g = micrograms per gram dry weight; DL = detection limit; RPD = relative percent difference; SRC = Saskatchewan Research Council Laboratory; Trich = TrichAnalytics Laboratory

Value

RPD > 40%



SIC

SRC Environmental Analytical Laboratories 102-422 Downey Rd, Saskatoon, SK S7N 4N1 Ph. (306)933-6932, Toll free 800-240-8808



Turnsround Time: Regular Rush (100% surcharge + overtime charges au **Contact lab in advance to authorize Invoice to: Company Name: Teck Coal Ltd.	thorized*)	ab Use Only: Radioactivity: form Fing O	□ background □ 0.05-0.2mR/hr □ >0.2mR/hr	SRC Clien Date/ Stora	t Co Time		d	
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RG_LNLK-RSC-13-M_20190517	1	Fish Musci	e 17-05-19	1	1	1		
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RG_LNLK-RSC-15-Nt_20190520	1	Fish Muscl	e 20-05-19	1	1	1		
RG_LNLK-RSC-16-M_20190520 '	1	Fish Musci	e 20-05-19	1	1	V		
RG_LNLK-RSC-17-M_20190520	1	Fish Muscl	e 20-05-19	1	1	1		
RS_LNLK-RSC-18-M_20190520	1	Fish Muscl	e 20-05-19	1	1	7		
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	Ph. (306)933-6932, Toll free 800-240-8808



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SRC Environmental Analytical Laboratories 102-422 Downey Rd, Sarkatoon, SK S7N 4NI Ph. (306)933-6932, Toll free 800-240-8808



Tarnaround Time: Regalar Rush (100% surcharge) Rush (100% surcharge + evertime charges suff * Contact lab in advance to authorize suvoice to: Contact Name: Teck Coal Lin. Contact Name: Cak Good Address: *A. Son 1777, 1545 Augus Date City/ Prov: Research, Sides Cakanda Postal Code: 100 800 Phone: _250-666-5269) parinté*) S # P.		background 0.05-0.2mR/hr >0.2mR/hr	SRC (Citamon Data/Stora)	t Cac		
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RG ERIMF-RSC-08-M 20190523	1	Fish Muscle	23-05-19	1	1	U	
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RG ERIME-RSC-10-M 20190523	1	Fish Muscle	23-06-19	4	1	1	
RG_ERIMF-RSC-11-M_20190523	1	Fish Muscle	23-06-19	1	4	d	
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SRC Environmental Analytical Laboratories 102-422 Downey Rd, Saskatoon, SK: S7N 4Nt Ph. (305)933-6932, Toll free 800-240-8808



Turnaround Time: E Reguler Rush (100% surcharge) Rush (100% surcharge + evertime charges authorized Contact lab in advance to authorize	Lab Use Only Radioactivity:	: beckground	SRC Clies Data/	t Cu	
lavoice to:	Serm Flag D		Stora	Pr	
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Contact Name; Cut Good	# of bottles				
Address: P.O. Be: 1777, 1948 Appar Dire	Preservatives				
City/ Prov; Sparwood, Reliak Columbia Postal Code; Will 800 Phone: 250-865-6289	Size			-	
ostal Code: William Phone: 250-665-5289	In Subgroup #			-	
Perill: Cel.Good@teck.com				-	
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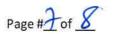
SRC Environmental Analytical Laboratories 143-111 Research Dr., Saskatoon, SK, S7N 3R2 Ph. (306)933-6932, Toll free 800-240-8808



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Turnaround Time:	☐ Regular ☐ Rush (1 ☐ Rush (100% surcharge + ow * Contact lab in advance	_		adioactivity:	□ 0.05	ckground 5-0.2mR/hr 2mR/hr	•	Client	Cod	le						_	
Invoice to:			W	VSA Flag 🚨													
Company Name: Teck C	Coal Ltd.			_													
Contact Name: Calt Good			#	of bottles													
Address: P.O. Box 1777, 124	4B Aspen Drive		Pr	reservatives					7				1			_	
City/Prov: Sparwood, Britis	sh Columbia		Si	ize 📙	_					_		+	_			_	
Postal Code: VOB 2GO	Phone: 250-865-5	289		Subgroup #						-		+	+	-		+	
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SRC Environmental Analytical Laboratories 143-111 Research Dr., Saskatoon, SK S7N 3R2 Ph. (306)933-6932, Toll free 800-240-8808



Turnaround Time: Invoice to: Company Name: Teck of Contact Name: Calt Good Address: P.O. Box 1777, 12/City/Prov: Sparwood, Britis Postal Code: VOB 2G0 Email: calt.good@teck.com PO# 19-12 Report Format:	Rush (100% surcharge + o * Contact lab in advant Coal Ltd. 4B Aspen Drive	-5289	Prized*) W # Pri Si In	ab Use Only adioactivity: /SA Flag of bottles reservatives ize Subgroup #	□ bac □ 0.0	ckground 6-0.2mR/hr 2mR/hr	SRC Group #								
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	Sample Site Description		# of Bottles per site	Sample Ty (water, soil,		Date/Time Sampled	Wei	Μο̈́	F	(metals					
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F	RG_ER_RSC_010-M-20190624		2	Fish muse	cle	22-Jun-2019	1	1	1						
RO	ER_RSC_11_R-M_2019062	2	2	Fish muse	cle	22-Jun-2019	1	1	V						
RO	ER_RSC_12_R-M_2019062	2	2	Fish muse	cle	22-Jun-2019	V	1	1					T	
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1/ 1 0	RG_STPD_RSC_15-M2019		1	Fish musc	cle	4-Jun-2019	1	7	1					T	
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			La	ab Use Only:												
Turnaround Time:		100% surcharge)		-		kground										
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Company Name: Teck	Coal Ltd.			•				-								
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Address: P.O. Box 1777, 12	4B Aspen Drive		Pro	eservatives -	_				\top			1	1	1	\neg	
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143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited
421 Pine Avenue
Sparwood, BC V0B 2G0
Attn: Cait Good

Date Samples Received: Jul-25-2019 Client P.O.: VPO00616225 19-12

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 2 authorized by Keith Gipman, Supervisor Results from Lab Section 6 authorized by Marion McConnell, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.

This is a final report.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

421 Pine Avenue Sparwood, BC V0B 2G0

Attn: Cait Good

Sample #: 2019041379 Client PO #: VPO00616225 19-12

Date Sampled: May 17, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

Description: 05/17/2019 RG_LNLK-RSC-11-M_20190517

Lab Section 2 Aluminum ug/g 12 Antimony ug/g <0.02 Arsenic ug/g <0.05 Barium ug/g 4.8 Beryllium ug/g <0.02	5 0.02 0.05 0.5 0.02 5
Antimony ug/g <0.02	0.02 0.05 0.5 0.02
Arsenic ug/g <0.05 Barium ug/g 4.8	0.05 0.5 0.02
Barium ug/g 4.8	0.5 0.02 5
0 0	0.02 5
Beryllium ug/g <0.02	5
,	-
Boron ug/g <5	0.02
Cadmium ug/g <0.02	0.02
Chromium ug/g <0.5	0.5
Cobalt ug/g <0.5	0.5
Copper ug/g 1.7	0.5
Iron ug/g 22	5
Lead ug/g <0.05	0.05
Manganese ug/g 1.3	0.5
Mercury ug/g 0.37	0.01
Molybdenum ug/g <0.05	0.05
Nickel ug/g <0.5	0.5
Selenium ug/g 0.40	0.05
Silver ug/g <0.02	0.02
Strontium ug/g 1.0	0.1
Thallium ug/g <0.01	0.01
Tin ug/g <0.2	0.2
Titanium ug/g 0.6	0.5
Uranium ug/g <0.02	0.02
Vanadium ug/g <0.2	0.2
Zinc ug/g 49	5
Lab Section 6	
Moisture % 75.55	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.



143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Variability in detection limits due to sample size. There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041380 Client PO #: VPO00616225 19-12

Date Sampled: May 17, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/17/2019 RG_LNLK-RSC-12-M_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	10	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.19	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	<0.5	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	70	50
Lab Section 6			
Moisture	%	73.51	0.02

Moisture % 73.51 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041381 Client PO #: VPO00616225 19-12

Date Sampled: May 17, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/17/2019 RG_LNLK-RSC-13-M_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.06	0.05
Barium	ug/g	4.8	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	2.1	0.5
Iron	ug/g	16	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	1.2	0.5
Mercury	ug/g	0.30	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.51	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.9	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	61	5
Lab Section 6			
Moisture	%	75.62	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 **F**: 306-933-7922 **Toll-free**: 1-800-240-8808 **E**: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041382 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/20/2019 RG_LNLK-RSC-14-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	9	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	< 0.05	0.05
Barium	ug/g	6.5	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	1.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.9	0.5
Iron	ug/g	30	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	1.2	0.5
Mercury	ug/g	0.58	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.47	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.7	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	65	5
Lab Section 6			
Moisture	%	74.31	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041383 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/20/2019 RG_LNLK-RSC-15-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.05
Barium	ug/g	9.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.7	0.5
Iron	ug/g	32	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.4	0.5
Mercury	ug/g	0.77	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.53	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.1	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	100	5
Lab Section 6			
Moisture	%	73.55	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041384 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

Description: 05/20/2019 RG_LNLK-RSC-16-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.13	0.05
Barium	ug/g	3.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.6	0.5
Iron	ug/g	13	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.1	0.5
Mercury	ug/g	0.38	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.48	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.4	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	43	5
Lab Section 6			
Moisture	%	74.00	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041385 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

Description: 05/20/2019 RG_LNLK-RSC-17-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	9	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.34	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	<0.5	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	60	50
Lab Section 6			
Moisture	%	76.30	0.02

Moisture 76.30 0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041386 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

Description: 05/20/2019 RG_LNLK-RSC-18-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	< 0.05	0.05
Barium	ug/g	5.6	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.6	0.5
Iron	ug/g	17	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	1.3	0.5
Mercury	ug/g	0.44	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.52	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.7	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	50	5
Lab Section 6			
Moisture	%	75.35	0.02

Moisture 75.35 0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041387 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/20/2019 RG_LNLK-RSC-19-M_20190520

Analyte	Units	Result	DL
Lab Section 2			
Al		-	-
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.07	0.05
Barium	ug/g	7.7	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.7	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	2.9	0.5
Iron	ug/g	24	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.4	0.5
Mercury	ug/g	0.20	0.01
Molybdenum	ug/g	<0.05	0.05
Worybuchum	ug/g	40.00	0.00
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.42	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	0.02	0.02
Vanadium	ug/g ug/g	<0.2	0.02
Zinc		<0.2 79	0.2 5
	ug/g	18	Э
Lab Section 6			
Moisture	%	73.96	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041388 Client PO #: VPO00616225 19-12

Date Sampled: May 20, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

05/20/2019 RG_LNLK-RSC-20-M_20190520 Description:

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	6.8	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.2	0.5
Iron	ug/g	17	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	3.7	0.5
Mercury	ug/g	0.32	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	0.54	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	6.4	0.1
Thallium	ug/g	<0.01	0.01
_			
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	64	5
Lab Section 6			
Moisture	%	73.95	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041389 Client PO #: VPO00616225 19-12

Date Sampled: May 15, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/15/2019 RG_STPD-RSC-01-M_20190515

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	4.9	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.4	0.5
Iron	ug/g	22	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	3.0	0.5
Mercury	ug/g	0.20	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	13	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	8.7	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	86	5
Lab Section 6			
Moisture	%	73.35	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041390 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

05/24/2019 RG_STPD-RSC-02-M_20190524 Description:

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.05	0.05
Barium	ug/g	1.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	2.3	0.5
Iron	ug/g	20	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	1.2	0.5
Mercury	ug/g	0.18	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	17	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.0	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	59	5
Lab Section 6			
Moisture	%	74.51	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041391 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/24/2019 RG_STPD-RSC-03-M_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.05
Barium	ug/g	2.5	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.6	0.5
Iron	ug/g	17	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	2.3	0.5
Mercury	ug/g	0.20	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	19	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	7.8	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	50	5
Lab Section 6			
Moisture	%	75 42	0.02

Moisture % 75.42 0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041392 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

05/24/2019 RG_STPD-RSC-04-M_20190524 Description:

Analyte	Units	Result	DL
Lab Section 2			
Alumainum		Æ	-
Aluminum	ug/g	<5 <0.02	5 0.02
Antimony Arsenic	ug/g	0.06	0.02
Barium	ug/g	1.2	0.05
Beryllium	ug/g ug/g	<0.02	0.02
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.03	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.4	0.5
Iron	ug/g	16	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.2	0.5
Mercury	ug/g	0.25	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	16	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	<0.01	0.01
_			
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	58	5
Lab Section 6			
Moisture	%	75.55	0.02

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The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041393 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

Description: 05/24/2019 RG_STPD-RSC-05-M_20190524

Analyte	Units	Result	DL
Lab Section 2			
Alveria		-50	50
Aluminum	ug/g	<50 <0.1	50 0.1
Antimony	ug/g	-	_
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
les e		50	50
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.25	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	17	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
_	,		
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	73.93	0.02
MOISTUIE	/0	73.33	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041394 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/24/2019 RG_STPD-RSC-06-M_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.09	0.05
Barium	ug/g	3.4	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.03	0.02
Chromium	ug/g	9.0	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.8	0.5
Iron	ug/g	83	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	2.7	0.5
Mercury	ug/g	0.14	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	16	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	7.3	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	62	5
Lab Section 6			
Moisture	%	74.48	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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Aug 15, 2019

Teck Coal Limited

Sample #: 2019041395 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/24/2019 RG_STPD-RSC-07-M_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.1
Barium	ug/g ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.19	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	14	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	74.76	0.02
	, -	=	

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041396 Client PO #: VPO00616225 19-12

Date Sampled: May 30, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

Description: 05/30/2019 RG_STPD-RSC-08-M_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.18	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	17	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	73.99	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041397 Client PO #: VPO00616225 19-12

Date Sampled: May 30, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/30/2019 RG_STPD-RSC-09-M_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.15	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	18	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	3	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	73.98	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041398 Client PO #: VPO00616225 19-12

Date Sampled: May 30, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/30/2019 RG_STPD-RSC-10-M_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.18	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	16	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium		<0.1	0.1
Vanadium	ug/g	<0.1 <1	1
	ug/g		50
Zinc	ug/g	50	ວບ
Lab Section 6			
Moisture	%	73.83	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041399 Client PO #: VPO00616225 19-12

Date Sampled: May 31, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

05/31/2019 RG_STPD-RSC-11-M_20190531 Description:

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.19	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	18	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	73.25	0.02

Moisture 73.25 0.02 Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041400 Client PO #: VPO00616225 19-12

Date Sampled: May 31, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/31/2019 RG_STPD-RSC-12-M_20190531

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.22	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	16	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	77.60	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041401 Client PO #: VPO00616225 19-12

Date Sampled: Jun 01, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 06/01/2019 RG_STPD-RSC-13-M_20190601

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.21	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	16	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	78.49	0.02
	, -		

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041402 Client PO #: VPO00616225 19-12

Date Sampled: May 15, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/15/2019 RG_ERIMF-RSC-04-M_20190515

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	6	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.36	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	2.2	0.5
Silver	ug/g ug/g	<0.02	0.02
Strontium	ug/g	4	1
Thallium	ug/g	<0.1	0.1
mamam	ug/g	30.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	76.07	0.02
	, ,	. 5.0.	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041403 Client PO #: VPO00616225 19-12

Date Sampled: May 17, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/17/2019 RG_ERIMF-RSC-05-M_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.32	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g ug/g	2.1	0.5
Silver	ug/g ug/g	<0.02	0.02
Strontium	ug/g ug/g	1	1
Thallium	ug/g ug/g	<0.1	0.1
	~9·9		
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	80	50
Lab Section 6			
Moisture	%	74.42	0.02
		• •=	

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041404 Client PO #: VPO00616225 19-12

Date Sampled: May 21, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/21/2019 RG_ERIMF-RSC-06-M_20190521

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	9	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.18	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.0	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	8	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	60	50
Lab Section 6			
Moisture	%	76.48	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041405 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-07-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.44	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.1	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	75.28	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041406 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-08-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.44	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	2.8	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	3	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	50	50
Lab Section 6			
Moisture	%	70.39	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041407 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-09-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	4.3	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.9	0.5
Iron	ug/g	16	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.4	0.5
Mercury	ug/g	0.30	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.3	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	56	5
Lab Section 6			
Moisture	%	76.30	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041408 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-10-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g ug/g	9	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	6	5
Mercury	ug/g	0.30	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.9	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	13	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	70	50
Lab Section 6			
Moisture	%	74.48	0.02
	, -	-	

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041409 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-11-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.30	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.8	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	60	50
Lab Section 6			
Moisture	%	76.43	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041410 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-12-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.30	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.8	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	3	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	50	50
Lab Section 6			
Moisture	%	81.16	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041411 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-13-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.1
Barium	ug/g	12	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.19	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.4	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	19	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	50	50
Lab Section 6			
Moisture	%	71.73	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041412 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

05/23/2019 RG_ERIMF-RSC-14-M_20190523 Description:

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	20	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.07	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.19	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	4.1	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	6	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	180	50
Lab Section 6	чу, у	100	50
Moisture	%	73.98	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041413 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/23/2019 RG_ERIMF-RSC-15-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	17	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	9	5
Mercury	ug/g	0.26	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ua/a	<5	5
Selenium	ug/g	1.1	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	25	0.02
	ug/g		
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	90	50
Lab Section 6			
Moisture	%	70.12	0.02
Molotaro	,0		0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041414 Client PO #: VPO00616225 19-12

Date Sampled: May 23, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

Description: 05/23/2019 RG_ERIMF-RSC-16-M_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.05
Barium	ug/g	15	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.8	0.5
Iron	ug/g	25	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	6.7	0.5
Mercury	ug/g	0.12	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.4	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	22	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	67	5
Lab Section 6			
Moisture	%	75.23	0.02
	, -		

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The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041415 Client PO #: VPO00616225 19-12

Date Sampled: May 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.05G TO 50ML**

Description: 05/24/2019 RG_ERWSF-RSC-01-M_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	1.5	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.9	0.5
Iron	ug/g	17	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	2.6	0.5
Mercury	ug/g	0.46	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	2.2	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.8	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	36	5
Lab Section 6			
Moisture	%	75.93	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041416 Client PO #: VPO00616225 19-12

Date Sampled: May 29, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 05/29/2019 RG_ERWSF-RSC-02-M_20190529

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	0.9	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.2	0.5
Iron	ug/g	15	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.4	0.5
Mercury	ug/g	0.20	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	2.3	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.0	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	22	5
Lab Section 6			
Moisture	%	81.29	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041417 Client PO #: VPO00616225 19-12

Date Sampled: May 30, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 05/30/2019 RG_ERWSF-RSC-03-M_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.26	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	2.2	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	82.92	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

2019041418 Sample #: Client PO #: VPO00616225 19-12

Date Sampled: Jun 13, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.2G TO 50ML**

Description: 06/13/2019 RG_ER_RSC_01-M_20190613

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	6	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.05	0.02
Barium	ug/g	0.63	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.1	0.1
Cobalt	ug/g	0.03	0.02
Copper	ug/g	1.4	0.1
Iron	ug/g	15	5
Lead	ug/g	0.02	0.02
Manganese	ug/g	1.1	0.2
Mercury	ug/g	0.72	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	1.7	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	55	1
Lab Section 6			
Moisture	%	78.42	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041419 Client PO #: VPO00616225 19-12

Date Sampled: Jun 13, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/13/2019 RG_ER_RSC_02-M_20190613

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.06	0.02
Barium	ug/g	0.82	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	0.03	0.02
Copper	ug/g	1.8	0.1
Iron	ug/g	19	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.5	0.2
Mercury	ug/g	0.24	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	1.3	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	40	1
Lab Section 6			
Moisture	%	77.61	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041420 Client PO #: VPO00616225 19-12

Date Sampled: Jun 21, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/21/2019 RG_ER_RSC_03-M_20190621

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.02
Barium	ug/g	1.2	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.5	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.8	0.1
Iron	ug/g	16	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g ug/g	1.3	0.02
Mercury	ug/g ug/g	0.30	0.2
Molybdenum	ug/g ug/g	<0.05	0.01
Molybaenam	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	3.3	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.3	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	61	1
Lab Section 6			
Moisture	%	80.76	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041421 Client PO #: VPO00616225 19-12

Date Sampled: Jun 22, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/22/2019 RG_ER_RSC_04-M_20190622

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.02
Barium	ug/g	0.95	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.2	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	2.3	0.1
Iron	ug/g	17	5
Lead	ug/g	0.02	0.02
Manganese	ug/g	1.1	0.2
Mercury	ug/g	0.34	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	3.0	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.0	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	78	1
Lab Section 6			
Moisture	%	79.07	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041422 Client PO #: VPO00616225 19-12

Date Sampled: Jun 22, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.5G TO 50ML

Description: 06/22/2019 RG_ER_RSC_05-M_20190622

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<2	2
Antimony	ug/g	<0.01	0.01
Arsenic	ug/g	0.09	0.01
Barium	ug/g	0.68	0.02
Beryllium	ug/g	<0.01	0.01
Boron	ug/g	<1	1
Cadmium	ug/g	<0.01	0.01
Chromium	ug/g	0.09	0.05
Cobalt	ug/g	0.01	0.01
Copper	ug/g	1.8	0.05
Iron	ug/g	19	2
Lead	ug/g	<0.01	0.01
Manganese	ug/g	1.7	0.1
Mercury	ug/g	0.52	0.005
Molybdenum	ug/g	<0.02	0.02
Nickel	ug/g	<0.05	0.05
Selenium	ug/g	2.5	0.01
Silver	ug/g	<0.01	0.01
Strontium	ug/g	3.6	0.05
Thallium	ug/g	0.011	0.005
Tin	ug/g	<0.05	0.05
Titanium	ug/g	<0.2	0.2
Uranium	ug/g	< 0.005	0.005
Vanadium	ug/g	<0.1	0.1
Zinc	ug/g	64	0.5
Lab Section 6			
Moisture	%	81.07	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041423 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/24/2019 RG_ER_RSC_06-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.16	0.02
Barium	ug/g	0.66	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.3	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.5	0.1
Iron	ug/g	13	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	0.9	0.2
Mercury	ug/g	0.28	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	1.9	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.2	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	53	1
Lab Section 6			
Moisture	%	79.12	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041424 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/24/2019 RG_ER_RSC_07-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.06	0.02
Barium	ug/g	0.52	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.2	0.1
Cobalt	ug/g	0.02	0.02
Copper	ug/g	1.1	0.1
Iron	ug/g	10	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	0.9	0.2
Mercury	ug/g	0.34	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	2.5	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.2	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	31	1
Lab Section 6			
Moisture	%	77.93	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041425 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/24/2019 RG_ER_RSC_08-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.04	0.02
Barium	ug/g	0.58	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.6	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.6	0.1
Iron	ug/g	16	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.5	0.2
Mercury	ug/g	0.17	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	2.4	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	28	1
Lab Section 6			
Moisture	%	78.29	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041426 Client PO #: VPO00616225 19-12

Date Sampled: Jun 22, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/22/2019 RG_ER_RSC_09-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.02
Barium	ug/g	0.84	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.8	0.1
Iron	ug/g	16	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.0	0.2
Mercury	ug/g	0.27	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	2.2	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.5	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	66	1
Lab Section 6			
Moisture	%	77.27	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041427 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.2G TO 50ML**

Description: 06/24/2019 RG_ER_RSC_010-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.02
Barium	ug/g	0.93	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.5	0.1
Iron	ug/g	14	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.2	0.2
Mercury	ug/g	0.30	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	0.1	0.1
Selenium	ug/g	1.7	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.0	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	63	1
Lab Section 6			
Moisture	%	79.82	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041428 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/24/2019 RG_ER_RSC_11-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.02
Barium	ug/g	1.2	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	<0.02	0.02
Copper	ug/g	1.6	0.1
Iron	ug/g	14	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.2	0.2
Mercury	ug/g	0.34	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	1.9	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	2.2	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	76	1
Lab Section 6			
Moisture	%	80.65	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041429 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.5G TO 50ML

Description: 06/24/2019 RG_ER_RSC_12-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<2	2
Antimony	ug/g	<0.01	0.01
Arsenic	ug/g	0.06	0.01
Barium	ug/g	1.1	0.02
Beryllium	ug/g	<0.01	0.01
Boron	ug/g	<1	1
Cadmium	ug/g	<0.01	0.01
Chromium	ug/g	<0.05	0.05
Cobalt	ug/g	<0.01	0.01
Copper	ug/g	1.6	0.05
Iron	ug/g	13	2
Lead	ug/g	<0.01	0.01
Manganese	ug/g	1.3	0.1
Mercury	ug/g	0.20	0.005
Molybdenum	ug/g	<0.02	0.02
Nickel	ug/g	<0.05	0.05
Selenium	ug/g	2.8	0.01
Silver	ug/g	<0.01	0.01
Strontium	ug/g	2.4	0.05
Thallium	ug/g	0.012	0.005
Tin	ug/g	<0.05	0.05
Titanium	ug/g	<0.2	0.2
Uranium	ug/g	<0.005	0.005
Vanadium	ug/g	<0.1	0.1
Zinc	ug/g	51	0.5
Lab Section 6			
Moisture	%	80.51	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041430 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.2G TO 50ML

Description: 06/24/2019 RG_ER_RSC_13-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	7	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.02
Barium	ug/g	0.86	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	0.04	0.02
Copper	ug/g	1.8	0.1
Iron	ug/g	20	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	1.3	0.2
Mercury	ug/g	0.28	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	2.5	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.6	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	56	1
Lab Section 6			
Moisture	%	77.23	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041431 Client PO #: VPO00616225 19-12

Date Sampled: Jun 24, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.5G TO 50ML

Description: 06/24/2019 RG_ER_RSC_14-M_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<2	2
Antimony	ug/g	<0.01	0.01
Arsenic	ug/g	0.12	0.01
Barium	ug/g	0.63	0.02
Beryllium	ug/g	<0.01	0.01
Boron	ug/g	<1	1
Cadmium	ug/g	<0.01	0.01
Chromium	ug/g	< 0.05	0.05
Cobalt	ug/g	<0.01	0.01
Copper	ug/g	1.6	0.05
Iron	ug/g	13	2
Lead	ug/g	<0.01	0.01
Manganese	ug/g	0.8	0.1
Mercury	ug/g	0.44	0.005
Molybdenum	ug/g	<0.02	0.02
Nickel	ug/g	<0.05	0.05
Selenium	ug/g	2.7	0.01
Silver	ug/g	<0.01	0.01
Strontium	ug/g	1.2	0.05
Thallium	ug/g	0.016	0.005
Tin	ug/g	<0.05	0.05
Titanium	ug/g	<0.2	0.2
Uranium	ug/g	<0.005	0.005
Vanadium	ug/g	<0.1	0.1
Zinc	ug/g	55	0.5
Lab Section 6			
Moisture	%	78.48	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041432 Client PO #: VPO00616225 19-12

Date Sampled: Jun 04, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.005G TO 50ML

Description: 06/04/2019 RG_STPD_RSC_14-M20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.10	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.26	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	18	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	76.02	0.02
	, -		

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 **F**: 306-933-7922 **Toll-free**: 1-800-240-8808 **E**: analytical@src.sk.ca

www.src.sk.ca/analytical

SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041433 Client PO #: VPO00616225 19-12

Date Sampled: Jun 04, 2019 Date Received: Jul 25, 2019

Sample Matrix: FDT 0.05G TO 50ML

Description: 06/04/2019 RG_STPD_RSC_15-M20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	6	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.25	0.05
Barium	ug/g	1.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	1.8	0.5
Iron	ug/g	19	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	1.0	0.5
Mercury	ug/g	0.19	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	19	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1.6	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	31	5
Lab Section 6			
Moisture	%	78.49	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

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SRC Group # 2019-10406

Aug 15, 2019

Teck Coal Limited

Sample #: 2019041434 Client PO #: VPO00616225 19-12

Date Sampled: Jun 04, 2019 Date Received: Jul 25, 2019

Sample Matrix: **FDT 0.005G TO 50ML**

Description: 06/04/2019 RG_STPD_RSC_16-M20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	<5	5
Mercury	ug/g	0.16	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	18	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	5	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	<50	50
Lab Section 6			
Moisture	%	82.45	0.02

Moisture 82.45 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 7.3 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.

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2019041414 0.109 2019041415 0.1471 2019041416 0.1288 2019041417 0.0878 2019041418 0.7117 2019041419 0.8021	2019041412	0.0738
2019041415 0.1471 2019041416 0.1288 2019041417 0.0878 2019041418 0.7117 2019041419 0.8021	2019041413	0.0569
2019041416 0.1288 2019041417 0.0878 2019041418 0.7117 2019041419 0.8021	2019041414	0.109
2019041417 0.0878 2019041418 0.7117 2019041419 0.8021	2019041415	0.1471
2019041418 0.7117 2019041419 0.8021	2019041416	0.1288
2019041419 0.8021	2019041417	0.0878
	2019041418	0.7117
2019041420 0.908	2019041419	0.8021
	2019041420	0.908



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Toll-free: 1-800-240-8808

T: 306-933-6932 F: 306-933-7922

Aug 14, 2019

This report was generated for samples included in SRC Group # 2019-10406

Quality Control Report

Cait Good **Teck Coal Limited** 421 Pine Avenue Sparwood, BC V0B 2G0

Reference Materials and Standards:

A reference material of known concentration is used whenever possible as either a control sample or control standard and analyzed with each batch of samples. These "QC" results are used to assess the performance of the method and must be within clearly defined limits; otherwise corrective action is required.

QC Analysis	Units	Target Value	Obtained Value	
Aluminum	ug/g	1280	1190	
Aluminum	ug/g	1280	1310	
Arsenic	ug/g	6.87	6.49	
Arsenic	ug/g	6.87	7.21	
Cadmium	ug/g	0.299	0.279	
Cadmium	ug/g	0.299	0.289	
Chromium	ug/g	1.57	1.48	
Chromium	ug/g	1.57	1.54	
Copper	ug/g	13.8	13.4	
Copper	ug/g	13.8	14.2	
Iron	ug/g	312	291	
Iron	ug/g	312	317	
Lead	ug/g	0.404	0.598	*(1)
Lead	ug/g	0.404	0.382	
Manganese	ug/g	2.70	2.53	
Manganese	ug/g	2.70	2.64	
Mercury	ug/g	0.364	0.307	
Mercury	ug/g	0.364	0.339	
Nickel	ug/g	1.20	1.13	
Nickel	ug/g	1.20	1.19	
Selenium	ug/g	3.45	3.37	
Selenium	ug/g	3.45	3.60	
Silver	ug/g	0.0234	0.0235	
Silver	ug/g	0.0234	0.0244	
Zinc	ug/g	47.8	42.7	
Zinc	ug/g	47.8	42.3	

^{*(1)} The Lead result for the quality control sample was outside the laboratory's specified limits. The data was reviewed and samples could not be reanalyzed due to limited sample availability. Additional quality control measures in the same batch were within specified limits.



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www.src.sk.ca/analytical

Aug 14, 2019

This report was generated for samples included in SRC Group # 2019-10406

Please note, duplicates could not be analyzed for ICP due to insufficient sample available.

Overall, there were no other indications of problems with the analysis and the results were considered acceptable.

Roxane Ortmann - Quality Assurance Supervisor





Trich Analytics Inc.

Fish Muscle Tissue Microchemistry Analysis Report

Client: Date Received: 08 Aug 2019
Liz Ashby Final Report Date: 23 Aug 2019

Liz Ashby Final Report Date: 23 Aug 2019
Golder Associates Ltd. Project No. 2019-071

Suite 200 - 2920 Virtual Way Vancouver, BC, V5M 0C4

Ph: 604-296-2766 Email: Liz Ashby@golder.com

Analytical Request: Fish Muscle Tissue Microchemistry (total metals and moisture) – 56 samples. See chain of custody form provided for sample identification numbers.

Includes: LA-ICP-MS (line scans), data integration and calculations, QA/QC results, Excel data, chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.02. Four point analytical balance used to measure sample weights. Accuracy +/- 0.1 mg. Analytical results are expressed in part per million (ppm) dry weight. Samples quantified using DORM-4 certified reference standard.

This report provides the analytical results only for fish muscle tissue samples noted above as received from the Client.

Reviewed and Amproved by Jennie Christensen, PhD, RPBio

23 Aug 2019

[The analytical report shall not be reproduced except in full under the expressed written consent of TrichAnalytics Inc.]

Trich Analytics Inc.

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

Samp	ole ID	41379	41380	41381	41382
Wet We	eight (g)	0.1059	0.0833	0.1398	0.1484
Moistu	ure (%)	70.8	68.9	73.7	72.3
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.273	0.073	0.150	0.053
23Na	2.79	1,987	906	1,353	1,488
24Mg	0.047	1,618	1,158	1,600	1,589
27Al	0.076	11.9	8.88	7.97	3.84
31P	56.7	12,310	10,289	11,589	10,682
39K	3.13	22,586	21,430	23,477	22,330
44Ca	22.1	2,727	1,268	1,580	1,128
51V	0.009	0.302	0.092	0.188	0.104
52Cr	0.107	1.94	1.52	2.11	1.58
55Mn	0.005	2.70	1.10	1.64	1.32
57Fe	0.938	41.2	26.9	40.0	20.6
59Co	0.008	0.247	0.081	0.152	0.085
60Ni	0.009	1.39	0.457	1.27	0.536
63Cu	0.004	3.41	2.17	3.16	2.31
66Zn	0.063	55.1	44.2	64.0	55.2
75As	0.044	0.211	0.061	0.199	0.079
77Se	0.165	0.732	0.644	0.911	0.635
88Sr	0.0004	2.51	0.721	1.01	0.696
95Mo	0.003	0.218	0.054	0.131	0.045
111Cd	0.014	0.586	0.386	0.620	0.445
118Sn	0.009	0.261	0.251	0.349	0.157
202Hg	0.028	0.544	0.293	0.547	0.917
208Pb	0.001	0.331	0.068	0.157	0.095
238U	0.0001	0.174	0.029	0.104	0.018

Notes:

ppm = parts per million
DL = detection limit
g = grams

Samp	ole ID	41383	41384	41385	41386
Wet We	eight (g)	0.1070	0.0975	0.0727	0.1460
Moistu	ure (%)	71.9	71.7	74.4	71.7
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.069	0.022	0.045	0.011
23Na	2.79	1,544	1,042	993	696
24Mg	0.047	1,508	1,533	1,473	1,587
27Al	0.076	3.46	3.38	2.47	1.01
31P	56.7	10,870	9,497	9,537	9,664
39K	3.13	15,403	19,434	18,096	16,440
44Ca	22.1	5,230	1,231	1,464	1,041
51V	0.009	0.099	0.042	0.086	0.026
52Cr	0.107	1.47	1.52	1.71	1.37
55Mn	0.005	4.66	0.856	1.52	0.932
57Fe	0.938	35.6	19.4	28.7	22.1
59Co	0.008	0.077	0.050	0.081	0.023
60Ni	0.009	0.543	0.644	0.802	0.273
63Cu	0.004	2.79	2.11	3.36	1.61
66Zn	0.063	68.7	31.9	67.3	50.5
75As	0.044	0.137	0.118	0.118	0.061
77Se	0.165	0.665	0.630	0.630	0.661
88Sr	0.0004	5.51	0.577	1.10	0.579
95Mo	0.003	0.034	0.016	0.057	0.012
111Cd	0.014	0.629	0.255	0.621	0.393
118Sn	0.009	0.151	0.055	0.116	0.038
202Hg	0.028	1.17	0.525	0.505	0.575
208Pb	0.001	0.113	0.026	0.084	0.028
238U	0.0001	0.025	0.0029	0.020	0.0012

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41387	41388	41389	41390
Wet We	eight (g)	0.0983	0.1593	0.0916	0.1894
Moistu	ure (%)	69.7	73.8	72.8	73.5
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.029	0.076	0.039	0.027
23Na	2.79	823	1,385	853	1,031
24Mg	0.047	1,487	1,485	1,489	1,412
27Al	0.076	2.24	4.51	1.77	1.19
31P	56.7	9,945	11,501	9,098	8,537
39K	3.13	18,501	21,386	15,093	13,741
44Ca	22.1	1,113	1,611	1,087	1,231
51V	0.009	0.069	0.115	0.051	0.031
52Cr	0.107	1.85	1.41	1.62	1.68
55Mn	0.005	1.72	1.42	0.948	1.27
57Fe	0.938	30.2	21.6	29.2	29.8
59Co	0.008	0.089	0.083	0.070	0.041
60Ni	0.009	1.06	0.421	0.663	0.777
63Cu	0.004	2.91	1.68	2.70	2.11
66Zn	0.063	60.8	54.3	57.0	48.7
75As	0.044	0.115	0.165	0.097	<0.044
77Se	0.165	0.602	0.860	12.9	16.1
88Sr	0.0004	0.751	1.26	0.950	0.965
95Mo	0.003	0.035	0.054	0.035	0.012
111Cd	0.014	0.544	0.571	0.503	0.399
118Sn	0.009	0.166	0.151	0.117	0.020
202Hg	0.028	0.369	0.536	0.351	0.334
208Pb	0.001	0.064	0.125	0.056	0.011
238U	0.0001	0.0148	0.0320	0.0081	0.0012

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41391	41392	41393	41394
Wet We	eight (g)	0.1529	0.1349	0.0518	0.1653
Moistu	ure (%)	71.4	75.0	68.3	74.3
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.052	0.035	0.041	0.054
23Na	2.79	1,299	1,177	1,138	1,254
24Mg	0.047	1,525	1,342	1,420	1,679
27Al	0.076	1.23	1.83	1.95	4.31
31P	56.7	9,999	8,325	8,200	9,408
39K	3.13	13,167	12,706	12,790	15,429
44Ca	22.1	4,897	1,221	1,110	1,558
51V	0.009	0.036	0.051	0.043	0.059
52Cr	0.107	2.17	1.29	1.47	1.69
55Mn	0.005	2.49	1.20	0.871	1.00
57Fe	0.938	48.1	19.7	18.4	28.5
59Co	0.008	0.068	0.050	0.034	0.078
60Ni	0.009	1.46	0.370	0.534	0.428
63Cu	0.004	1.43	1.39	2.06	1.90
66Zn	0.063	45.8	48.1	21.9	46.5
75As	0.044	0.089	0.053	0.045	0.118
77Se	0.165	18.1	14.3	16.1	17.3
88Sr	0.0004	5.65	0.985	0.740	1.15
95Mo	0.003	0.020	0.028	0.020	0.039
111Cd	0.014	0.338	0.422	0.211	0.407
118Sn	0.009	0.096	0.058	0.058	0.074
202Hg	0.028	0.323	0.399	0.319	0.282
208Pb	0.001	0.010	0.030	0.024	0.073
238U	0.0001	0.0012	0.0041	0.0020	0.0058

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41395	41396	41397	41398
Wet We	eight (g)	0.0425	0.0507	0.0674	0.0709
Moistu	ure (%)	69.9	66.1	73.4	70.4
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.031	0.014	0.035	0.037
23Na	2.79	947	867	1,891	1,685
24Mg	0.047	1,224	1,148	1,969	1,777
27Al	0.076	3.08	1.67	3.19	2.52
31P	56.7	7,641	9,378	13,375	13,921
39K	3.13	13,351	18,583	24,944	24,370
44Ca	22.1	1,028	988	1,840	1,870
51V	0.009	0.027	0.023	0.051	0.036
52Cr	0.107	1.25	1.51	1.92	1.97
55Mn	0.005	0.577	0.711	2.05	1.49
57Fe	0.938	19.5	17.5	29.3	23.7
59Co	0.008	0.022	0.026	0.046	0.050
60Ni	0.009	0.411	0.730	0.914	0.806
63Cu	0.004	1.28	1.13	1.32	1.86
66Zn	0.063	35.5	25.0	36.2	51.6
75As	0.044	<0.044	<0.044	<0.044	0.052
77Se	0.165	15.0	15.6	22.5	19.0
88Sr	0.0004	0.673	0.613	1.19	1.29
95Mo	0.003	0.012	0.009	0.016	0.016
111Cd	0.014	0.316	0.200	0.305	0.378
118Sn	0.009	0.137	0.025	0.390	0.060
202Hg	0.028	0.296	0.219	0.310	0.398
208Pb	0.001	0.016	0.013	0.050	0.023
238U	0.0001	0.0006	0.0003	0.0032	0.0024

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41399	41400	41401	41402
Wet We	eight (g)	0.0577	0.0472	0.0713	0.0953
	ure (%)	71.4	74.2	70.8	71.1
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.028	0.026	0.040	0.023
23Na	2.79	1,051	1,322	1,687	1,356
24Mg	0.047	1,637	2,304	2,071	1,660
27Al	0.076	4.47	5.38	4.96	2.80
31P	56.7	10,561	11,908	12,346	10,701
39K	3.13	18,825	22,549	23,348	18,805
44Ca	22.1	1,658	1,565	1,646	1,266
51V	0.009	0.056	0.043	0.067	0.035
52Cr	0.107	1.85	2.58	3.22	1.46
55Mn	0.005	1.17	1.27	2.08	1.08
57Fe	0.938	25.2	34.2	50.7	25.6
59Co	0.008	0.055	0.075	0.134	0.044
60Ni	0.009	1.37	2.04	3.32	0.372
63Cu	0.004	1.69	1.21	1.67	1.86
66Zn	0.063	28.2	20.9	29.9	48.7
75As	0.044	0.063	0.048	<0.044	0.066
77Se	0.165	19.9	20.8	19.9	2.79
88Sr	0.0004	0.948	0.993	2.93	0.848
95Mo	0.003	0.024	0.015	0.014	0.024
111Cd	0.014	0.230	0.142	0.180	0.326
118Sn	0.009	0.164	0.232	0.092	0.121
202Hg	0.028	0.333	0.378	0.416	0.618
208Pb	0.001	0.057	0.040	0.024	0.023
238U	0.0001	0.0028	0.0008	0.0008	0.0008

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41403	41404	41405	41406
Wet We	eight (g)	0.0547	0.0473	0.0750	0.0627
	ure (%)	69.7	71.7	73.9	70.3
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.035	0.037	0.015	0.031
23Na	2.79	2,287	2,160	1,406	2,121
24Mg	0.047	1,692	2,198	1,767	2,116
27Al	0.076	4.04	4.06	2.03	2.70
31P	56.7	11,204	14,467	12,203	12,720
39K	3.13	15,299	28,092	24,492	21,979
44Ca	22.1	1,675	1,886	1,401	2,379
51V	0.009	0.047	0.068	0.034	0.053
52Cr	0.107	1.89	1.90	1.60	1.82
55Mn	0.005	1.94	1.74	0.633	1.67
57Fe	0.938	28.3	34.9	25.7	55.2
59Co	0.008	0.078	0.073	0.039	0.080
60Ni	0.009	1.47	0.904	0.576	0.904
63Cu	0.004	1.51	3.63	1.98	3.68
66Zn	0.063	66.5	93.2	26.0	52.1
75As	0.044	<0.044	0.085	0.058	0.088
77Se	0.165	2.20	1.80	1.44	3.64
88Sr	0.0004	1.56	1.28	0.900	2.18
95Mo	0.003	0.020	0.031	0.020	0.035
111Cd	0.014	0.534	0.647	0.166	0.342
118Sn	0.009	0.085	0.340	0.082	0.077
202Hg	0.028	0.509	0.347	0.692	0.801
208Pb	0.001	0.062	0.070	0.019	0.055
238U	0.0001	0.0055	0.0067	0.0012	0.0043

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41407	41408	41409	41410
Wet We	eight (g)	0.1027	0.0892	0.0511	0.0411
Moistu	ure (%)	72.0	72.4	68.3	75.4
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.018	0.024	0.013	0.037
23Na	2.79	1,723	1,603	1,550	2,012
24Mg	0.047	1,960	1,388	1,537	1,688
27Al	0.076	2.28	4.29	1.50	5.14
31P	56.7	11,969	10,371	13,430	14,594
39K	3.13	21,565	14,892	26,295	28,172
44Ca	22.1	1,238	2,646	1,429	1,980
51V	0.009	0.040	0.035	0.026	0.051
52Cr	0.107	1.97	1.81	1.82	2.18
55Mn	0.005	1.05	1.41	1.04	1.63
57Fe	0.938	29.2	32.5	25.5	47.6
59Co	0.008	0.071	0.052	0.039	0.087
60Ni	0.009	1.37	1.07	1.00	1.34
63Cu	0.004	1.52	1.55	1.43	2.09
66Zn	0.063	44.8	42.3	60.4	69.1
75As	0.044	0.089	0.074	0.047	0.069
77Se	0.165	1.68	2.11	2.33	2.65
88Sr	0.0004	0.845	2.34	0.854	1.66
95Mo	0.003	0.014	0.019	0.015	0.023
111Cd	0.014	0.286	0.240	0.341	0.379
118Sn	0.009	0.084	0.059	0.038	0.236
202Hg	0.028	0.564	0.519	0.520	0.562
208Pb	0.001	0.020	0.024	0.010	0.051
238U	0.0001	0.0008	0.0016	0.0004	0.0016

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41411	41412	41413	41414
Wet We	eight (g)	0.0315	0.0847	0.0439	0.1084
	ure (%)	66.7	71.9	70.2	73.3
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.026	0.052	0.022	0.029
23Na	2.79	1,744	2,000	1,767	1,897
24Mg	0.047	2,002	2,100	2,103	1,887
27Al	0.076	1.73	3.82	3.01	2.49
31P	56.7	14,825	13,951	12,714	12,835
39K	3.13	25,477	19,823	20,015	22,252
44Ca	22.1	3,295	2,981	2,044	2,120
51V	0.009	0.047	0.042	0.027	0.044
52Cr	0.107	2.03	1.72	2.13	1.83
55Mn	0.005	1.34	2.35	1.18	1.13
57Fe	0.938	49.1	58.6	35.1	41.8
59Co	0.008	0.082	0.168	0.106	0.185
60Ni	0.009	1.04	0.73	1.27	0.88
63Cu	0.004	3.27	3.46	2.16	2.82
66Zn	0.063	56.1	106	67.9	60.9
75As	0.044	0.075	0.082	0.059	0.083
77Se	0.165	2.24	4.55	1.66	1.90
88Sr	0.0004	3.07	3.21	1.43	1.66
95Mo	0.003	0.018	0.041	0.018	0.028
111Cd	0.014	0.316	0.650	0.348	0.374
118Sn	0.009	0.072	0.049	0.023	0.095
202Hg	0.028	0.342	0.419	0.473	0.235
208Pb	0.001	0.029	0.011	0.011	0.021
238U	0.0001	0.0008	<0.0001	0.0008	0.0012

Notes:

ppm = parts per million
DL = detection limit

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g = grams

Samp	ole ID	41415	41416	41417	41418
Wet We	eight (g)	0.1521	0.1496	0.0850	0.6181
Moistu	ure (%)	74.3	76.7	75.1	77.3
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.017	0.014	0.009	0.011
23Na	2.79	1,528	1,545	995	1,350
24Mg	0.047	2,626	1,878	1,601	1,747
27Al	0.076	2.07	2.68	3.04	2.47
31P	56.7	16,692	14,201	11,199	15,027
39K	3.13	26,227	27,366	22,261	28,010
44Ca	22.1	2,560	1,579	1,288	1,423
51V	0.009	0.023	0.045	0.021	0.022
52Cr	0.107	1.74	1.67	1.44	1.46
55Mn	0.005	1.60	1.01	0.815	1.13
57Fe	0.938	37.8	22.8	19.7	27.4
59Co	0.008	0.044	0.029	0.025	0.026
60Ni	0.009	0.480	0.516	0.370	0.200
63Cu	0.004	3.19	1.52	1.61	1.99
66Zn	0.063	51.3	23.5	26.1	57.3
75As	0.044	<0.044	<0.044	<0.044	0.066
77Se	0.165	3.28	3.15	2.52	1.93
88Sr	0.0004	1.37	0.476	0.326	0.943
95Mo	0.003	0.024	0.015	0.006	0.010
111Cd	0.014	0.248	0.174	0.204	0.429
118Sn	0.009	0.152	0.090	0.050	0.129
202Hg	0.028	0.896	0.426	0.432	1.26
208Pb	0.001	0.034	0.014	0.014	0.025
238U	0.0001	0.0036	0.0009	0.0003	0.0006

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41419	41420	41421	41422
Wet We	eight (g)	0.9077	0.6599	0.8228	1.2785
Moistu	ure (%)	76.6	79.0	77.4	79.2
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.017	0.016	0.024	0.020
23Na	2.79	1,236	604	1,288	1,748
24Mg	0.047	1,595	1,876	1,928	1,108
27Al	0.076	1.93	1.75	3.00	1.56
31P	56.7	14,151	11,927	12,611	11,988
39K	3.13	27,463	22,549	23,409	24,475
44Ca	22.1	1,433	1,359	1,372	1,254
51V	0.009	0.024	0.025	0.039	0.033
52Cr	0.107	1.36	1.53	1.37	1.26
55Mn	0.005	1.03	1.03	1.39	1.15
57Fe	0.938	22.8	23.2	24.8	25.9
59Co	0.008	0.015	0.019	0.024	0.021
60Ni	0.009	0.110	0.161	0.144	0.151
63Cu	0.004	2.43	2.74	2.42	1.65
66Zn	0.063	43.6	70.4	73.3	50.2
75As	0.044	0.084	0.068	0.090	0.056
77Se	0.165	1.69	3.68	3.20	2.43
88Sr	0.0004	0.716	1.05	0.790	0.776
95Mo	0.003	0.009	0.015	0.015	0.014
111Cd	0.014	0.315	0.513	0.587	0.432
118Sn	0.009	0.058	0.062	0.168	0.067
202Hg	0.028	0.428	0.568	0.599	0.753
208Pb	0.001	0.013	0.015	0.043	0.019
238U	0.0001	0.0006	0.0009	0.0012	0.0009

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41423	41424	41425	41426
	eight (g)	0.4864	0.5747	0.7085	0.6855
Moist	ure (%)	77.3	77.3	76.5	75.5
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.017	0.023	0.012	0.015
23Na	2.79	1,571	1,803	1,558	1,765
24Mg	0.047	1,840	1,740	1,286	1,801
27Al	0.076	1.12	3.14	1.71	1.14
31P	56.7	11,581	14,250	11,345	12,945
39K	3.13	23,790	28,246	23,585	26,024
44Ca	22.1	1,425	1,520	1,218	1,500
51V	0.009	0.02	0.033	0.025	0.011
52Cr	0.107	1.43	1.53	1.32	1.44
55Mn	0.005	0.947	1.23	1.02	0.915
57Fe	0.938	23.5	21.5	17.9	22.7
59Co	0.008	0.022	0.030	0.017	0.019
60Ni	0.009	0.231	0.318	0.167	0.123
63Cu	0.004	2.74	1.92	1.90	2.17
66Zn	0.063	69.3	43.9	27.1	64.0
75As	0.044	0.105	0.120	0.047	0.092
77Se	0.165	2.23	3.46	2.70	2.78
88Sr	0.0004	0.934	1.00	0.67	0.805
95Mo	0.003	0.013	0.017	0.009	0.008
111Cd	0.014	0.457	0.315	0.201	0.358
118Sn	0.009	0.116	0.173	0.105	0.052
202Hg	0.028	0.563	0.595	0.275	0.516
208Pb	0.001	0.020	0.028	0.018	0.009
238U	0.0001	0.0006	0.0021	0.0006	0.0006

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41427	41428	41429	41430
Wet We	eight (g)	0.8215	0.5986	1.0214	0.7133
Moistu	ure (%)	77.8	77.6	78.6	75.9
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.015	0.019	0.012	0.018
23Na	2.79	1,570	1,578	962	1,259
24Mg	0.047	1,283	1,424	1,381	1,504
27Al	0.076	1.14	1.13	1.30	1.62
31P	56.7	11,370	10,838	9,882	10,942
39K	3.13	22,925	21,215	17,886	19,189
44Ca	22.1	1,143	1,153	967	1,308
51V	0.009	0.024	0.024	0.023	0.036
52Cr	0.107	1.28	1.29	1.26	1.33
55Mn	0.005	1.00	0.829	0.939	1.09
57Fe	0.938	19.2	20.4	19.3	16.3
59Co	0.008	0.020	0.022	0.018	0.020
60Ni	0.009	0.217	0.196	0.120	0.160
63Cu	0.004	1.76	2.02	2.23	1.73
66Zn	0.063	53.5	85.2	53.3	50.6
75As	0.044	0.063	0.092	0.059	0.104
77Se	0.165	1.92	2.18	3.07	2.89
88Sr	0.0004	0.619	0.716	0.612	0.871
95Mo	0.003	0.014	0.013	0.009	0.012
111Cd	0.014	0.410	0.580	0.431	0.419
118Sn	0.009	0.112	0.100	0.128	0.094
202Hg	0.028	0.471	0.574	0.368	0.478
208Pb	0.001	0.017	0.016	0.018	0.019
238U	0.0001	0.0003	0.0009	0.0009	0.0012

Notes:

ppm = parts per million
DL = detection limit

g = grams

Samp	ole ID	41431	41432	41433	41434
Wet Weight (g)		1.3220	0.0750	0.1014	0.0739
Moistu	ure (%)	76.0	70.3	77.1	74.2
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.012	0.034	0.030	0.034
23Na	2.79	1,269	1,369	966	1,345
24Mg	0.047	1,461	1,463	1,339	1,548
27Al	0.076	0.687	1.13	1.27	3.10
31P	56.7	11,744	9,948	10,850	9,439
39K	3.13	22,192	16,332	20,267	17,140
44Ca	22.1	1,212	1,399	1,056	1,229
51V	0.009	0.018	0.013	0.020	0.030
52Cr	0.107	1.33	1.25	1.26	1.42
55Mn	0.005	0.879	0.866	0.584	0.793
57Fe	0.938	18.6	20.5	15.2	26.4
59Co	0.008	0.015	0.021	0.021	0.048
60Ni	0.009	0.074	0.180	0.246	1.52
63Cu	0.004	2.11	1.60	1.40	2.79
66Zn	0.063	57.1	35.9	22.7	46.0
75As	0.044	0.094	<0.044	0.087	<0.044
77Se	0.165	2.86	18.0	17.3	18.7
88Sr	0.0004	0.669	1.02	0.513	0.780
95Mo	0.003	0.007	0.008	0.009	0.013
111Cd	0.014	0.414	0.306	0.180	0.321
118Sn	0.009	0.058	0.029	0.058	0.076
202Hg	0.028	0.737	0.337	0.247	0.268
208Pb	0.001	0.010	0.006	0.013	0.011
238U	0.0001	0.0003	0.0003	0.0006	0.0012

Notes:

ppm = parts per million
DL = detection limit

g = grams

Sam	ole ID	41382	41382 (Duplicate)	RPD	41412	41412 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.004	0.053	0.039	-	0.052	0.051	-
23Na	2.79	1,488	1,115	28.7	2,000	1,687	17.0
24Mg	0.047	1,589	1,460	8.4	2,100	1,818	14.4
27Al	0.076	3.84	3.90	1.5	3.82	4.00	4.5
31P	56.7	10,682	8,596	21.6	13,951	11,569	18.7
39K	3.13	22,330	17,037	26.9	19,823	16,666	17.3
44Ca	22.1	1,128	1,021	10.0	2,981	3,039	1.9
51V	0.009	0.104	0.062	-	0.042	0.040	-
52Cr	0.107	1.58	1.54	-	1.72	1.64	-
55Mn	0.005	1.32	1.17	12.4	2.35	2.48	5.6
57Fe	0.938	20.6	23.7	14.1	58.6	55.4	5.6
59Co	0.008	0.085	0.073	-	0.168	0.166	1.1
60Ni	0.009	0.536	0.621	14.7	0.734	0.861	16.0
63Cu	0.004	2.31	2.39	3.6	3.46	3.05	12.5
66Zn	0.063	55.2	52.7	4.6	106	92.2	13.7
75As	0.044	0.079	0.081	-	0.082	0.088	-
77Se	0.165	0.635	0.592	-	4.55	4.06	11.5
88Sr	0.0004	0.696	0.620	11.6	3.21	2.80	13.5
95Mo	0.003	0.045	0.031	-	0.041	0.045	-
111Cd	0.014	0.445	0.416	6.8	0.650	0.607	6.9
118Sn	0.009	0.157	0.073	-	0.049	0.036	-
202Hg	0.028	0.917	0.829	10.1	0.419	0.331	23.2
208Pb	0.001	0.095	0.064	39.2	0.011	0.011	-
238U	0.00010	0.018	0.014	28.8	< 0.0001	0.0032	-

Notes:

ppm = parts per million

RPD = Relative Percent Difference

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements (as per BC MOE, British Columbia Environmental Laboratory Manual, 2015 Edition, February 2016).

Only applies to QC samples at concentrations above 20X Detection Limit

Samp	ole ID	41418	41418 (Duplicate)	RPD	41427	41427 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.004	0.011	0.014	-	0.015	0.016	-
23Na	2.79	1,350	1,159	15.2	1,570	1,160	30.0
24Mg	0.047	1,747	1,508	14.6	1,283	1,108	14.7
27AI	0.076	2.47	2.30	-	1.14	1.45	-
31P	56.7	15,027	12,391	19.2	11,370	8,699	26.6
39K	3.13	28,010	24,921	11.7	22,925	16,456	32.9
44Ca	22.1	1,423	1,413	0.7	1,143	1,016	11.8
51V	0.009	0.022	0.022	-	0.024	0.022	-
52Cr	0.107	1.46	1.43	-	1.28	1.11	-
55Mn	0.005	1.13	1.01	10.4	1.00	0.85	16.4
57Fe	0.938	27.4	27.9	2.0	19.2	15.6	-
59Co	0.008	0.026	0.030	-	0.020	0.019	-
60Ni	0.009	0.200	0.218	8.5	0.217	0.202	6.8
63Cu	0.004	1.99	2.01	1.1	1.76	1.31	29.4
66Zn	0.063	57.3	58.0	1.2	53.5	43.2	21.3
75As	0.044	0.066	0.054	-	0.063	0.059	-
77Se	0.165	1.93	2.07	-	1.92	1.58	-
88Sr	0.0004	0.943	0.878	7.1	0.619	0.690	10.9
95Mo	0.003	0.010	0.009	-	0.014	0.008	-
111Cd	0.014	0.429	0.421	1.9	0.410	0.372	9.5
118Sn	0.009	0.129	0.092	-	0.112	0.097	-
202Hg	0.028	1.26	1.31	3.8	0.471	0.406	-
208Pb	0.001	0.025	0.021	17.4	0.017	0.016	-
238U	0.00010	0.0006	0.0003	-	0.0003	0.0009	-

Notes:

ppm = parts per million

RPD = Relative Percent Difference

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements (as per BC MOE, British Columbia Environmental Laboratory Manual, 2015 Edition, February 2016).

Only applies to QC samples at concentrations above 20X Detection Limit

Parameter	Detection Limit (ppm)	Certified Value DORM-4 Conc. (ppm)	Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.004	1.21	1.42	117	6.5
23Na	2.79	14,000	16,513	118	4.6
24Mg	0.047	910	1,059	116	3.3
27AI	0.076	1,280	1,620	127	6.7
31P	56.7	8,000	9,227	115	6.1
39K	3.13	15,500	17,750	115	7.3
44Ca	22.1	2,360	2,874	122	5.0
51V	0.009	1.57	1.86	119	10.0
52Cr	0.107	1.87	2.18	117	3.7
55Mn	0.005	3.17	3.74	118	2.6
57Fe	0.938	343	405	118	2.7
59Co	0.008	0.250	0.302	121	3.3
60Ni	0.009	1.34	1.62	121	2.4
63Cu	0.004	15.7	19.7	125	6.1
66Zn	0.063	51.6	61.4	119	6.7
75As	0.044	6.87	7.59	110	1.9
77Se	0.165	3.45	3.72	108	6.2
88Sr	0.0004	10.1	11.9	118	3.4
95Mo	0.003	0.290	0.339	117	3.7
111Cd	0.014	0.299	0.407	136*	4.5
118Sn	0.009	0.061	0.076	124	3.2
202Hg	0.028	0.412	0.483	117	9.9
208Pb	0.001	0.404	0.498	123	16.9
238U	0.00010	0.050	0.063	127	13.2

Notes:

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: 70 - 130% of the certified values for the method (as per BC MOE, *British Columbia Environmental Laboratory Manual*, 2015 Edition, February 2016)

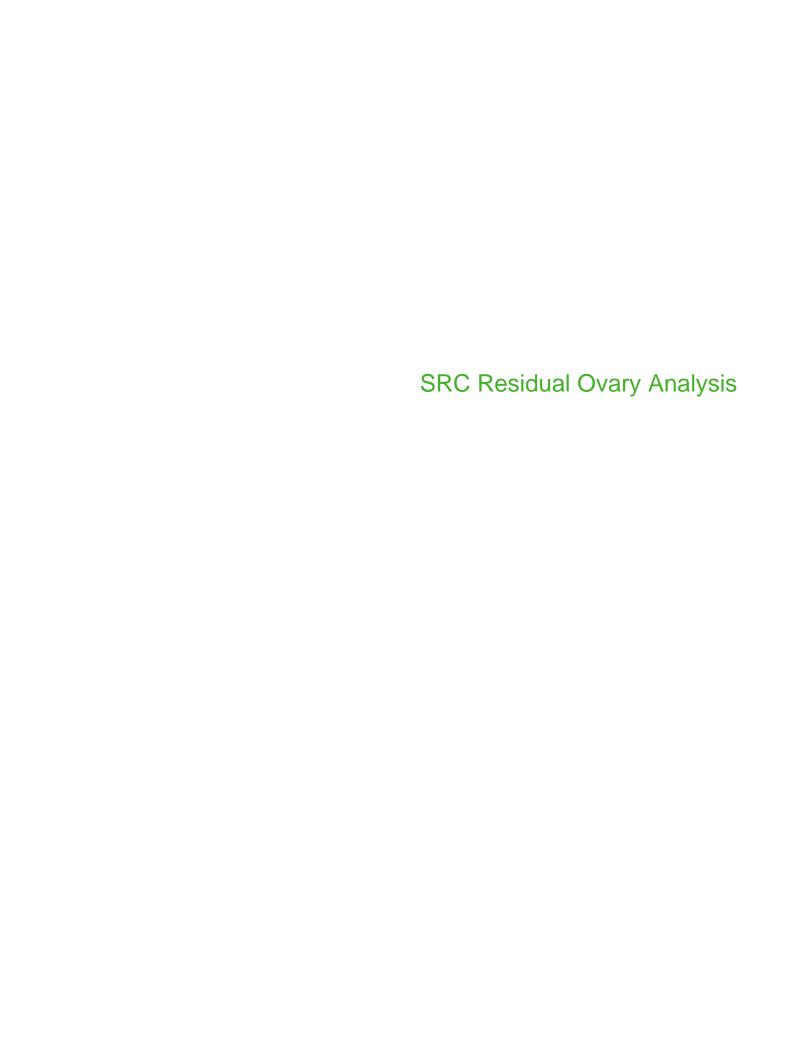
BC laboratory standards for RSD (precision) of reference material are not available; therefore a DQO ≤20% was established for all elements

^{*} reported accuracy for cadmium is outside of guidance specification

SRC SAMPLE SAMPLE DESCRIPTION

41379 05/17/2019 RG_LNLK-RSC-11-M_20190517 *TISSUE* 41380 05/17/2019 RG_LNLK-RSC-12-M_20190517 *TISSUE* 41381 05/17/2019 RG_LNLK-RSC-13-M_20190517 *TISSUE* 41382 05/20/2019 RG_LNLK-RSC-14-M_20190520 *TISSUE* 41383 05/20/2019 RG_LNLK-RSC-15-M_20190520 *TISSUE* 41384 05/20/2019 RG_LNLK-RSC-16-M_20190520 *TISSUE* 41385 05/20/2019 RG_LNLK-RSC-17-M_20190520 *TISSUE* 41386 05/20/2019 RG_LNLK-RSC-18-M_20190520 *TISSUE* 41387 05/20/2019 RG_LNLK-RSC-19-M_20190520 *TISSUE* 41388 05/20/2019 RG_LNLK-RSC-20-M_20190520 *TISSUE* 41389 05/15/2019 RG_STPD-RSC-01-M_20190515 *TISSUE* 41390 05/24/2019 RG_STPD-RSC-02-M_20190524 *TISSUE* 41391 05/24/2019 RG_STPD-RSC-03-M_20190524 *TISSUE* 41392 05/24/2019 RG_STPD-RSC-04-M_20190524 *TISSUE* 41393 05/24/2019 RG_STPD-RSC-05-M_20190524 *TISSUE* 41394 05/24/2019 RG_STPD-RSC-06-M_20190524 *TISSUE* 41395 05/24/2019 RG_STPD-RSC-07-M_20190524 *TISSUE* 41396 05/30/2019 RG_STPD-RSC-08-M_20190530 *TISSUE* 41397 05/30/2019 RG_STPD-RSC-09-M_20190530 *TISSUE* 41398 05/30/2019 RG_STPD-RSC-10-M_20190530 *TISSUE* 41399 05/31/2019 RG_STPD-RSC-11-M_20190531 *TISSUE* 41400 05/31/2019 RG_STPD-RSC-12-M_20190531 *TISSUE* 41401 06/01/2019 RG_STPD-RSC-13-M_20190601 *TISSUE* 41402 05/15/2019 RG_ERIMF-RSC-04-M_20190515 *TISSUE* 41403 05/17/2019 RG_ERIMF-RSC-05-M_20190517 *TISSUE* 41404 05/21/2019 RG_ERIMF-RSC-06-M_20190521 *TISSUE* 41405 05/23/2019 RG_ERIMF-RSC-07-M_20190523 *TISSUE* 41406 05/23/2019 RG_ERIMF-RSC-08-M_20190523 *TISSUE* 41407 05/23/2019 RG_ERIMF-RSC-09-M_20190523 *TISSUE* 41408 05/23/2019 RG_ERIMF-RSC-10-M_20190523 *TISSUE* 41409 05/23/2019 RG_ERIMF-RSC-11-M_20190523 *TISSUE* 41410 05/23/2019 RG_ERIMF-RSC-12-M_20190523 *TISSUE* 41411 05/23/2019 RG_ERIMF-RSC-13-M_20190523 *TISSUE* 41412 05/23/2019 RG_ERIMF-RSC-14-M_20190523 *TISSUE* 41413 05/23/2019 RG_ERIMF-RSC-15-M_20190523 *TISSUE* 41414 05/23/2019 RG_ERIMF-RSC-16-M_20190523 *TISSUE* 41415 05/24/2019 RG ERWSF-RSC-01-M 20190524 *TISSUE* 41416 05/29/2019 RG_ERWSF-RSC-02-M_20190529 *TISSUE* 41417 05/30/2019 RG_ERWSF-RSC-03-M_20190530 *TISSUE* 41418 06/24/2019 RG ER RSC 01-M 20190624 *TISSUE* 41419 06/24/2019 RG_ER_RSC_02-M_20190624 *TISSUE* 41420 06/24/2019 RG_ER_RSC_03-M_20190624 *TISSUE* 41421 06/24/2019 RG_ER_RSC_04-M_20190624 *TISSUE* 41422 06/24/2019 RG ER RSC 05-M 20190624 *TISSUE* 41423 06/24/2019 RG_ER_RSC_06-M_20190624 *TISSUE* 41424 06/24/2019 RG_ER_RSC_07-M_20190624 *TISSUE* 41425 06/24/2019 RG_ER_RSC_08-M_20190624 *TISSUE* 41426 06/22/2019 RG_ER_RSC_09-M_20190624 *TISSUE* 41427 06/22/2019 RG_ER_RSC_010-M_20190624 *TISSUE* 41428 06/22/2019 RG_ER_RSC_11-M_20190622 *TISSUE* 41429 06/22/2019 RG_ER_RSC_12-M_20190622 *TISSUE* 41430 06/22/2019 RG_ER_RSC_13-M_20190622 *TISSUE* 41431 06/22/2019 RG_ER_RSC_14-M_20190622 *TISSUE* 41432 06/04/2019 RG_STPD_RSC_14-M2019 *TISSUE* 41433 06/04/2019 RG_STPD_RSC_15-M2019 *TISSUE* 41434 06/04/2019 RG_STPD_RSC_16-M2019 *TISSUE*

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited
421 Pine Avenue
Sparwood, BC V0B 2G0
Attn: Cait Good

Date Samples Received: Jul-12-2019 Client P.O.: VPO00616225

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 2 authorized by Keith Gipman, Supervisor Results from Lab Section 6 authorized by Marion McConnell, Supervisor

- * Test methods and data are validated by the laboratory's Quality Assurance Program.
- * Routine methods follow recognized procedures from sources such as
 - * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
 - * Environment Canada
 - * US EPA
 - * CANMET
- * The results reported relate only to the test samples as provided by the client.
- * Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.
- * Additional information is available upon request.

This is a final report.



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Client PO #:

Date Received: Jul 12, 2019

SRC Group # 2019-9707

VPO00616225

Aug 06, 2019

Teck Coal Limited

421 Pine Avenue Sparwood, BC V0B 2G0

Attn: Cait Good

Sample #: 2019038442 Date Sampled: May 17, 2019

Sample Matrix: **TISSUE**

Description: 05/17/2019 RG_LNLK-RSC-11-O_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	11	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	6	5
Iron	ug/g	100	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	18	5
Mercury	ug/g	0.04	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	1.2	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	200	50
Lab Section 6			
Moisture	%	71.62	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.



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SRC Group # 2019-9707

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Variability in detection limits due to sample size. There was no sample remaining to perform rechecks due to limited sample weight submitted to the laboratory.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038443 Client PO #: VPO00616225
Date Sampled: May 17, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/17/2019 RG_LNLK-RSC-12-O_20190517

Analyte	Units	Result	DL
Lab Section 2			
Alumainum		Æ	_
Aluminum Antimony	ug/g ug/g	<5 <0.02	5 0.02
Arsenic	ug/g ug/g	<0.02	0.02
Barium	ug/g ug/g	4.7	0.05
Beryllium	ug/g ug/g	<0.02	0.02
Berymuni	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.8	0.5
Iron	ug/g	65	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	14	0.5
Mercury	ug/g	<0.01	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.4	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	<0.01	0.01
Tie		0.0	0.0
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	180	5
Lab Section 6			
Moisture	%	70.04	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038444 Client PO #: VPO00616225
Date Sampled: May 17, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/17/2019 RG_LNLK-RSC-13-O_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	6	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.12	0.05
Barium	ug/g	9.4	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.1	0.5
Iron	ug/g	63	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	9.1	0.5
Mercury	ug/g	0.03	0.01
Molybdenum	ug/g	0.10	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.3	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	200	5
Lab Section 6			
Moisture	%	67.84	0.02

Moisture % 67.84 0.02

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The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038445 Client PO #: VPO00616225
Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/20/2019 RG_LNLK-RSC-14-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	7	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.07	0.05
Barium	ug/g	12	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	1.4	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.6	0.5
Iron	ug/g	85	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	16	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.4	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	180	5
Lab Section 6			
Moisture	%	73.60	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038446 Client PO #: VPO00616225
Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/20/2019 RG_LNLK-RSC-15-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.05
Barium	ug/g ug/g	9.9	0.03
Beryllium	ug/g ug/g	<0.02	0.02
Beryllidiri	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.6	0.5
Iron	ug/g	68	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	9.0	0.5
Mercury	ug/g	0.06	0.01
Molybdenum	ug/g	0.12	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.4	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	220	5
Lab Section 6			
Moisture	%	72.49	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038447 Client PO #: VPO00616225 Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/20/2019 RG_LNLK-RSC-16-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ua/a	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.12	0.05
Barium	ug/g ug/g	6.6	0.03
Beryllium	ug/g ug/g	<0.02	0.02
Beryllidiri	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	5.9	0.5
Iron	ug/g	63	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	16	0.5
Mercury	ug/g	0.03	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.5	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	150	5
Lab Section 6			
Moisture	%	67.76	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038448 Client PO #: VPO00616225
Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/20/2019 RG_LNLK-RSC-17-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	7	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	5	5
Iron	ug/g	80	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	19	5
Mercury	ug/g	0.03	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	2.0	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	200	50
Lab Section 6			
Moisture	%	72.52	0.02

Moisture % 72.52 0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038449 Client PO #: VPO00616225
Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: **05/20/2019 RG_LNLK-RSC-18-O_20190520**

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.09	0.05
Barium	ug/g	9.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.0	0.5
Iron	ug/g	49	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.12	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.7	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	160	5
Lab Section 6			
Moisture	%	48.26	0.02

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The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038450 Client PO #: VPO00616225
Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/20/2019 RG_LNLK-RSC-19-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.15	0.05
Barium	ug/g	6.2	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	5.4	0.5
Iron	ug/g	64	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	14	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.09	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.6	0.05
Silver	ug/g	0.04	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Moisture	%	73.90	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038451 Client PO #: VPO00616225 Date Sampled: May 20, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/20/2019 RG_LNLK-RSC-20-O_20190520

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.18	0.05
Barium	ug/g	7.7	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.8	0.5
Iron	ug/g	73	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	12	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	1.6	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Moisture	%	71.56	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample Matrix: TISSUE

Description: 05/15/2019 RG_STPD-RSC-01-O_20190515

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.05
Barium	ug/g	2.6	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.45	0.02
Chromium	ug/g	0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.6	0.5
Iron	ug/g	85	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	9.7	0.5
Mercury	ug/g	0.01	0.01
Molybdenum	ug/g	0.19	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	35	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.05	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	180	5
Lab Section 6			
Moisture	%	71.47	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038453 Client PO #: VPO00616225
Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/24/2019 RG_STPD-RSC-02-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	0.7	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	5.0	0.5
Iron	ug/g	73	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	<0.01	0.01
Molybdenum	ug/g	0.13	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	35	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	0.05	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	160	5
Lab Section 6			
Moisture	%	71.43	0.02

Moisture % 71.43 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038454 Client PO #: VPO00616225
Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/24/2019 RG_STPD-RSC-03-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.15	0.05
Barium	ug/g	1.8	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.9	0.5
Iron	ug/g	51	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	6.3	0.5
Mercury	ug/g	0.01	0.01
Molybdenum	ug/g	0.16	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	31	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.06	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	140	5
Lab Section 6			
Moisture	%	70.24	0.02

Moisture % 70.24 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038455 Client PO #: VPO00616225
Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/24/2019 RG_STPD-RSC-04-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.05	0.05
Barium	ug/g	1.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	5.0	0.5
Iron	ug/g	88	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.19	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	39	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Moisture	%	74.42	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038456 Client PO #: VPO00616225
Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/24/2019 RG_STPD-RSC-05-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Alveria		æ	5
Aluminum	ug/g	<5 <0.02	5 0.02
Antimony Arsenic	ug/g	<0.02 0.07	0.02
	ug/g		
Barium	ug/g	3.0	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.4	0.5
	,		_
Iron 	ug/g	74	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	18	0.5
Mercury	ug/g	0.01	0.01
Molybdenum	ug/g	0.18	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	34	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	0.03	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Malatura	0/	70.40	0.00
Moisture	%	72.49	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038457 Client PO #: VPO00616225 Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/24/2019 RG_STPD-RSC-06-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.05
Barium	ug/g	1.1	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.7	0.5
Iron	ug/g	51	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	10	0.5
Mercury	ug/g	<0.01	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	28	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	160	5
Lab Section 6			
Moisture	%	69.73	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038458 Client PO #: VPO00616225 Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/24/2019 RG_STPD-RSC-07-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	18	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	41	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	180	50
Lab Section 6			
Moisture	%	72.35	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038459 Client PO #: VPO00616225
Date Sampled: May 30, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: **05/30/2019 RG_STPD-RSC-08-O_20190530**

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g ug/g	<0.5	0.1
Barium	ug/g ug/g	<0.5 <5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	80	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	11	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	36	0.5
Silver	ug/g	0.03	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	160	50
Lab Section 6			
Moisture	%	72.67	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038460 Client PO #: VPO00616225 Date Sampled: May 30, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/30/2019 RG_STPD-RSC-09-O_20190530

Analyte	Units	Result	DL
Lab Section 2			
Alumainum		50	50
Aluminum Antimony	ug/g ug/g	<50 <0.1	50 0.1
Anumony Arsenic		<0.5	0.1
Barium	ug/g	<0.5 <5	0.5 5
Beryllium	ug/g ug/g	<0.02	0.02
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	70	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	8	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	28	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
T:-		.0	0
Tin Titanium	ug/g	<2 <5	2 5
Uranium	ug/g	-	
	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	120	50
Lab Section 6			
Moisture	%	57.88	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038461 Client PO #: VPO00616225
Date Sampled: May 30, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/30/2019 RG_STPD-RSC-10-O_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	<0.05	0.05
Barium	ug/g	1.2	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	5.1	0.5
Iron	ug/g	58	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.01	0.01
Molybdenum	ug/g	0.12	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	30	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.04	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	160	5
Lab Section 6			
Moisture	%	69.29	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038462 Client PO #: VPO00616225
Date Sampled: May 31, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/31/2019 RG_STPD-RSC-11-O_20190531

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.06	0.05
Barium	ug/g ug/g	1.1	0.03
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.9	0.5
Iron	ug/g	84	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.01	0.01
Molybdenum	ug/g	0.17	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	44	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.04	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Moisture	%	73.01	0.02
	· -		

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038463 Client PO #: VPO00616225
Date Sampled: May 31, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/31/2019 RG_STPD-RSC-12-O_20190531

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	11	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	34	0.5
Silver	ug/g	0.03	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	210	50
Lab Section 6			
Moisture	%	71.77	0.02

Moisture % 71.77 0.02

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The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038464 Client PO #: VPO00616225 Date Sampled: Jun 01, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 06/01/2019 RG_STPD-RSC-13-O_20190601

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	90	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	12	5
Mercury	ug/g	0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g ug/g	42	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g ug/g	<1	1
Thallium		<0.1	0.1
maillum	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	71.15	0.02
Molotaro	70	0	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038465 Client PO #: VPO00616225 Date Sampled: May 15, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/15/2019 RG_ERIMF-RSC-04-O_20190515

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.03	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	19	5
Mercury	ug/g	0.04	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	7.6	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g ug/g	<0.1	0.1
Vanadium		<0.1	1
	ug/g		50
Zinc	ug/g	180	ວບ
Lab Section 6			
Moisture	%	73.78	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038466 Client PO #: VPO00616225
Date Sampled: May 17, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/17/2019 RG_ERIMF-RSC-05-O_20190517

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ua/a	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.1
Barium	ug/g	9	5
Beryllium	ug/g	<0.02	0.02
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	12	5
Mercury	ug/g	0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	9.3	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	260	50
Lab Section 6			
Moisture	%	72.65	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038467 Client PO #: VPO00616225
Date Sampled: May 21, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/21/2019 RG_ERIMF-RSC-06-O_20190521

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	7	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	13	5
Mercury	ug/g	0.03	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	3.8	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	70.07	0.02

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The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038468 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-07-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.10	0.05
Barium	ug/g	3.2	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.3	0.5
Iron	ug/g	50	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	14	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.12	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	5.7	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	160	5
Lab Section 6			
Moisture	%	73.03	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038469 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-08-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.09	0.05
Barium	ug/g	1.0	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.6	0.5
Iron	ug/g	57	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.19	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	12	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	150	5
Lab Section 6			
Moisture	%	71.95	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038470 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-09-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.05
Barium	ug/g	1.9	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.3	0.5
Iron	ug/g	60	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	0.03	0.01
Molybdenum	ug/g	0.21	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	7.7	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	170	5
Lab Section 6			
Moisture	%	72.57	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038471 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-10-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	12	5
Antimony	ug/g	0.02	0.02
Arsenic	ug/g	0.09	0.05
Barium	ug/g	16	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	2.1	0.5
Iron	ug/g	28	5
Lead	ug/g	0.10	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.30	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	2.0	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	22	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	120	5
Lab Section 6			
Moisture	%	70.32	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038472 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-11-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	14	5
Mercury	ug/g	0.04	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	12	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	77.82	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038473 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-12-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	8	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	5	5
Iron	ug/g	90	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	18	5
Mercury	ug/g	0.04	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	6.7	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium		<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<0.1	1
	ug/g	250	50
Zinc	ug/g	∠30	50
Lab Section 6			
Moisture	%	74.44	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

T: 306-933-6932 F: 306-933-7922

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038474 Client PO #: VPO00616225 Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/23/2019 RG_ERIMF-RSC-13-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Alveria		-50	50
Aluminum	ug/g	<50 <0.1	50 0.1
Antimony	ug/g	-	_
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	8	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron		00	50
	ug/g	90	
Lead	ug/g	<0.5	0.5
Manganese	ug/g	8	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	5.3	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ua/a	<2	2
Titanium	ug/g	<2 <5	5
	ug/g		_
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	73.54	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038475 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-14-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g ug/g	11	5
Beryllium	ug/g ug/g	<0.02	0.02
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	100	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	18	5
Mercury	ug/g	0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	20	0.5
Silver	ug/g	0.03	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	260	50
Lab Section 6			
Moisture	%	74.15	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038476 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-15-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	6	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	5	5
Iron	ug/g	80	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	15	5
Mercury	ug/g	0.03	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	6.4	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	210	50
Lab Section 6			
Moisture	%	72.24	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038477 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-16-O_20190523

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	13	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	90	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	12	5
Mercury	ug/g	0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	8.4	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	230	50
Lab Section 6			
Moisture	%	73.53	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038478 Client PO #: VPO00616225
Date Sampled: May 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/24/2019 RG_ERWSF-RSC-01-O_20190524

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.08	0.05
Barium	ug/g	0.7	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.9	0.5
Iron	ug/g	68	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.03	0.01
Molybdenum	ug/g	0.21	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	20	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.2	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	180	5
Lab Section 6			
Moisture	%	76.41	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038479 Client PO #: VPO00616225
Date Sampled: May 29, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/29/2019 RG_ERWSF-RSC-02-O_20190529

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	6	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.12	0.05
Barium	ug/g	1.0	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.2	0.5
Iron	ug/g	88	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	12	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.18	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	13	0.05
Silver	ug/g	0.03	0.02
Strontium	ug/g	0.2	0.1
Thallium	ug/g	<0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	190	5
Lab Section 6			
Moisture	%	74.17	0.02

Moisture % 74.17 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038480 Client PO #: VPO00616225
Date Sampled: May 30, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/30/2019 RG_ERWSF-RSC-03-O_20190530

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	10	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	<0.05	0.05
Barium	ug/g	1.4	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	2.6	0.5
Iron	ug/g	69	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	8.3	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.10	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	11	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.2	0.1
Thallium	ug/g	0.01	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	130	5
Lab Section 6			
Moisture	%	69.81	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038481 Client PO #: VPO00616225 Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/23/2019 RG_ERIMF-RSC-10-O_20190523-DUP

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	7	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.03	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	16	5
Mercury	ug/g	0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	9.2	0.5
Silver	ug/g	0.03	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	170	50
Lab Section 6			
Moisture	%	69.07	0.02

Moisture 69.07 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038482 Client PO #: VPO00616225
Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 05/23/2019 RG_ERIMF-RSC-11-O_20190523-DUP

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	<50	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	15	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	13	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	200	50
Lab Section 6			
Moisture	%	68.84	0.02

Moisture % 68.84 0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038483 Client PO #: VPO00616225 Date Sampled: May 23, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 05/23/2019 RG_ERIMF-RSC-13-O_20190523-DUP

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	70	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	7	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	4.6	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	150	50
Lab Section 6			
Moisture	%	68.00	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038484 Client PO #: VPO00616225
Date Sampled: Jun 04, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/04/2019 RG_STPD-RSC-14-O_20190604-DUP

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	12	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	30	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
mailium	ug/g	VO. 1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	70.37	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038485 Client PO #: VPO00616225
Date Sampled: Jun 04, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/04/2019 RG_STPD-RSC-15-O_20190604-DUP

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	70	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	10	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	33	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc		190	50
	ug/g	130	50
Lab Section 6			
Moisture	%	74.23	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038486 Client PO #: VPO00616225
Date Sampled: Jun 04, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/04/2019 RG_STPD-RSC-14-O_20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<50	50
Antimony	ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	11	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	26	0.5
Silver	ug/g	<0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	160	50
Lab Section 6			
Moisture	%	69.95	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038487 Client PO #: VPO00616225
Date Sampled: Jun 04, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUÉ

Description: 06/04/2019 RG_STPD-RSC-15-O_20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	uala	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.1
Barium	ug/g ug/g	<0.5 <5	5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	<5	5
Iron	ug/g	60	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	9	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	31	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	190	50
Lab Section 6			
Moisture	%	81.23	0.02
	, -		

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038488 Client PO #: VPO00616225
Date Sampled: Jun 13, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUÉ

Description: 06/13/2019 RG_ER-RSC-01-O_20190613

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.06	0.02
Barium	ug/g	0.39	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	0.1	0.1
Cobalt	ug/g	0.12	0.02
Copper	ug/g	5.0	0.1
Iron	ug/g	90	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	13	0.2
Mercury	ug/g	0.06	0.01
Molybdenum	ug/g	0.16	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	22	0.02
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	220	1
Lab Section 6			
Moisture	%	74.93	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038489 Client PO #: VPO00616225
Date Sampled: Jun 13, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/13/2019 RG_ER-RSC-02-O_20190613

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.13	0.02
Barium	ug/g	1.0	0.05
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<2	2
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.1	0.1
Cobalt	ug/g	0.07	0.02
Copper	ug/g	4.5	0.1
Iron	ug/g	85	5
Lead	ug/g	<0.02	0.02
Manganese	ug/g	10	0.2
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.15	0.05
Nickel	ug/g	<0.1	0.1
Selenium	ug/g	18	0.02
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.1	0.1
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.01	0.01
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	220	1
Lab Section 6			
Moisture	%	72.84	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038490 Client PO #: VPO00616225
Date Sampled: Jun 14, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/14/2019 RG_ER-RSC-03-O_20190614

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.18	0.05
Barium	ug/g	2.5	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.2	0.5
Iron	ug/g	95	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.05	0.01
Molybdenum	ug/g	0.08	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	25	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	260	5
Lab Section 6			
Moisture	%	75.11	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038491 Client PO #: VPO00616225
Date Sampled: Jun 22, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUÉ

Description: 06/22/2019 RG_ER-RSC-04-O_20190622

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.19	0.05
Barium	ug/g	1.8	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.13	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.7	0.5
Iron	ug/g	100	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	12	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	<0.05	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	22	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	290	5
Lab Section 6			
Moisture	%	74.56	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038492 Client PO #: VPO00616225 Date Sampled: Jun 22, 2019 Date Received: Jul 12, 2019

Sample Matrix: **TISSUE**

Description: 06/22/2019 RG_ER-RSC-05-O_20190622

Analyte	Units	Result	DL
Lab Section 2			
Aluminum		<5	5
Antimony	ug/g	<0.02	0.02
Antimony Arsenic	ug/g	0.14	0.02
	ug/g	_	0.05
Barium	ug/g	1.2	
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.07	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.4	0.5
Iron	ug/g	150	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	16	0.5
Mercury	ug/g	0.07	0.01
Molybdenum	ug/g ug/g	0.12	0.05
Molybaenam	ug/g	0.12	0.03
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	27	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium		<0.2	0.02
Zinc	ug/g	300	0.2 5
	ug/g	300	Э
Lab Section 6			
Moisture	%	77.90	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038493 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-06-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	18	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.93	0.05
Barium	ug/g	2.4	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	4.4	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	11	0.5
Iron	ug/g	350	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	10	0.5
Mercury	ug/g	0.10	0.01
Molybdenum	ug/g	0.27	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	19	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	1.5	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	250	5
Lab Section 6			
Moisture	%	73.06	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038494 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-07-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	9	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.39	0.05
Barium	ug/g	2.2	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.26	0.02
Chromium	ug/g	0.8	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.7	0.5
Iron	ug/g	99	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	9.2	0.5
Mercury	ug/g	0.03	0.01
Molybdenum	ug/g	0.11	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	14	0.05
Silver	ug/g	0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	200	5
Lab Section 6			
Moisture	%	70.28	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038495 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-08-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g ug/g	<0.02	0.02
Arsenic	ug/g	0.15	0.05
Barium	ug/g	1.1	0.03
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.6	0.5
Iron	ug/g	94	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	6.2	0.5
Mercury	ug/g	0.02	0.01
Molybdenum	ug/g	0.10	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	36	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.4	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	240	5
Lab Section 6			
Moisture	%	73.59	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038496 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-09-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.34	0.05
Barium	ug/g	1.2	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.15	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.5	0.5
Iron	ug/g	110	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	11	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.08	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	26	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	230	5
Lab Section 6			
Moisture	%	73.41	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038497 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-10-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum		6	5
Antimony	ug/g	<0.02	0.02
Anumony Arsenic	ug/g	0.25	0.02
Barium	ug/g	0.25 1.6	0.05
Beryllium	ug/g ug/g	<0.02	0.5
Derymum	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.6	0.5
Iron	ug/g	87	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	0.05	0.01
Molybdenum	ug/g	0.03	0.05
Molybaenam	ug/g	0.13	0.03
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	16	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	230	5
Lab Section 6	ug/g	200	3
Lab Occion v			
Moisture	%	74.71	0.02

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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038498 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUÉ

Description: 06/24/2019 RG_ER-RSC-11-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
A L. marina mar		0	_
Aluminum	ug/g	6 <0.02	5 0.02
Antimony Arsenic	ug/g	0.02	0.02
Barium	ug/g	3.0	0.05
	ug/g		0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.04	0.02
Chromium	ug/g	3.4	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.0	0.5
Iron	ug/g	170	5
Lead	ug/g	<0.05	0.05
		15	0.05
Manganese	ug/g		0.5
Mercury	ug/g	0.02 0.08	0.01
Molybdenum	ug/g	0.06	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	18	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	8.3	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.02
Zinc	ug/g	250	5
Lab Section 6	ug/g	200	3
Las occion o			
Moisture	%	70.67	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038499 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-12-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.11	0.05
Barium	ug/g	1.5	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.05	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	0.6	0.5
Copper	ug/g	4.5	0.5
Iron	ug/g	100	5
Lead	ug/g	< 0.05	0.05
Manganese	ug/g	13	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.12	0.05
Nickel	ug/g	0.6	0.5
Selenium	ug/g	38	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.5	0.1
Thallium	ug/g	0.02	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	260	5
Lab Section 6			
Moisture	%	76.99	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038500 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUÉ

Description: 06/24/2019 RG_ER-RSC-13-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.18	0.05
Barium	ug/g	1.8	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.02	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	3.7	0.5
Iron	ug/g	87	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	10	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.10	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	23	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.6	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	210	5
Lab Section 6			
Moisture	%	73.45	0.02

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Results are reported on a dry basis.

Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019038501 Client PO #: VPO00616225
Date Sampled: Jun 24, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/24/2019 RG_ER-RSC-14-O_20190624

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ug/g	<5	5
Antimony	ug/g	<0.02	0.02
Arsenic	ug/g	0.25	0.05
Barium	ug/g	1.4	0.5
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<5	5
Cadmium	ug/g	0.10	0.02
Chromium	ug/g	<0.5	0.5
Cobalt	ug/g	<0.5	0.5
Copper	ug/g	4.1	0.5
Iron	ug/g	90	5
Lead	ug/g	<0.05	0.05
Manganese	ug/g	8.4	0.5
Mercury	ug/g	0.04	0.01
Molybdenum	ug/g	0.07	0.05
Nickel	ug/g	<0.5	0.5
Selenium	ug/g	16	0.05
Silver	ug/g	<0.02	0.02
Strontium	ug/g	0.3	0.1
Thallium	ug/g	0.03	0.01
Tin	ug/g	<0.2	0.2
Titanium	ug/g	<0.5	0.5
Uranium	ug/g	<0.02	0.02
Vanadium	ug/g	<0.2	0.2
Zinc	ug/g	200	5
Lab Section 6			
Moisture	%	72.95	0.02

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Variability in detection limits due to sample size.



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SRC Group # 2019-9707

Aug 06, 2019

Teck Coal Limited

Sample #: 2019039126 Client PO #: VPO00616225
Date Sampled: Jun 04, 2019 Date Received: Jul 12, 2019

Sample Matrix: TISSUE

Description: 06/04/2019 RG_STPD_RSC_16_0_20190604

Analyte	Units	Result	DL
Lab Section 2			
Aluminum	ua/a	<50	50
Antimony	ug/g ug/g	<0.1	0.1
Arsenic	ug/g	<0.5	0.5
Barium	ug/g	<0.5 <5	5
Beryllium	ug/g	<0.02	0.02
Beryllium	ug/g	<0.02	0.02
Boron	ug/g	<50	50
Cadmium	ug/g	<0.02	0.02
Chromium	ug/g	<5	5
Cobalt	ug/g	<5	5
Copper	ug/g	5	5
Iron	ug/g	80	50
Lead	ug/g	<0.5	0.5
Manganese	ug/g	12	5
Mercury	ug/g	<0.02	0.02
Molybdenum	ug/g	<0.5	0.5
Nickel	ug/g	<5	5
Selenium	ug/g	40	0.5
Silver	ug/g	0.02	0.02
Strontium	ug/g	<1	1
Thallium	ug/g	<0.1	0.1
Tin	ug/g	<2	2
Titanium	ug/g	<5	5
Uranium	ug/g	<0.1	0.1
Vanadium	ug/g	<1	1
Zinc	ug/g	170	50
Lab Section 6			
Moisture	%	72.76	0.02

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 10.7 °C upon receipt.

Results are reported on a dry basis.

Variability in detection limits due to sample size.



Environmental Analytical Laboratories 143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

T: 306-933-6932 F: 306-933-7922 Toll-free: 1-800-240-8808 E: analytical@src.sk.ca

www.src.sk.ca/analytical

Aug 06, 2019

This report was generated for samples included in SRC Group # 2019-9707

Quality Control Report

Cait Good Teck Coal Limited 421 Pine Avenue Sparwood, BC V0B 2G0

Reference Materials and Standards:

A reference material of known concentration is used whenever possible as either a control sample or control standard and analyzed with each batch of samples. These "QC" results are used to assess the performance of the method and must be within clearly defined limits; otherwise corrective action is required.

QC Analysis	Units	Target Value	Obtained Value
Aluminum	ug/g	1280	1300
Aluminum	ug/g	1280	1240
Arsenic	ug/g	6.87	7.27
Arsenic	ug/g	6.87	6.68
Cadmium	ug/g	0.299	0.295
Cadmium	ug/g	0.299	0.283
Chromium	ug/g	1.57	1.59
Chromium	ug/g	1.57	1.54
Copper	ug/g	13.8	14.4
Copper	ug/g	13.8	13.4
Iron	ug/g	312	306
Iron	ug/g	312	289
Lead	ug/g	0.404	0.400
Lead	ug/g	0.404	0.368
Manganese	ug/g	2.70	2.82
Manganese	ug/g	2.70	2.75
Mercury	ug/g	0.364	0.318
Mercury	ug/g	0.364	0.294
Nickel	ug/g	1.20	1.21
Nickel	ug/g	1.20	1.13
Selenium	ug/g	3.45	3.71
Selenium	ug/g	3.45	3.51
Silver	ug/g	0.0234	0.0255
Silver	ug/g	0.0234	0.0245
Zinc	ug/g	47.8	45.2
Zinc	ug/g	47.8	41.9

Please note, duplicates could not be analyzed for ICP due to insufficient sample available.

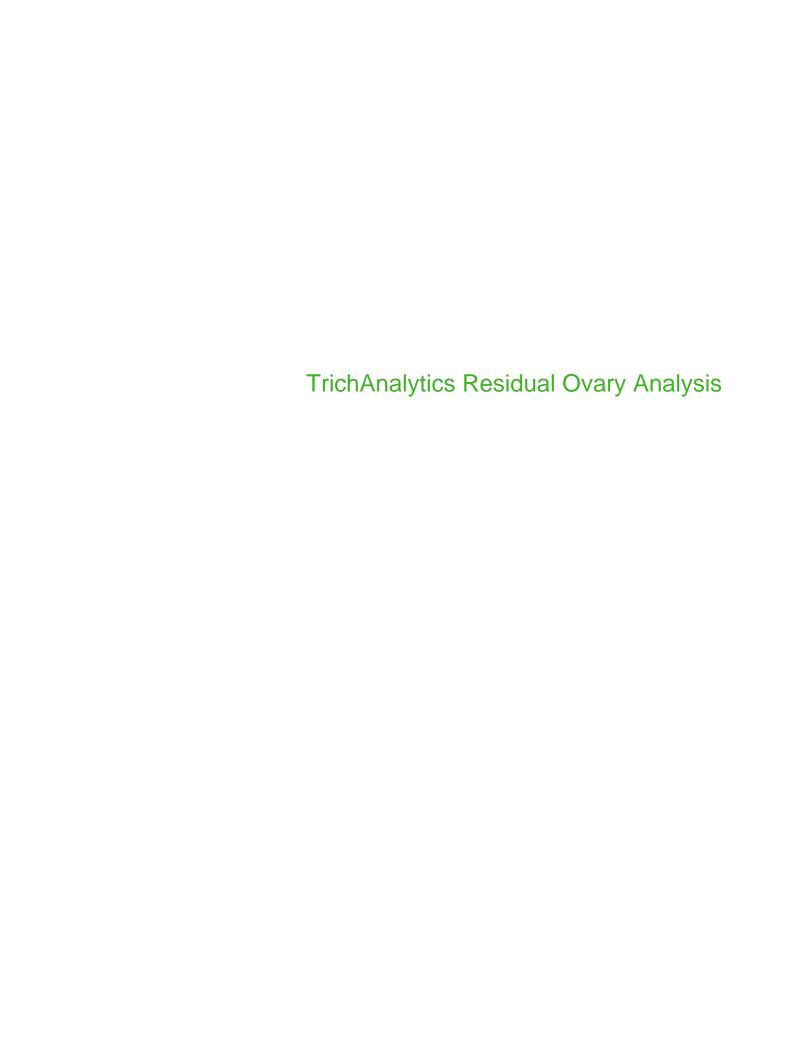
All quality control results were within the specified limits and considered acceptable.

Roxane Ortmann - Quality Assurance Supervisor

Group #: 2019-9707 Client: Teck Coal

Sample #	%	%	Wet to Freeze		
SRC Sample	Moisture	Solid	Conversion	Dry Analysis Weight	Wet Weight Basis
38442	71.6233	28.3767	3.5240	0.0205	0.0722
38443	70.0393	29.9607	3.3377	0.0288	0.0961
38444	67.8363	32.1637	3.1091	0.0338	0.1051
38445	73.6000	26.4000	3.7879	0.0324	0.1227
38446	72.4876	27.5124	3.6347	0.0741	0.2693
38447	67.7560	32.2440	3.1014	0.0552	0.1712
38448	72.5166	27.4834	3.6386	0.0206	0.0750
38449	48.2625	51.7375	1.9328	0.0465	0.0899
38450	73.9007	26.0993	3.8315	0.0385	0.1475
38451	71.5643	28.4357	3.5167	0.0395	0.1389
38452	71.4747	28.5253	3.5057	0.0516	0.1809
38453	71.4286	28.5714	3.5000	0.0628	0.2198
38454	70.2375	29.7625	3.3599	0.0495	0.1663
38455	74.4220	25.5780	3.9096	0.0504	0.1970
38456	72.4894	27.5106	3.6350	0.0305	0.1109
38457	69.7342	30.2658	3.3041	0.0466	0.1540
38458	72.3497	27.6503	3.6166	0.0244	0.0882
38459	72.6708	27.3292	3.6591	0.0257	0.0940
38460	57.8797	42.1203	2.3741	0.0095	0.0226
38461	69.2925	30.7075	3.2565	0.0419	0.1364
38462	73.0116	26.9884	3.7053	0.0303	0.1123
38463	71.7697	28.2303	3.5423	0.0184	0.0652
38464	71.1538	28.8462	3.4667	0.0236	0.0818
38465	73.7819	26.2181	3.8142	0.0212	0.0809
38466	72.6457	27.3543	3.6557	0.013	0.0475
38467	70.0671	29.9329	3.3408	0.0191	0.0638
38468	73.0333	26.9667	3.7083	0.0697	0.2585
38469	71.9530	28.0470	3.5654	0.0592	0.2111
38470	72.5686	27.4314	3.6455	0.0341	0.1243
38471	70.3226	29.6774	3.3696	0.0406	0.1368
38472	77.8243	22.1757	4.5094	0.0137	0.0618
38473	74.4420	25.5580	3.9127	0.0214	0.0837
38474	73.5380	26.4620	3.7790	0.0164	0.0620
38475	74.1512	25.8488	3.8686	0.0187	0.0723
38476	72.2437	27.7563	3.6028	0.0192	0.0692
38477	73.5294	26.4706	3.7778	0.0144	0.0544
38478	76.4105	23.5895	4.2392	0.0518	0.2196
38479	74.1688	25.8312	3.8713	0.03	0.1161
38480	69.8132	30.1868	3.3127	0.0289	0.0957
38481	69.0722	30.9278	3.2333	0.0182	0.0588
38482	68.8442	31.1558	3.2097	0.0038	0.0122

38483	68.0000	32.0000	3.1250	0.0111	0.0347
38484	70.3665	29.6335	3.3746	0.0254	0.0857
38485	74.2284	25.7716	3.8802	0.0249	0.0966
38486	69.9513	30.0487	3.3279	0.0162	0.0539
38487	81.2325	18.7675	5.3284	0.0226	0.1204
38488	74.9347	25.0653	3.9896	0.1662	0.6631
38489	72.8427	27.1573	3.6823	0.1602	0.5899
38490	75.1060	24.8940	4.0170	0.0339	0.1362
38491	74.5550	25.4450	3.9301	0.0345	0.1356
38492	77.9022	22.0978	4.5253	0.0439	0.1987
38493	73.0589	26.9411	3.7118	0.0454	0.1685
38494	70.2760	29.7240	3.3643	0.0373	0.1255
38495	73.5876	26.4124	3.7861	0.0697	0.2639
38496	73.4096	26.5904	3.7608	0.0335	0.1260
38497	74.7121	25.2879	3.9545	0.046	0.1819
38498	70.6677	29.3323	3.4092	0.0398	0.1357
38499	76.9861	23.0139	4.3452	0.0694	0.3016
38500	73.4485	26.5515	3.7663	0.0441	0.1661
38501	72.9487	27.0513	3.6967	0.0592	0.2188
39126	72.7637	27.2363	3.6716	0.0182	0.0668





Trich Analytics In

Fish Ovary Tissue Microchemistry Analysis Report

Client:

James Elphick Nautilus Environmental Inc. 8664 Commerce Court, Burnaby, BC

V8A 4N7

Ph: 250-216-8420

Email: james@nautilusenvironmental.com

Date Received: 28 May 2019 Final Report Date: 17 Jun 2019 2019-059 Project No. Report Revision Rev.2

Metals Analytical Request: Fish Tissue Microchemistry – 8 Fish ovary tissue samples

Fish Ovary Tissue Sample IDs: RG_STPD-RSC-01-R-O_20190521*; RG_STPD-RSC-02-R-O_20190524

> RG_STPD-RSC-03-R-O_20190524; RG_STPD-RSC-04-R-O_20190524 RG STPD-RSC-05-R-O 20190524; RG STPD-RSC-06-R-O 20190524 RG_STPD-RSC-07-R-O_20190524; RG_ERWSF-RSC-01-R-O_20190524

Includes: LA-ICP-MS (line scans), data integration and calculations, Excel data, QA/QC results, chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.01.

Analytical results are expressed in part per million (ppm) dry weight.

Samples quantified using DORM-4 certified reference standard.

*Sample bottle label (RG STPD-RSC-01-R-O 20190515) was different than the COC label (RG STPD-RSC-01-R-O 20190521).

COC form included on last page of report.

Moisture not requested.

This report provides the analytical results only for fish tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

17 Jun 2019

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Trich Analytics Inc.

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

Samp	ole ID	RG_STPD-RSC-01-R- O_20190521*	RG_STPD-RSC-02-R- O_20190524	RG_STPD-RSC-03-R- O_20190524	RG_STPD-RSC-04-R- O_20190524
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.032	0.023	0.041	0.037
23Na	3	3,924	2,638	2,917	2,773
24Mg	0.04	1,873	1,667	1,975	2,204
27AI	0.03	0.259	0.240	0.542	0.146
31P	78	14,178	12,062	14,169	12,508
39K	3	21,760	11,701	13,942	11,970
44Ca	17	1,671	1,186	1,634	1,507
51V	0.012	0.029	0.017	0.021	0.021
52Cr	0.61	1.27	1.63	1.54	1.21
55Mn	0.2	15.2	20.5	11.3	15.7
57Fe	1.5	115	108	85.1	105
59Co	0.024	0.110	0.110	0.136	0.100
60Ni	0.008	0.084	0.573	0.216	0.043
63Cu	0.004	4.94	5.60	6.33	5.35
66Zn	0.032	180	152	190	174
75As	0.229	<0.229	<0.229	<0.229	<0.229
77Se	0.9	36.8	35.0	25.9	35.7
88Sr	0.0004	0.677	0.559	0.835	0.669
95Mo	0.002	0.207	0.104	0.162	0.172
111Cd	0.034	1.24	0.900	1.10	1.32
118Sn	0.042	0.222	0.135	0.343	<0.042
202Hg	0.016	0.166	0.119	0.138	0.178
208Pb	0.001	0.011	0.005	0.009	0.003
238U	0.00001	0.0010	< 0.00001	0.0005	0.0005

Notes:

ppm = parts per million

DL = detection limit

Samp	ole ID	RG_STPD-RSC-05-R- O_20190524	RG_STPD-RSC-06-R- O_20190524	RG_STPD-RSC-07-R- O_20190524	RG_ERWSF-RSC-01-R- O_20190524
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.007	0.058	0.035	0.060	< 0.007
23Na	3	3,402	2,395	2,906	2,830
24Mg	0.04	2,321	1,900	2,029	1,657
27AI	0.03	0.617	0.653	1.93	0.836
31P	78	13,563	13,306	11,715	12,303
39K	3	16,343	12,145	13,649	13,380
44Ca	17	1,924	1,449	1,482	1,290
51V	0.012	0.035	0.029	0.089	0.024
52Cr	0.61	1.44	1.45	2.43	1.19
55Mn	0.2	27.2	17.5	23.0	13.1
57Fe	1.5	115	71.6	95.4	82.9
59Co	0.024	0.118	0.111	0.122	0.093
60Ni	0.008	0.075	0.071	0.209	0.140
63Cu	0.004	4.54	5.11	4.19	4.73
66Zn	0.032	229	172	208	144
75As	0.229	<0.229	<0.229	<0.229	<0.229
77Se	0.9	30.5	27.8	42.4	16.9
88Sr	0.0004	1.16	0.820	0.839	0.395
95Mo	0.002	0.221	0.145	0.184	0.160
111Cd	0.034	1.55	1.24	1.50	1.04
118Sn	0.042	0.114	0.329	0.625	0.402
202Hg	0.016	0.190	0.137	0.173	0.160
208Pb	0.001	0.018	0.024	0.039	0.021
238U	0.00001	0.0015	0.0019	0.0069	0.0005

Notes:

ppm = parts per million

DL = detection limit

Nautilus Environmental Inc. Fish Ovary Tissue QA-QC Relative Percent Difference Results

Sam	ple ID	RG_STPD-RSC-04-R- O_20190524	RG_STPD-RSC-04-R- O_20190524 (Duplicate)	RPD	RG_STPD-RSC-05-R- O_20190524	RG_STPD-RSC-05-R- O_20190524 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.007	0.037	0.029	22.9	0.058	0.053	9.4
23Na	3	2,773	2,258	20.5	3,402	3,134	8.2
24Mg	0.04	2,204	2,037	7.9	2,321	1,877	21.2
27AI	0.03	0.146	0.180	21.2	0.617	0.641	3.9
31P	78	12,508	10,650	16.1	13,563	13,367	1.5
39K	3	11,970	10,279	15.2	16,343	14,753	10.2
44Ca	17	1,507	1,811	18.4	1,924	1,793	7.1
51V	0.012	0.021	0.013	47.4	0.035	0.027	25.4
52Cr	0.61	1.21	1.19	1.5	1.44	1.27	13.0
55Mn	0.2	15.7	15.8	0.8	27.2	24.0	12.5
57Fe	1.5	105	96.0	9.4	115	91.0	23.6
59Co	0.024	0.100	0.089	12.5	0.118	0.096	21.3
60Ni	0.008	0.043	0.046	6.0	0.075	0.056	30.0
63Cu	0.004	5.35	4.52	16.8	4.54	3.63	22.0
66Zn	0.032	174	128	30.3	229	206	10.6
75As	0.229	<0.229	<0.229	-	<0.229	<0.229	-
77Se	0.9	35.7	33.2	7.1	30.5	34.7	13.0
88Sr	0.0004	0.669	0.668	0.2	1.16	1.03	12.1
95Mo	0.002	0.172	0.154	11.0	0.221	0.189	15.2
111Cd	0.034	1.32	0.93	34.2	1.55	1.53	1.3
118Sn	0.042	< 0.042	0.035	-	0.114	0.093	19.6
202Hg	0.016	0.178	0.143	22.0	0.190	0.209	9.7
208Pb	0.001	0.0028	0.0026	7.5	0.018	0.013	30.0
238U	0.00001	0.0005	<0.00001	-	0.0015	0.0014	3.1

Notes:

ppm = parts per million

RPD = Relative Percent Difference

% = percent

Page 4 of 6

	DORM-4 Conc.	Actual Conc.		Precision RSD
Parameter	(ppm)	(ppm)	Accuracy (%)	(%)
7Li	1.21	1.13	93.8	6.8
23Na	14,000	14,334	102	5.1
24Mg	910	866	95.2	3.5
27Al	1,280	1,268	99.1	6.6
31P	8,000	7,924	99.1	4.5
39K	15,500	15,505	100	5.5
44Ca	2,360	2,344	99.3	5.3
51V	1.57	1.53	97.4	10.0
52Cr	1.87	1.91	102	2.3
55Mn	3.17	3.42	108	7.8
57Fe	343	340	99.2	5.3
59Co	0.250	0.241	96.2	5.7
60Ni	1.34	1.23	92.1	2.2
63Cu	15.7	14.9	95.1	5.9
66Zn	51.6	52.6	102	7.8
75As	6.87	6.89	100	5.2
77Se	3.45	3.34	96.9	2.6
88Sr	10.1	10.1	100	6.1
95Mo	0.290	0.273	94.2	9.2
111Cd	0.299	0.267	89.2	6.0
118Sn	0.061	0.056	92.5	13.3
202Hg	0.412	0.423	103	7.5
208Pb	0.404	0.377	93.4	8.0
238U	0.0500	0.0498	99.6	16.2

Notes:

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Trich Analytics Inc.

Chain of Custody (COC)

	an Heights, Saanichton, BC, V8M 0B3 h: (250) 532-1084	for LA-ICP-MS Analysis						
	Invoicing		Reporting (if different from Invoicing)					
Project Numbe	r: RSC Toxicity Supporting Study	,						
Company Name:		Company Name:						
Contact Name:	David Semeniuk	Contact Name:						
Address:	2 Lamb Street	Address:						
City, Province:	Georgetown, ON	City, Province:						
Postal Code:	L7G 3M9	Postal Code:						
Phone:	778-229-1791	Phone:						
Email:	dsemeniuk@minnow.ca	Email:	james@nautilusenvironmental.com; dsemeniuk@minnow.ca; sweech@minnow.ca; nigel.fisher@teck.com					
		Sample Analysis Re						
	Sample Identification:		Sample Type:					
	Sample Identification.	Species	Sample type					
	1 RG_STPD-RSC-01-R-O_20190521 .	RSC	Unripe ovary					
	2 RG_STPD-RSC-02-R-O_20190524 •	RSC	Unripe ovary					
	3 RG_STPD-RSC-03-R-O_20190524 '	RSC	Unripe ovary					
	4 RG_STPD-RSC-04-R-O_20190524 ;	RSC	Unripe ovary					
	5 RG_STPD-RSC-05-R-O_20190524 *	RSC	Unripe ovary					
	6 RG_STPD-RSC-06-R-O_20190524	RSC	Unripe ovary					
	7 RG STPD-RSC-07-R-O_20190524 •	RSC	Unripe ovary					
	8 RG_ERWSF-RSC-01-R-O_20190524 ,	RSC	Unripe ovary					
	9							
	10							
	11							
	12							
	13							
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	15							
	16							
	17							
	18							
	19							
	20							
Sample(s) Releas	sed By: Li Sa Bourou	Sample(s) Receive	ed By: GERIENE LABINE					
Signature:	sed By: Li 5a Baurar	Signature:	curin IS					
Date Sent: 2(0. May -19	Date Received:	28 May 2019. (Project #: 2019-059)					
Sample(s) Return	THE RESERVE THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWIND TWO IS NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO IS NAMED IN	Shipping Condition						
		Shipping Contain	er:					
Signature:		Date Sent:						



Trich Analytics Inc.

Fish Ovary Tissue Microchemistry Analysis Report

Client:Date Received:06 Jun 2019James ElphickReport Date:12 Jun 2019Nautillus Environmental Inc.Project No.2019-062

8664 Commerce Court, Burnaby, BC

V8A 4N7

Ph: 250-216-8420

Email: james@nautilusenvironmental.com

Analytical Request: Fish Ovary Tissue Microchemistry (total metals and moisture) – 31 fish ovary tissue samples See chain of custody form provided for sample identification numbers.

Includes: LA-ICP-MS (line scans), data integration and calculations, Excel data, QA-QC results.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.01. Analytical results are expressed in part per million (ppm) dry weight. Samples quantified using DORM-4 certified reference standard.

This report provides the analytical results only for fish ovary tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

Date

12 Jun 2019

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Trich Analytics Inc.

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

Samp	ole ID	RG_LNLK-RSC-11-R- O_20190517	RG_LNLK-RSC-12-R- O_20190517	RG_LNLK-RSC-13-R- O_20190517	RG_LNLK-RSC-14-R- O_20190520	RG_LNLK-RSC-15-R- O_20190520
Wet We	eight (g)	0.0487	0.1134	0.0839	0.0865	0.1777
Moistu	ıre (%)	62.8	70.7	47.0	68.8	64.7
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	0.121	<0.020	<0.020	0.036	<0.020
23Na	2.0	3165	2528	3415	3912	3365
24Mg	0.050	1660	1390	1460	1606	1712
27AI	0.100	6.04	0.799	0.910	4.32	0.960
31P	40.0	11816	11679	13351	13570	13086
39K	4.0	15433	12653	14023	14480	13258
44Ca	94.0	1776	1016	1127	2779	1833
51V	0.030	0.210	<0.030	<0.030	0.065	0.047
52Cr	0.300	1.79	1.60	1.68	1.62	1.69
55Mn	0.250	23.4	18.1	16.2	18.1	15.8
57Fe	1.0	112	88.6	98.2	112	105
59Co	0.010	0.189	0.082	0.077	0.125	0.116
60Ni	0.010	1.11	0.854	0.430	0.821	0.317
63Cu	0.005	5.75	3.50	5.47	3.81	5.59
66Zn	0.600	158	162	231	129	204
75As	0.300	<0.300	<0.300	<0.300	<0.300	<0.300
77Se	0.200	1.53	1.47	1.81	1.71	2.11
88Sr	0.020	1.05	0.410	0.457	1.97	0.792
95Mo	0.005	0.275	0.139	0.095	0.195	0.153
111Cd	0.030	1.43	0.818	1.27	0.797	1.23
118Sn	0.010	0.108	0.075	0.180	0.060	0.066
202Hg	0.020	0.175	0.124	0.162	0.151	0.223
208Pb	0.001	0.200	0.008	0.007	0.051	0.007
238U	0.0001	0.042	0.0005	<0.0001	0.004	0.0011

Notes:

ppm = parts per million

DL = detection limit

g = grams

Samp	ole ID	RG_LNLK-RSC-16-R- O_20190520	RG_LNLK-RSC-17-R- O_20190520	RG_LNLK-RSC-18-R- O_20190520	RG_LNLK-RSC-19-R- O_20190520	RG_LNLK-RSC-20-R- O_20190520
Wet We	eight (g)	0.2535	0.0599	0.1673	0.0609	0.1668
Moistu	ıre (%)	67.3	67.8	62.5	40.9	70.2
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	<0.020	<0.020	<0.020	<0.020	0.025
23Na	2.0	3075	3226	2435	3410	3280
24Mg	0.050	1384	1624	1243	1513	1547
27Al	0.100	0.391	1.45	0.453	0.347	2.00
31P	40.0	11809	12344	12500	11580	12448
39K	4.0	11721	13636	11238	12125	11713
44Ca	94.0	1118	1507	995	1048	1304
51V	0.030	0.035	0.048	<0.030	< 0.030	0.088
52Cr	0.300	1.46	1.70	1.47	1.93	1.60
55Mn	0.250	22.0	26.9	17.0	20.0	17.9
57Fe	1.0	82.4	92.6	65.0	88.5	93.9
59Co	0.010	0.062	<0.010	0.053	0.113	0.096
60Ni	0.010	0.162	<0.010	0.166	0.848	0.396
63Cu	0.005	6.08	4.90	3.87	5.28	5.22
66Zn	0.600	135	217	140	193	175
75As	0.300	<0.300	<0.300	<0.300	<0.300	<0.300
77Se	0.200	1.78	2.57	1.77	1.59	2.00
88Sr	0.020	0.446	0.413	0.389	0.498	0.714
95Mo	0.005	0.170	0.214	0.103	0.094	0.177
111Cd	0.030	0.715	1.27	0.708	0.990	0.987
118Sn	0.010	0.024	0.225	0.112	0.092	0.194
202Hg	0.020	0.106	0.168	0.114	0.117	0.147
208Pb	0.001	0.005	0.012	0.012	0.006	0.029
238U	0.0001	<0.0001	0.0005	<0.0001	<0.0001	0.005

Notes:

ppm = parts per million

DL = detection limit

g = grams

Samp	ole ID	_	_	RG_ERIMF-RSC-06-R-	_	RG_ERIMF-RSC-08-R-
34/-+34/-	:	O_20190515	O_20190517	O_20190521	O_20190523	O_20190523
Wet We		0.1058	0.0809	0.0408	0.317	0.2075
Moistu		71.9	67.7	58.8	72.1	71.1
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	0.069	0.031	0.089	0.030	0.058
23Na	2.0	3758	3160	4142	3628	4425
24Mg	0.050	1928	1643	2127	1772	2185
27Al	0.100	4.01	0.593	4.26	1.63	2.82
31P	40.0	14944	11065	15331	13425	14518
39K	4.0	17905	13843	16873	13619	13917
44Ca	94.0	2207	1411	1988	1723	2392
51V	0.030	0.128	0.032	0.174	0.055	0.120
52Cr	0.300	1.96	1.50	2.60	1.57	1.81
55Mn	0.250	29.6	17.1	20.7	20.4	22.4
57Fe	1.0	111	61.6	94.6	76.7	88.8
59Co	0.010	0.186	0.102	0.208	0.135	0.164
60Ni	0.010	0.748	0.750	2.25	0.252	0.430
63Cu	0.005	4.54	5.36	3.33	3.58	5.99
66Zn	0.600	193	201	214	151	182
75As	0.300	<0.300	<0.300	<0.300	<0.300	<0.300
77Se	0.200	9.70	7.89	4.69	5.75	14.4
88Sr	0.020	1.16	0.645	1.24	0.890	1.30
95Mo	0.005	0.385	0.146	0.281	0.154	0.266
111Cd	0.030	1.19	1.21	1.33	0.824	1.05
118Sn	0.010	0.141	0.054	0.200	0.129	0.341
202Hg	0.020	0.164	0.173	0.169	0.119	0.165
208Pb	0.001	0.086	0.004	0.125	0.017	0.081
238U	0.0001	0.007	0.0006	0.025	0.002	0.011

Notes:

ppm = parts per million

DL = detection limit

g = grams

Samp	ole ID	RG_ERIMF-RSC-09-R- O 20190523	RG_ERIMF-RSC-10-R- O_20190523	RG_ERIMF-RSC-11-R- O_20190523	RG_ERIMF-RSC-12-R- O 20190523	RG_ERIMF-RSC-13-R- O 20190523
Wet We	eiaht (a)	0.2077	0.0584	0.0169	0.0672	0.0298
Moistu		73.4	74.3	72.2	74.3	68.1
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	0.257	0.055	0.026	0.094	0.025
23Na	2.0	5773	3198	2707	3539	2762
24Mg	0.050	2183	1772	1358	2129	1686
27Al	0.100	7.38	4.98	4.14	12.5	9.47
31P	40.0	14673	13481	11541	12762	12753
39K	4.0	15531	14083	13072	13986	13904
44Ca	94.0	3018	1558	1188	2931	1433
51V	0.030	0.319	0.116	0.071	0.314	0.094
52Cr	0.300	2.22	1.65	1.94	2.93	3.28
55Mn	0.250	20.6	21.8	15.2	21.1	13.4
57Fe	1.0	114	73.4	66.4	135	189
59Co	0.010	0.248	0.141	0.150	0.306	0.206
60Ni	0.010	1.30	0.836	1.41	3.18	3.32
63Cu	0.005	5.60	3.43	2.33	5.00	4.58
66Zn	0.600	197	132	137	153	166
75As	0.300	0.333	<0.300	<0.300	<0.300	<0.300
77Se	0.200	10.3	9.07	10.2	8.50	5.01
88Sr	0.020	2.35	0.932	0.562	1.68	0.646
95Mo	0.005	0.385	0.232	0.166	0.323	0.210
111Cd	0.030	2.78	0.726	0.848	1.20	0.889
118Sn	0.010	0.265	0.085	0.051	0.106	0.075
202Hg	0.020	0.155	0.134	0.126	0.147	0.120
208Pb	0.001	0.279	0.080	0.036	0.152	0.013
238U	0.0001	0.079	0.010	0.006	0.030	0.0006

Notes:

ppm = parts per million

DL = detection limit

g = grams

Sample ID		RG_ERIMF-RSC-14-R-	_	_	RG_ERWSF-RSC-02-R-	-
		O_20190523	O_20190523	O_20190523	O_20190529	O_20190530
Wet We		0.0698	0.034	0.0822	0.1323	0.1142
Moistu		74.8	29.1	72.5	72.1	72.4
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	0.082	0.076	0.024	<0.020	<0.020
23Na	2.0	3368	3619	3575	2857	2966
24Mg	0.050	1938	2108	1840	2077	1869
27Al	0.100	10.3	8.45	3.85	1.18	7.26
31P	40.0	12370	15313	14177	13168	13827
39K	4.0	15022	17583	16978	14541	15697
44Ca	94.0	2220	2098	1821	1431	1336
51V	0.030	0.212	0.165	0.064	<0.030	0.082
52Cr	0.300	2.59	2.95	2.35	1.50	3.54
55Mn	0.250	25.6	27.0	18.1	19.8	17.8
57Fe	1.0	134	123	141	103	150
59Co	0.010	0.313	0.272	0.166	0.093	0.206
60Ni	0.010	2.37	2.43	2.01	0.517	3.79
63Cu	0.005	4.46	6.81	4.89	4.28	3.47
66Zn	0.600	235	222	196	188	162
75As	0.300	<0.300	<0.300	<0.300	<0.300	<0.300
77Se	0.200	23.2	8.42	8.49	12.9	14.3
88Sr	0.020	1.15	0.933	0.933	0.348	0.450
95Mo	0.005	0.261	0.353	0.211	0.204	0.153
111Cd	0.030	1.72	1.50	1.21	1.18	0.965
118Sn	0.010	0.094	0.054	0.087	0.031	0.167
202Hg	0.020	0.186	0.242	0.190	0.187	0.162
208Pb	0.001	0.176	0.084	0.012	0.006	0.028
238U	0.0001	0.015	0.038	0.0011	<0.0001	0.0006

Notes:

ppm = parts per million

DL = detection limit

g = grams

Sample ID		RG_STPD-RSC-08-R- O_20190530	RG_STPD-RSC-09-R- O_20190530	RG_STPD-RSC-10-R- O_20190530	RG_STPD-RSC-11-R- O_20190531	RG_STPD-RSC-12-R- O_20190531
Wet We	eight (g)	0.0819	0.0626	0.224	0.0976	0.0623
Moistu	ıre (%)	66.2	65.0	70.0	69.6	62.0
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.020	0.038	0.060	0.040	0.035	0.048
23Na	2.0	3159	2189	2848	3146	3077
24Mg	0.050	2038	1556	1674	1706	1885
27Al	0.100	3.18	5.26	1.38	1.69	5.48
31P	40.0	13774	13794	12429	11784	14476
39K	4.0	16447	12394	11234	13117	17485
44Ca	94.0	1782	1167	1462	1372	1773
51V	0.030	0.065	0.103	<0.030	0.034	0.063
52Cr	0.300	2.88	2.42	1.49	2.12	2.75
55Mn	0.250	17.9	13.6	16.7	12.5	17.0
57Fe	1.0	140	97.7	88.1	116	125
59Co	0.010	0.188	0.153	0.066	0.136	0.159
60Ni	0.010	2.65	1.71	0.235	1.58	2.31
63Cu	0.005	5.02	5.02	5.60	4.31	5.47
66Zn	0.600	185	112	164	163	186
75As	0.300	<0.300	<0.300	<0.300	< 0.300	<0.300
77Se	0.200	36.6	30.4	33.1	35.0	35.4
88Sr	0.020	1.11	0.911	0.971	0.658	0.927
95Mo	0.005	0.146	0.124	0.140	0.145	0.218
111Cd	0.030	1.112	0.649	0.814	0.981	1.08
118Sn	0.010	0.039	0.222	0.083	0.081	0.029
202Hg	0.020	0.174	0.091	0.091	0.149	0.157
208Pb	0.001	0.031	0.093	0.011	0.009	0.019
238U	0.0001	0.0011	0.010	0.0005	0.0006	0.0011

Notes:

ppm = parts per million

DL = detection limit

g = grams

Samı	ole ID	RG_STPD-RSC-13-R- O_20190531	
Wet We	eight (g)	0.1059	
Moist	ıre (%)	69.0	
Parameter	DL (ppm)	(ppm)	
7Li	0.020	0.058	
23Na	2.0	2971	
24Mg	0.050	2078	
27Al	0.100	2.82	
31P	40.0	13668	
39K	4.0	16660	
44Ca	94.0	1713	
51V	0.030	0.042	
52Cr	0.300	1.45	
55Mn	0.250	17.8	
57Fe	1.0	119	
59Co	0.010	0.145	
60Ni	0.010	0.552	
63Cu	0.005	5.21	
66Zn	0.600	190	
75As	0.300	<0.300	
77Se	0.200	43.0	
88Sr	0.020	1.15	
95Mo	0.005	0.196	
111Cd	0.030	1.20	
118Sn	0.010	0.066	
202Hg	0.020	0.179	
208Pb	0.001	0.015	
238U	0.0001	0.0011	

Notes:

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue QA/QC Relative Percent Difference Results

Sample ID		RG_LNLK-RSC-15-R- O_20190520	RG_LNLK-RSC-15-R- O_20190520 (Duplicate)	RPD	RG_LNLK-RSC-16-R- O_20190520	RG_LNLK-RSC-16-R- O_20190520 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.020	<0.020	<0.020	-	<0.020	<0.020	-
23Na	2.0	3365	3734	10.4	3075	2675	13.9
24Mg	0.050	1712	1539	10.6	1384	1238	11.1
27Al	0.100	0.960	0.687	33.2	0.391	0.271	36.0
31P	40.0	13086	12747	2.6	11809	10195	14.7
39K	4.0	13258	14388	8.2	11721	10472	11.3
44Ca	94.0	1833	1765	3.8	1118	981	13.0
51V	0.030	0.047	0.057	19.4	0.035	< 0.030	-
52Cr	0.300	1.69	1.61	5.0	1.46	1.29	12.4
55Mn	0.250	15.8	13.6	14.9	22.0	19.7	11.0
57Fe	1.0	105	95.9	9.1	82.4	76.2	7.7
59Co	0.010	0.116	0.110	5.3	0.062	0.049	22.7
60Ni	0.010	0.317	0.206	42.8	0.162	0.118	31.5
63Cu	0.005	5.59	5.39	3.7	6.08	5.25	14.7
66Zn	0.600	204	189	7.2	135	115	15.7
75As	0.300	< 0.300	< 0.300	-	< 0.300	< 0.300	-
77Se	0.200	1.85	1.25	38.5	1.67	1.30	24.6
88Sr	0.020	0.792	0.714	10.3	0.446	0.383	15.3
95Mo	0.005	0.153	0.146	4.3	0.170	0.147	14.3
111Cd	0.030	1.23	1.00	20.4	0.715	0.557	24.8
118Sn	0.010	0.066	0.078	16.1	0.024	0.024	0.3
202Hg	0.020	0.223	0.181	21.0	0.106	0.083	24.8
208Pb	0.0010	0.0074	0.0075	0.5	0.005	0.003	37.3
238U	0.0001	0.0011	0.0011	0.0	<0.0001	<0.0001	-

Notes:

ppm = parts per million

RPD = Relative Percent Difference

Nautilus Environmental Inc. - Fish Ovary Tissue QA/QC Relative Percent Difference Results

Sample ID		RG_LNLK-RSC-18-R- O_20190520	RG_LNLK-RSC-18-R- O_20190520 (Duplicate)	RPD	RG_ERIMF-RSC-07-R- O_20190523	RG_ERIMF-RSC-07-R- O_20190523 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.020	<0.020	<0.020	-	0.030	0.023	25.8
23Na	2.0	2435	2036	17.8	3628	2944	20.8
24Mg	0.050	1243	1142	8.5	1772	1518	15.4
27Al	0.100	0.453	0.466	2.9	1.63	1.53	6.8
31P	40.0	12500	10698	15.5	13425	11703	13.7
39K	4.0	11238	9373	18.1	13619	11439	17.4
44Ca	94.0	995	927	7.1	1723	1385	21.8
51V	0.030	< 0.030	<0.030	-	0.055	0.048	13.9
52Cr	0.300	1.47	1.37	7.1	1.57	1.49	5.2
55Mn	0.250	17.0	15.5	9.3	20.4	17.4	15.8
57Fe	1.0	65.0	55.5	15.8	76.7	64.0	17.9
59Co	0.010	0.053	0.041	25.3	0.135	0.112	18.4
60Ni	0.010	0.166	0.155	7.0	0.252	0.354	33.5
63Cu	0.005	3.87	3.6	8.1	3.58	2.96	19.0
66Zn	0.600	140	125	11.3	151	125	18.4
75As	0.300	< 0.300	<0.300	-	< 0.300	< 0.300	-
77Se	0.200	1.70	1.52	11.6	5.66	4.33	26.7
88Sr	0.020	0.389	0.354	9.5	0.890	0.753	16.6
95Mo	0.005	0.103	0.094	9.1	0.154	0.115	28.7
111Cd	0.030	0.708	0.588	18.4	0.824	0.665	21.3
118Sn	0.010	0.112	0.095	15.9	0.129	0.077	50.6
202Hg	0.020	0.114	0.094	19.4	0.119	0.093	23.9
208Pb	0.0010	0.012	0.009	30.1	0.017	0.013	26.2
238U	0.0001	<0.0001	<0.0001	-	0.0022	0.0016	28.6

Notes:

ppm = parts per million

RPD = Relative Percent Difference

Sam	ple ID	RG_STPD-RSC-10-R- O_20190530	RG_STPD-RSC-10-R- O_20190530 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)
7Li	0.020	0.040	0.031	25.6
23Na	2.0	2848	2435	15.6
24Mg	0.050	1674	1413	16.9
27Al	0.100	1.38	1.19	14.6
31P	40.0	12429	11566	7.2
39K	4.0	11234	10163	10.0
44Ca	94.0	1462	1242	16.2
51V	0.030	< 0.030	< 0.030	-
52Cr	0.300	1.49	1.43	4.0
55Mn	0.250	16.7	13.8	18.9
57Fe	1.0	88.1	71.9	20.2
59Co	0.010	0.066	0.053	21.2
60Ni	0.010	0.235	0.219	6.9
63Cu	0.005	5.60	4.46	22.7
66Zn	0.600	164	124	27.6
75As	0.300	< 0.300	< 0.300	-
77Se	0.200	33.3	28.8	14.6
88Sr	0.020	0.971	0.785	21.2
95Mo	0.005	0.140	0.117	17.3
111Cd	0.030	0.814	0.637	24.3
118Sn	0.010	0.083	0.073	12.9
202Hg	0.020	0.091	0.074	21.0
208Pb	0.0010	0.011	0.008	29.9
238U	0.0001	0.0005	0.0005	0.0

Notes:

ppm = parts per million

RPD = Relative Percent Difference

		Set I			Set II		
Daramatar	DORM-4 Conc.	Actual Conc.	A	Precision RSD	Actual Conc.	A	Precision RSD
Parameter	(ppm)	(ppm)	Accuracy (%)	(%)	(ppm)	Accuracy (%)	(%)
7Li	1.21	1.12	108	12.0	1.12	108	7.0
23Na	14000	13302	105	9.3	13222	106	4.5
24Mg	910	882	103	9.8	835	109	12.8
27Al	1280	991	129	22.0	1190	108	13.1
31P	8000	7446	107	6.6	7308	109	3.8
39K	15500	15214	102	5.4	13792	112	3.8
44Ca	2360	2245	105	5.3	2103	112	4.1
51V	1.57	1.26	125	16.5	1.49	106	9.3
52Cr	1.87	1.65	113	7.1	1.80	104	3.4
55Mn	3.17	2.88	110	10.8	2.81	113	8.3
57Fe	343	297	116	5.9	294	117	7.3
59Co	0.250	0.204	123	6.1	0.218	115	3.6
60Ni	1.34	1.11	121	12.6	1.10	121	4.3
63Cu	15.7	12.3	127	6.1	13.3	118	3.4
66Zn	51.6	44.1	117	5.3	43.3	119	4.0
75As	6.87	5.75	120	7.3	6.43	107	2.6
77Se	3.45	2.89	120	5.7	3.13	110	3.8
88Sr	10.1	9.75	104	15.9	9.24	109	2.5
95Mo	0.290	0.246	118	4.8	0.251	115	2.5
111Cd	0.299	0.211	141	6.8	0.215	139	7.1
118Sn	0.061	0.048	127	41.4	0.054	113	8.3
202Hg	0.412	0.308	134	4.5	0.340	121	8.8
208Pb	0.404	0.374	108	22.8	0.353	114	8.4
238U	0.050	0.040	126	19.3	0.037	134	9.7

Notes:

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

207-1753 Sea	h A n a lytics Inc. on Heights, Saanichton, BC, V8M 0B3 h: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis				
	Invoicing		Reporting (if different from Invoicing)			
Project Numbe	r: RSC Toxicity Supporting Study					
Company Name:	Minnow Environmental	Company Name:				
Contact Name:	David Semeniuk	Contact Name:				
Address:	2 Lamb Street	Address:				
City, Province:	Georgetown, ON	City, Province:				
Postal Code:	L7G 3M9	Postal Code:				
Phone:	778-229-1791	Phone:				
Email:	Dsemeniuk@minnow.ca	Email:	james@nautilusenvironmental.com; dsemeniuk@minnow.ca; sweech@minnow.ca			
		Sample Analysis Re	niael.fisher@teck.com			
	Sample Identification:		Sample Type:			
SAMPLE ID#:	Sample Identification.	Species	Sample type			
#1	1 RG_LNLK-RSC-11-R-O_20190517	RSC	Unripe ovary			
#2	RG_LNLK-RSC-12-R-O_20190517	RSC	Unripe ovary			
*3	RG_LNLK-RSC-13-R-O_20190517	RSC Unripe ovary				
#4 "	4 RG_LNLK-RSC-14-R-O_20190520	RSC Unripe ovary				
45	RG_LNLK-RSC-15-R-O_20190520	RSC Unripe ovary				
#6	RG_LNLK-RSC-16-R-O_20190520	RSC	Unripe ovary			
#7	7 RG_LNLK-RSC-17-R-O_20190520	RSC	Unripe ovary			
#8	RG_LNLK-RSC-18-R-O_20190520	RSC	Unripe ovary			
#9	RG_LNLK-RSC-19-R-O_20190520	RSC	Unripe ovary			
410	RG_LNLK-RSC-20-R-O_20190520	RSC	Unripe ovary			
# I) 1	RG_ERIMF-RSC-04-R-0_20190515	RSC	Unripe ovary			
#12 12	RG_ERIMF-RSC-05-R-0_20190517	RSC	Unripe ovary			
#13 13	RG_ERIMF-RSC-06-R-O_20190521	RSC	Unripe ovary			
#14 14	RG_ERIMF-RSC-07-R-O_20190523	RSC	Unripe ovary			
Sample(s) Release	ed By: Noel Soogrim	Sample(s) Received By: Genene La Bine				
Signature: Www.		Signature: Grunn LB				
Date Sent: 5	91 - NUL-3	Date Received: 06JUN 2019 (Project #: 2019-062)				
Sample(s) Returned to Client By:		Shipping Conditions:				
		Shipping Container:				
Signature:		Date Sent:				

Trich Analytics Inc. Chain of Custody (COC) 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 for LA-ICP-MS Analysis Ph: (250) 532-1084 Invoicing Reporting (if different from Invoicing) Project Number: RSC Toxicity Supporting Study Company Name: Minnow Environmental Company Name: Contact Name: David Semeniuk Contact Name: Address: 2 Lamb Street Address: City, Province: Georgetown, ON City, Province: Postal Code: L7G 3M9 Postal Code: Phone: 778-229-1791 Phone: james@nautilusenvironmental.com; dsemeniuk@minnow.ca; sweech@minnow.ca, Email: Dsemeniuk@minnow.ca igel.fisher@teck.com Sample Analysis Requested Sample Type: Sample Identification: SAMPLE IDA Species Sample type RSC RG_ERIMF-RSC-06-R-O_20190523 Unripe ovary +15 RG_ERIMF-RSC-09-R-O_20190523 RSC Unripe ovary #16 RG_ERIMF-RSC-10-R-O_20190523 RSC Unripe ovary #17 RSC RG_ERIMF-RSC-11-R-O_20190523 Unripe ovary #18 RG_ERIMF-RSC-12-R-O_20190523 RSC Unripe ovary #19 RG_ERIMF-RSC-13-R-O_20190523 RSC Unripe ovary #20 RG ERIMF-RSC-14-R-O 20190523 RSC Unripe ovary +21 RG_ERIMF-RSC-15-R-O_20190523 RSC Unripe ovary # 22 # 23 RG_ERIMF-RSC-16-R-O_20190523 RSC Unripe ovary RG_ERWSF-RSC-02-R-O_20190529 Unripe ovary #24 RSC RG_ERWSF-RSC-03-R-O_20190530 Unripe ovary # 25 12 RG_STPD-RSC-08-R-O_20190530 RSC Unripe ovary #26 RG_STPD-RSC-09-R-O_20190530 RSC Unripe ovary #27 RSC #28 RG_STPD-RSC-10-R-O_20190530 Unripe ovary RSC RG STPD-RSC-11-R-O 20190531 Unripe ovary #29 RG_STPD-RSC-12-R-O_20190531 RSC Unripe ovary #30 RSC 17 RG_STPD-RSC-13-R-O_20190531 Unripe ovary #31 18 19 20 Sample(s) Released By: Noe1 Soognim Signature: ` Date Received: 06 JUN 2019 (PROJUCT #: 2019-062) 5-JUN-19 Date Sent: Sample(s) Returned to Client By: Shipping Conditions: Shipping Container: Signature: Date Sent:



Trich Analytics Inc.

Fish Ovary Tissue Microchemistry Analysis Report

Client:Date Received:19 Jun 2019James ElphickReport Date:21 Jun 2019Nautilus Environmental Inc.Project No.2019-062

8664 Commerce Court, Burnaby, BC

V8A 4N7

Ph: 250-216-8420

Email: james@nautilusenvironmental.com

Analytical Request: Fish Ovary Tissue Microchemistry (total metals and moisture) – 2 fish ovary tissue samples Sample IDs: RG_ER_RSC-01-R-O_20190613 and RG_ER_RSC-02-R-O_20190613

Includes: LA-ICP-MS (line scans), data integration and calculations, Excel data, QA-QC results, chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.01. Analytical results are expressed in part per million (ppm) dry weight. Samples quantified using DORM-4 certified reference standard.

This report provides the analytical results only for fish ovary tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

Date

21 Jun 2019

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Trich Analytics Inc.

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

Sample ID		RG_ER_RSC-01-R-	RG_ER_RSC-02-R-
sam	טו שונ	O_20190613	O_20190613
Wet We	eight (g)	0.2694	0.2173
Moist	ıre (%)	73.2	70.5
Parameter	DL (ppm)	(ppm)	(ppm)
7Li	0.005	0.044	0.019
23Na	1	4,339	4,215
24Mg	0.03	1,655	1,496
27Al	0.02	2.99	1.05
31P	48	14,467	14,643
39K	4	16,593	15,788
44Ca	10	2,200	1,381
51V	0.015	0.108	0.030
52Cr	0.09	1.62	1.69
55Mn	0.01	22.2	16.1
57Fe	0.7	153	140
59Co	0.007	0.144	0.093
60Ni	0.008	0.336	0.484
63Cu	0.006	6.49	5.57
66Zn	0.06	225	206
75As	0.262	<0.262	<0.262
77Se	0.2	24.4	16.8
88Sr	0.001	1.18	0.724
95Mo	0.002	0.251	0.175
111Cd	0.03	2.25	1.49
118Sn	0.007	0.160	0.050
202Hg	0.010	0.275	0.129
208Pb	0.001	0.099	0.007
238U	0.0001	0.012	0.001

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue QA/QC Relative Percent Difference Results

Sam	ple ID	RG_ER_RSC-01-R- O_20190613	RG_ER_RSC-01-R- O_20190613 (Duplicate)	RPD	RG_ER_RSC-02-R- O_20190613	RG_ER_RSC-02-R- O_20190613 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.005	0.044	0.051	14.1	0.019	0.020	7.1
23Na	1	4,339	4,613	6.1	4,215	4,119	2.3
24Mg	0.03	1,655	1,580	4.7	1,496	1,530	2.3
27Al	0.02	2.99	3.49	15.4	1.05	1.29	19.8
31P	48	14,467	14,305	1.1	14,643	14,320	2.2
39K	4	16,593	18,048	8.4	15,788	15,345	2.8
44Ca	10	2,200	2,129	3.3	1,381	1,404	1.7
51V	0.015	0.108	0.112	3.5	0.030	0.040	27.0
52Cr	0.09	1.62	1.69	4.1	1.69	1.81	6.8
55Mn	0.01	22.2	21.5	3.3	16.1	16.6	3.5
57Fe	0.7	153	146	4.5	140	134	3.9
59Co	0.007	0.144	0.145	0.6	0.093	0.103	10.4
60Ni	0.008	0.336	0.447	28.3	0.484	0.601	21.6
63Cu	0.006	6.49	6.39	1.5	5.57	5.64	1.2
66Zn	0.06	225	225	0.0	206	212	2.7
75As	0.262	<0.262	<0.262	-	<0.262	<0.262	-
77Se	0.2	24.4	24.3	0.2	16.8	17.6	4.9
88Sr	0.001	1.18	1.22	3.2	0.724	0.777	7.0
95Mo	0.002	0.251	0.253	1.1	0.175	0.184	5.3
111Cd	0.03	2.25	2.36	4.7	1.49	1.51	1.3
118Sn	0.007	0.160	0.166	3.6	0.050	0.064	24.7
202Hg	0.010	0.275	0.257	6.5	0.129	0.138	6.9
208Pb	0.001	0.099	0.126	23.4	0.007	0.014	50.0
238U	0.0001	0.0123	0.0167	30.5	0.0010	0.0012	22.2

Notes:

ppm = parts per million

RPD = Relative Percent Difference

Daramatar	DORM-4 Conc.	Actual Conc.	A	Precision RSD
Parameter	(ppm)	(ppm)	Accuracy (%)	(%)
7Li	1.21	1.44	119	2.4
23Na	14,000	17,113	122	1.0
24Mg	910	1082	119	3.3
27Al	1,280	1,625	127	8.3
31P	8,000	9,512	119	2.0
39K	15,500	17,597	114	1.5
44Ca	2,360	2,598	110	3.1
51V	1.57	1.88	120	5.1
52Cr	1.87	2.22	119	3.4
55Mn	3.17	3.90	123	6.7
57Fe	343	423	123	4.9
59Co	0.250	0.311	124	4.6
60Ni	1.34	1.63	122	4.7
63Cu	15.7	20.3	130	5.1
66Zn	51.6	59.9	116	5.3
75As	6.87	8.24	120	2.2
77Se	3.45	3.89	113	3.5
88Sr	10.1	11.3	112	5.4
95Mo	0.290	0.323	111	4.1
111Cd	0.299	0.392	131	6.2
118Sn	0.061	0.068	111	15
202Hg	0.412	0.482	117	4.8
208Pb	0.404	0.467	115	7.3
238U	0.050	0.051	102	14

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

207-1753 Sea	h A n a lytics Inc. In Heights, Saanichton, BC, VBM 0B3 In. (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis			
	Invoicing		Reporting (if different from Invoicing)		
Project Numbe	r: RSC Toxicity Supporting Study				
Company Name:	Nautilus Environmental	Company Name:			
Contact Name:	James Elphick	Contact Name:			
Address:	8664 Commerce Court	Address:			
City, Province:	Burnaby, BC	City, Province:			
Postal Code:	V5A 4N7	Postal Code:			
Phone:	1-250-216-8420	Phone:			
Email:	james@nautilusenvironmental.com	Email:	james@nautilusenvironmental.com, dsemeniuk@minnow.ca, sweech@minnow.ca,		
Ernan.		Sample Analysis Re	niget fisher@teck.com		
		Sample Analysis Ne	Sample Type:		
	Sample Identification:	Species	Sample type		
	1 RG_ER_RSC-01-R-O_20190613	RSC	Unripe ovary		
	RG_ER-RSC-02-R-O_20190613	RSC	Unripe ovary		
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Sample(s) Release	ed By: David Semeniuk		By: Crewin Los		
Signature: David Semeniuk		Signature: 6 4	PRIEME LABINE		
Date Sent:	18-Jun-19	Date Received:	20 JUN 2019 (PROSECT#: 2019-062)		
Sample(s) Returne		Shipping Condition	ns:		
NOTE: page 1 of 2	4	Shipping Containe	er:		
Signature:		Date Sent:			



Trich Analytics Inc.

Fish Ovary Tissue Microchemistry Analysis Report

Client:Date Received:14 Jun 2019James ElphickReport Date:17 Jun 2019Nautilus Environmental Inc.Project No.2019-062

8664 Commerce Court, Burnaby, BC

V8A 4N7

Ph: 250-216-8420

Email: james@nautilusenvironmental.com

Analytical Request: Fish Ovary Tissue Microchemistry (total metals and moisture) – 3 fish ovary tissue samples

Sample IDs: RG_STPD-RSC-14-R-O_20190604, RG_STPD-RSC-15-R-O_20190604, RG_STPD-RSC-16-R-O_20190604

Includes: LA-ICP-MS (line scans), data integration and calculations, Excel data, QA-QC results, chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.01. Analytical results are expressed in part per million (ppm) dry weight. Samples quantified using DORM-4 certified reference standard.

This report provides the analytical results only for fish ovary tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

Date

17 Jun 2019

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Trich Analytics Inc.

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

Sample ID		RG_STPD-RSC-14-R- O_20190604	RG_STPD-RSC-15-R- O_20190604	RG_STPD-RSC-16-R- O_20190604
Wet Weight (g)		0.0410	0.0168	0.0529
Moistu	ıre (%)	37.3	33.3	61.4
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)
7Li	0.004	0.152	0.121	0.080
23Na	2	3,126	3,252	4,154
24Mg	0.03	2,027	2,034	2,129
27Al	0.02	6.48	8.87	6.38
31P	81	16,462	16,393	16,753
39K	3	17,189	18,763	20,350
44Ca	12	1,545	1,763	1,549
51V	0.011	0.175	0.110	0.097
52Cr	0.22	2.11	2.29	2.03
55Mn	0.04	21.8	19.3	21.6
57Fe	0.90	115	120	158
59Co	0.013	0.262	0.225	0.192
60Ni	0.01	1.22	1.56	1.22
63Cu	0.01	6.97	5.81	6.25
66Zn	0.04	210	196	194
75As	0.111	0.207	0.169	<0.111
77Se	0.80	29.6	36.8	47.1
88Sr	0.0002	0.951	1.12	1.03
95Mo	0.002	0.294	0.264	0.262
111Cd	0.02	2.09	2.14	1.75
118Sn	0.004	0.222	0.053	0.097
202Hg	0.013	0.212	0.187	0.176
208Pb	0.0003	0.193	0.119	0.082
238U	0.00002	0.068	0.019	0.009

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue QA/QC Relative Percent Difference Results

Sam	ple ID	RG_STPD-RSC-14-R- O_20190604	RG_STPD-RSC-14-R- O_20190604 (Duplicate)	RPD	RG_STPD-RSC-15-R- O_20190604	RG_STPD-RSC-15-R- O_20190604 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.004	0.152	0.074	68.4	0.121	0.079	42.9
23Na	2	3,126	2,565	19.7	3,252	2,902	11.4
24Mg	0.03	2,027	1,779	13.0	2,034	1,808	11.7
27Al	0.02	6.48	3.66	55.6	8.87	4.93	57.2
31P	81	16,462	15,839	3.9	16,393	15,145	7.9
39K	3	17,189	15,083	13.1	18,763	17,302	8.1
44Ca	12	1,545	1,227	22.9	1,763	1,501	16.0
51V	0.011	0.175	0.092	61.6	0.110	0.065	51.5
52Cr	0.22	2.11	1.94	8.3	2.29	1.90	18.6
55Mn	0.04	21.8	18.1	19.0	19.3	17.6	9.5
57Fe	0.9	115	89.2	24.9	120	104	15.0
59Co	0.013	0.262	0.169	43.0	0.225	0.159	34.0
60Ni	0.010	1.22	1.19	2.1	1.56	0.961	47.4
63Cu	0.010	6.97	5.85	17.6	5.81	5.05	14.1
66Zn	0.04	210	196	7.0	196	174	11.9
75As	0.111	0.207	0.162	24.1	0.169	0.132	24.1
77Se	0.8	29.6	29.2	1.3	36.8	37.2	1.3
88Sr	0.0002	0.951	0.758	22.5	1.12	0.851	27.7
95Mo	0.002	0.294	0.201	37.2	0.264	0.216	20.2
111Cd	0.02	2.09	1.98	5.2	2.14	1.63	27.0
118Sn	0.004	0.222	0.128	53.4	0.053	0.032	50.4
202Hg	0.013	0.212	0.176	18.6	0.187	0.151	21.7
208Pb	0.0003	0.193	0.076	87.5	0.119	0.045	90.6
238U	0.00002	0.068	0.016	122.9	0.019	0.006	110.2

Notes:

ppm = parts per million

RPD = Relative Percent Difference

Sample ID		RG_STPD-RSC-16-R- O_20190604	RG_STPD-RSC-16-R- O_20190604 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)
7Li	0.004	0.080	0.080	0.5
23Na	2	4,154	3,726	10.9
24Mg	0.03	2,129	2,056	3.5
27Al	0.02	6.38	9.80	42.3
31P	81	16,753	15,465	8.0
39K	3	20,350	17,686	14.0
44Ca	12	1,549	1,496	3.5
51V	0.011	0.097	0.092	5.5
52Cr	0.22	2.03	2.00	1.6
55Mn	0.04	21.6	19.9	8.2
57Fe	0.9	158	155	2.0
59Co	0.013	0.192	0.166	14.5
60Ni	0.010	1.22	1.27	4.1
63Cu	0.010	6.25	6.05	3.2
66Zn	0.04	194	193	0.5
75As	0.111	< 0.111	< 0.111	-
77Se	0.8	47.1	45.2	4.1
88Sr	0.0002	1.03	0.984	4.3
95Mo	0.002	0.262	0.224	15.4
111Cd	0.02	1.75	1.72	1.7
118Sn	0.004	0.097	0.109	11.2
202Hg	0.013	0.176	0.156	11.7
208Pb	0.0003	0.082	0.095	14.8
238U	0.00002	0.009	0.006	40.0

ppm = parts per million

RPD = Relative Percent Difference

Davanaatar	DORM-4 Conc.	Actual Conc.	A	Precision RSD
Parameter	(ppm)	(ppm)	Accuracy (%)	(%)
7Li	1.21	1.37	113	2.1
23Na	14,000	16,011	114	4.3
24Mg	910	984	108	5.0
27Al	1,280	1,287	101	12.5
31P	8,000	7,996	100	3.5
39K	15,500	17,454	113	5.0
44Ca	2,360	2,940	125	3.4
51V	1.57	1.58	101	13.3
52Cr	1.87	2.02	108	4.8
55Mn	3.17	3.43	108	8.6
57Fe	343	385	112	5.6
59Co	0.250	0.257	103	12.0
60Ni	1.34	1.37	102	12.7
63Cu	15.7	19.1	122	3.1
66Zn	51.6	54.5	106	5.3
75As	6.87	6.60	96	4.0
77Se	3.45	2.60	75	9.6
88Sr	10.1	11.36	112	2.3
95Mo	0.290	0.297	102	9.0
111Cd	0.299	0.307	103	4.2
118Sn	0.061	0.054	89	19.9
202Hg	0.412	0.392	95	5.9
208Pb	0.404	0.435	108	14.5
238U	0.050	0.059	118	7.9

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Trich Analytics Inc. Chain of Custody (COC) 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 for LA-ICP-MS Analysis Ph: (250) 532-1084 Invoicing Reporting (if different from Invoicing) Project Number: RSC Toxicity Supporting Study Company Name: Nautilus Environmental Company Name: Contact Name: James Elphick Contact Name: Address: 8664 Commerce Court Address: City, Province: Burnaby, BC City, Province: Postal Code: V5A 4N7 Postal Code: 1-250-216-8420 Phone: Phone: james@nautilusenvironmental.com; dsemeniuk@minnow.ca; sweech@minnow.ca; Email: james@nautilusenvlronmental.com Email: nigel fisher@teck.com Sample Analysis Requested Sample Type: Sample Identification: Species Sample type RG_STPD-RSC-14-R-O_20190604 RSC Unripe ovary RG_STPD-RSC-15-R-O_20190604 RSC Unripe ovary RG_STPD-RSC-16-R-O_20190604 RSC Unripe ovary 10 11 12 13 14 15 16 17 18 19 20 Sample(s) Received By: Genene LaBine Sample(s) Released By: David Semeniuk David Semeniuk Signature: Signature: (Project #: 2019-062) 5-Jun-19 Date Received: 14 Jun 2019 Date Sent: Sample(s) Returned to Client By: Shipping Conditions: NOTE: page 1 of 2 Shipping Container: Date Sent: Signature:



Trich Analytics In

Fish Ovary Tissue Microchemistry Analysis Report

Client: Date Received: 04 Jul 2019 James Elphick Report Date: 26 Jul 2019 Project No. 2019-066 Nautilus Environmental Inc.

8664 Commerce Court, Burnaby, BC

V8A 4N7

Ph: 250-216-8420

Email: james@nautilusenvironmental.com

Analytical Request: Fish Ovary Tissue Microchemistry (total metals and moisture) – 12 fish ovary tissue samples See chain of custody form provided for sample identification numbers.

Includes: LA-ICP-MS (line scans), data integration and calculations, Excel data, QA-QC results, chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. method MET-002.02. Analytical results are expressed in part per million (ppm) dry weight. Samples quantified using DORM-4 certified reference standard.

This report provides the analytical results only for fish ovary tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

26 Jul 2019

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Trich Analytics Inc.

207-1753 Sean Heights Saanichton, BC V8M 0B3

www.trichanalytics.com

Nautilus Environmental Inc. - Fish Ovary Tissue Analysis

Sample ID		RG_ER_RSC-03-R- O_20190621	RG_ER_RSC-04-R- O_20190622	RG_ER_RSC-05-R- O_20190622	RG_ER_RSC-06-R- O_20190624
Wet We	eight (g)	0.0527	0.0447	0.1024	0.1014
Moistu	ıre (%)	63.0	66.4	70.2	65.4
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.043	0.048	0.315	0.073
23Na	0.312	2,800	3,312	6,096	4,309
24Mg	0.020	1,868	1,830	2,400	1,693
27Al	0.019	3.44	4.90	16.2	3.84
31P	63.5	17,299	15,225	19,596	16,767
39K	3.35	15,354	16,879	22,131	13,052
44Ca	6.79	1,001	1,327	2,555	1,252
51V	0.011	0.083	0.146	0.466	0.132
52Cr	0.020	2.05	2.16	3.40	2.41
55Mn	0.002	22.6	23.2	39.3	16.8
57Fe	0.272	155	142	372	155
59Co	0.005	0.145	0.180	0.518	0.153
60Ni	0.010	1.16	1.29	2.74	1.15
63Cu	0.005	5.99	6.02	8.25	6.04
66Zn	0.048	293	231	321	197
75As	0.130	0.162	0.205	0.557	0.329
77Se	1.53	30.3	27.8	38.9	18.7
88Sr	0.0002	0.841	0.785	2.46	1.04
95Mo	0.002	0.129	0.120	0.407	0.123
111Cd	0.057	1.78	1.54	7.87	1.25
118Sn	0.003	0.055	0.129	0.348	0.213
202Hg	0.008	0.211	0.176	0.280	0.129
208Pb	0.0004	0.057	0.090	0.425	0.107
238U	0.0001	0.005	0.013	0.154	0.015

Notes:

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue Analysis

Sample ID		RG_ER_RSC-07-R- O_20190624	RG_ER_RSC-08-R- O_20190624	RG_ER_RSC-09-R- O_20190624	RG_ER_RSC-10-R- O_20190624
Wet Weight (g)		0.0116	0.0804	0.0588	0.0671
Moistu	ıre (%)	35.3	72.1	67.3	70.0
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.043	0.023	0.081	0.304
23Na	0.312	2,598	2,998	5,537	5,407
24Mg	0.020	1,078	1,612	2,254	2,339
27Al	0.019	5.06	0.955	4.27	14.8
31P	63.5	12,814	16,664	20,489	22,019
39K	3.35	7,661	19,073	21,450	21,140
44Ca	6.79	606	910	2,125	2,052
51V	0.011	0.135	0.053	0.111	0.375
52Cr	0.020	1.48	1.74	1.89	3.16
55Mn	0.002	7.61	11.2	24.7	34.9
57Fe	0.272	60.5	147	245	194
59Co	0.005	0.121	0.112	0.209	0.453
60Ni	0.010	0.521	0.841	0.802	1.85
63Cu	0.005	3.74	4.95	8.16	8.65
66Zn	0.048	85.4	239	426	332
75As	0.130	0.525	<0.130	0.748	0.714
77Se	1.53	5.92	40.4	35.2	27.3
88Sr	0.0002	0.685	0.679	2.10	2.08
95Mo	0.002	0.091	0.139	0.213	0.379
111Cd	0.057	0.640	1.25	2.57	7.85
118Sn	0.003	0.104	0.054	0.484	0.412
202Hg	0.008	0.072	0.143	0.279	0.264
208Pb	0.0004	0.071	0.014	0.105	0.376
238U	0.0001	0.005	0.001	0.014	0.130

Notes:

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue Analysis

Sample ID		RG_ER_RSC-11-R- O_20190624	RG_ER_RSC-12-R- O_20190624	RG_ER_RSC-13-R- O_20190624	RG_ER_RSC-14-R- O_20190624
Wet Weight (g)		0.1098	0.1178	0.0690	0.2637
Moistu	ıre (%)	68.8	72.9	68.6	74.0
Parameter	DL (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.038	0.029	0.020	0.155
23Na	0.312	3,228	2,402	3,444	4,318
24Mg	0.020	1,829	1,979	1,573	2,040
27Al	0.019	1.76	1.69	0.982	7.83
31P	63.5	15,762	14,519	15,706	18,196
39K	3.35	14,520	13,980	15,852	17,549
44Ca	6.79	1,051	1,465	963	1,846
51V	0.011	0.058	0.064	0.024	0.227
52Cr	0.020	1.48	1.46	1.28	2.13
55Mn	0.002	25.6	25.2	16.7	19.5
57Fe	0.272	118	149	154	205
59Co	0.005	0.136	0.102	0.095	0.241
60Ni	0.010	0.390	0.438	0.267	1.08
63Cu	0.005	5.87	5.44	4.04	6.45
66Zn	0.048	189	253	259	316
75As	0.130	0.286	0.133	0.241	0.722
77Se	1.53	19.6	41.3	25.8	22.7
88Sr	0.0002	0.752	0.793	0.753	1.28
95Mo	0.002	0.139	0.160	0.116	0.256
111Cd	0.057	1.08	1.50	1.34	3.52
118Sn	0.003	0.206	0.111	0.099	0.703
202Hg	0.008	0.149	0.164	0.167	0.234
208Pb	0.0004	0.042	0.041	0.008	0.250
238U	0.0001	0.004	0.007	0.0004	0.066

Notes:

ppm = parts per million

DL = detection limit

g = grams

Nautilus Environmental Inc. - Fish Ovary Tissue QA/QC Relative Percent Difference Results

Sam	ple ID	RG_ER_RSC-03-R- O_20190621	RG_ER_RSC-03-R- O_20190621 (Duplicate)	RPD	RG_ER_RSC-07-R- O_20190624	RG_ER_RSC-07-R- O_20190624 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.006	0.043	0.090	-	0.043	0.037	-
23Na	0.312	2,800	2,932	4.6	2,598	2,682	3.2
24Mg	0.020	1,868	1,852	0.9	1,078	1,192	10.0
27Al	0.019	3.44	3.82	10.5	5.06	4.91	2.9
31P	63.5	17,299	17,112	1.1	12,814	13,537	5.5
39K	3.35	15,354	15,165	1.2	7,661	8,556	11.0
44Ca	6.79	1,001	1,160	14.7	606	525	14.4
51V	0.011	0.083	0.150	-	0.135	0.062	-
52Cr	0.020	2.05	2.67	26.2	1.48	1.44	2.8
55Mn	0.002	22.6	23.8	5.3	7.6	8.1	6.0
57Fe	0.272	155	164	5.4	60.5	68.5	12.4
59Co	0.005	0.145	0.207	35.0	0.121	0.104	15.5
60Ni	0.010	1.16	1.78	42.0	0.521	0.500	4.2
63Cu	0.005	5.99	6.20	3.4	3.74	4.09	9.1
66Zn	0.048	293	303	3.5	85.4	92.6	8.0
75As	0.130	0.162	0.325	-	0.525	0.477	-
77Se	1.53	30.3	29.3	-	5.92	6.48	-
88Sr	0.0002	0.841	1.01	18.1	0.685	0.574	17.7
95Mo	0.002	0.129	0.181	33.3	0.091	0.076	18.1
111Cd	0.057	1.78	1.59	11.2	0.640	0.464	-
118Sn	0.003	0.055	0.104	-	0.104	0.096	7.5
202Hg	0.008	0.211	0.219	3.7	0.072	0.064	-
208Pb	0.0004	0.057	0.062	7.8	0.071	0.063	11.5
238U	0.0001	0.005	0.007	38.3	0.005	0.004	22

Notes:

ppm = parts per million

RPD = Relative Percent Difference

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD \leq 40% for all elements (as per BC MOE, *British Columbia Environmental Laboratory Manual*, 2015 Edition, February 2016) Only applies to QC samples at concentrations above 20X Detection Limit

Sam	ple ID	RG_ER_RSC-14-R- O_20190624	RG_ER_RSC-14-R- O_20190624 (Duplicate)	RPD
Parameter	DL (ppm)	(ppm)	(ppm)	(%)
7Li	0.006	0.155	0.181	15.3
23Na	0.312	4,318	4,532	4.8
24Mg	0.020	2,040	2,095	2.7
27Al	0.019	7.83	8.13	3.8
31P	63.5	18,196	18,630	2.4
39K	3.35	17,549	17,882	1.9
44Ca	6.79	1,846	2,273	20.7
51V	0.011	0.227	0.284	22.4
52Cr	0.020	2.13	2.81	27.7
55Mn	0.002	19.5	21.6	10.4
57Fe	0.272	205	216	5.4
59Co	0.005	0.241	0.350	36.8
60Ni	0.010	1.08	1.45	29.4
63Cu	0.005	6.45	7.20	11.1
66Zn	0.048	316	345	8.8
75As	0.130	0.722	0.834	-
77Se	1.53	22.7	23.1	-
88Sr	0.0002	1.28	1.70	28.1
95Mo	0.002	0.256	0.341	28.6
111Cd	0.057	3.52	3.81	8.0
118Sn	0.003	0.703	0.855	19.5
202Hg	0.008	0.234	0.240	2.4
208Pb	0.0004	0.250	0.361	36.3
238U	0.0001	0.066	0.052	23.0

ppm = parts per million

RPD = Relative Percent Difference

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD \leq 40% for all elements (as per BC MOE, *British Columbia Environmental Laboratory Manual*, 2015 Edition, February 2016) Only applies to QC samples at concentrations above 20X Detection Limit

Parameter	Detection Limit (ppm)	Certified Value DORM-4 Conc. (ppm)	Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.30	108	2.2
23Na	0.312	14,000	15,639	112	4.2
24Mg	0.020	910	1,004	110	12.0
27AI	0.019	1,280	1,534	120	0.8
31P	63.5	8,000	9,302	116	3.5
39K	3.35	15,500	17,108	110	1.3
44Ca	6.79	2,360	2,718	115	4.8
51V	0.011	1.57	1.83	116	3.1
52Cr	0.020	1.87	2.11	113	7.9
55Mn	0.002	3.17	3.57	113	8.1
57Fe	0.272	343	386	112	4.9
59Co	0.005	0.25	0.275	110	5.4
60Ni	0.010	1.34	1.50	112	10.2
63Cu	0.005	15.7	18.5	118	0.6
66Zn	0.048	51.6	58.2	113	1.0
75As	0.130	6.87	7.81	114	2.9
77Se	1.53	3.45	3.85	112	1.5
88Sr	0.0002	10.1	11.7	116	3.5
95Mo	0.002	0.29	0.328	113	3.0
111Cd	0.057	0.299	0.374	125	2.1
118Sn	0.003	0.061	0.057	93	23.8
202Hg	0.008	0.412	0.488	118	2.8
208Pb	0.0004	0.404	0.365	90	1.5
238U	0.0001	0.050	0.058	116	0.0

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: 70 - 130% of the certified values for the method (as per BC MOE, *British Columbia Environmental Laboratory Manual*, 2015 Edition, February 2016)

BC laboratory standards for RSD (precision) of reference material are not available; therefore a DQO \leq 20% was established for all elements

207-1753 Se	h A n a l y t i c s I n c. van Heights, Saanichton, BC, V8M 0B3 vh: (250) 532-1084		Cha for	ain of Custody (COC) LA-ICP-MS Analysis			
	Invoicing		Repo	(if different from Invoicing)			
Project Numbe	er: RSC Toxicity Supporting Study						
Company Name:	Nautilus Environmental	Company Name:					
Contact Name:	James Elphick	Contact Name:					
Address:	8664 Commerce Court	Address:					
City, Province:	Burnaby, BC	City, Province:	-				
Postal Code:	V5A 4N7	Postal Code:	-				
Phone:	1-250-216-8420	Phone:	-				
Email:	james@nautilusenvironmental.com	Email:	0.00	senvironmental.com; dsemeniuk@minnow.ca; sweech@minnow.ca;			
		Sample Ana	.ted	ck.com			
	Sample Identification:		1	Sample Type:			
	T	Sr		Sample type			
	1 RG_ER_RSC-03-R-O_20190621	RSC	Inripe ovary				
	2 RG_ER-RSC-04-R-O_20190622	RSC	Unripe ovary				
	3 RG_ER-RSC-05-R-O_20190622	RSC .	Unripe ovary				
	4 RG_ER-RSC-06-R-O_20190624	RSC	Unripe ovary				
100000	5 RG_ER-RSC-07-R-O_20190624	RSC	Unripe ovary				
	6 RG_ER-RSC-08-R-O_20190624	RSC	Unripe ovary				
	7 RG ER-RSC-09-R-O 20190624	RSC	Unripe ovary				
	8 RG_ER-RSC-10-R-O_20190624	RSC	Unripe ovary				
	9 RG_ER-RSC-11-R-O_20190624	RSC	Unripe ovary				
1	10 RG_ER-RSC-12-R-O_20190624	RSC	Unripe ovary				
1	11 RG_ER-RSC-13-R-O_20190624	RSC	Unripe ovary				
1	2 RG_ER-RSC-14-R-O_20190624	RSC	Unripe ovary				
1	13						
1	14	0.00					
1	15						
1	1.6						
1	17						
1	.8			- Andrew III			
1	9						
2	20						
Sample(s) Releas	ed By: David Semeniuk	Sample(s) Receive	ed By: GE	PIENE LABIME			
Signature:	David Semeniuk	Signature:	win	12			
Date Sent:	2-Jul-19	Date Received:	04 Jul	2019. (Project +: 2019-066)			
Sample(s) Return		Shipping Conditions:					
NOTE: page 1 of	2	Shipping Container:					
Signature:		Date Sent:					

TrichAnalytics Ripe Egg Analysis



Trich Analytics Inc.

Fish Tissue Microchemistry Analysis Report

Client:

Cait Good

Lead, Regional Water Monitoring

Teck Coal Limited Phone: 250.425.8202

Email: Cait.Good@teck.com

Date Received: 21 May 2020
Final Report Date: 27 May 2020
Report Revision Date: 06 Jul 2020
Project No. 2020-113
Revision No. Rev. 1

Analytical Request: Fish Egg Tissue Microchemistry (total metals and moisture) – 60 samples. See chain of custody form provided for sample identification numbers.

Includes: LA-ICP-MS (line scans), data integration and calculations, QA/QC results, Excel data, and chain of custody form.

Notes:

Samples prepared and analyzed using TrichAnalytics Inc. CALA accredited analytical method MET-002.04.

Four point analytical balance used to measure sample weights. Accuracy +/- 0.1 mg.

Analytical results are expressed in part per million (ppm) dry weight.

Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.

Client specific DQO for Selenium accuracy is 90 - 110% of the certified values; (average achieved 105%; range 93 - 110%).

Individual standard concentrations provided to determine accuracy, as requested.

Client requested on 06 Jul 2020 that RPD values be compared with British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio

06 Jul 2020

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207-1753 Sean Heights Saanichton, BC V8M 0B3

www.trichanalytics.com

Fish Tissue Analysis COM-013.02

C	Client Sample ID		STPD-01	STPD-02	STPD-03	STPD-04	STPD-05	STPD-06	STPD-07	STPD-08	STPD-09	STPD-10
Lab	oratory Samp	le ID	001	002	003	004	005	006	007	008	009	010
W	/et Weight (m	ıg)	57.3	207.3	110.3	82.7	92.6	126.1	2.6	49.6	89.4	38.0
D	ry Weight (m	g)	36.2	89.8	55.3	33.8	42.4	53.3	1.7	30.6	40.5	21.0
	Moisture (%)		36.8	56.7	49.9	59.1	54.2	57.7	34.6	38.3	54.7	44.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.027	0.023	0.032	0.041	0.041	0.032	0.035	0.023	0.023	0.025
11B	0.096	0.320	0.106	0.112	<0.096	0.129	0.100	<0.096	<0.096	< 0.096	<0.096	<0.096
23Na	3.1	10	2,983	2,845	2,420	2,830	3,151	2,852	1,776	2,071	2,089	1,820
24Mg	0.069	0.230	840	779	791	905	981	780	737	774	708	602
27Al	0.060	0.200	4.2	2.4	2.4	5.8	2.7	1.3	0.194	0.507	1.6	1.4
31P	52	173	12,696	12,864	12,763	13,926	13,675	12,493	10,552	12,048	11,309	11,241
39K	0.992	3.3	8,505	9,399	9,667	10,339	10,922	9,514	7,694	8,068	6,849	7,571
44Ca	10	33	440	385	333	387	451	347	245	241	226	248
49Ti	0.158	0.527	1.1	0.738	0.922	1.4	0.968	0.738	0.553	0.692	0.553	0.830
51V	0.030	0.100	0.064	0.035	< 0.030	0.056	0.046	< 0.030	<0.030	< 0.030	< 0.030	< 0.030
52Cr	0.099	0.330	3.2	1.9	1.9	2.9	2.2	1.5	1.1	1.3	1.4	1.4
55Mn	0.013	0.043	4.4	5.5	3.2	4.1	7.9	4.1	4.4	3.4	3.5	3.4
57Fe	0.793	2.6	59	58	41	67	51	34	37	34	36	34
59Co	0.003	0.010	0.146	0.080	0.081	0.121	0.077	0.080	0.036	0.044	0.055	0.032
60Ni	0.013	0.043	1.9	1.2	0.917	3.1	1.2	0.401	< 0.013	0.106	0.229	0.368
63Cu	0.005	0.017	5.7	4.9	5.2	4.9	4.5	4.8	2.5	4.2	3.9	4.4
66Zn	0.232	0.773	78	72	67	90	90	74	60	66	67	67
75As	0.420	1.4	< 0.420	< 0.420	< 0.420	<0.420	< 0.420	<0.420	<0.420	< 0.420	< 0.420	<0.420
77Se	0.320	1.1	22	22	21	26	24	19	19	22	21	20
88Sr	0.001	0.003	0.410	0.319	0.315	0.329	0.348	0.294	0.240	0.271	0.244	0.204
95Mo	0.001	0.003	0.062	0.055	0.048	0.062	0.066	0.041	0.048	0.035	0.041	0.041
107Ag	0.001	0.003	0.052	0.039	0.041	0.069	0.057	0.038	0.028	0.057	0.031	0.044
111Cd	0.043	0.143	< 0.043	< 0.043	< 0.043	<0.043	< 0.043	< 0.043	< 0.043	< 0.043	< 0.043	< 0.043
118Sn	0.011	0.037	0.223	0.198	0.091	0.270	0.330	0.198	0.035	0.177	0.163	0.176
121Sb	0.001	0.003	0.005	0.003	0.003	0.003	0.003	0.003	< 0.001	0.001	0.003	0.003
137Ba	0.001	0.003	0.727	0.799	1.0	0.981	0.872	0.927	0.709	0.745	0.727	0.345
202Hg	0.033	0.110	< 0.033	< 0.033	<0.033	< 0.033	< 0.033	< 0.033	<0.033	0.057	0.063	< 0.033
205Tl	0.001	0.003	0.011	0.009	0.011	0.005	0.005	0.004	0.005	0.005	0.006	0.005
208Pb	0.001	0.003	0.009	0.004	0.004	0.012	0.004	0.003	0.001	0.003	0.001	0.003
238U	0.001	0.003	0.002	0.001	< 0.001	0.002	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

C	lient Sample I	D	STPD-11	STPD-12	STPD-13	STPD-14	STPD-15	STPD-16	ERIMF-4	ERIMF-5	ERIMF-6	ERIMF-7
Lab	oratory Samp	e ID	011	012	013	014	015	016	017	018	019	020
W	/et Weight (m	g)	29.9	31.3	26.1	209.9	73.5	72.7	81.6	85.3	43.4	154.3
D	ry Weight (m	g)	19.1	18.8	10.5	89.0	32.5	25.7	47.8	41.3	25.1	66.5
	Moisture (%)		36.1	39.9	59.8	57.6	55.8	64.6	41.4	51.6	42.2	56.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.041	0.039	0.062	0.044	0.055	0.039	0.018	0.025	0.022	0.016
11B	0.096	0.320	<0.096	<0.096	<0.096	<0.096	<0.096	<0.096	<0.096	<0.096	0.145	<0.096
23Na	3.1	10.3	2,892	2,873	3,165	2041	2,917	2,515	2,675	2,691	2,973	2,650
24Mg	0.069	0.230	932	692	802	748	880	766	724	703	1,021	901
27AI	0.060	0.2	6.6	2.8	5.4	1.2	3.1	1.4	0.989	1.5	4.1	1.9
31P	52	173	13,783	12,611	13,040	12154	12,552	11,348	10,739	11,763	13,252	13,080
39K	0.992	3.3	10,234	8,627	9,031	7635	8,980	7,562	9,415	8,932	9,702	8,823
44Ca	10	33	423	398	411	285	397	274	484	357	455	447
49Ti	0.158	0.5	1.3	0.922	1.1	0.738	0.922	0.738	0.646	0.922	1.2	0.952
51V	0.030	0.100	0.061	0.042	0.071	< 0.030	0.042	< 0.030	<0.030	0.035	0.053	0.035
52Cr	0.099	0.330	2.7	2.2	3.4	1.5	2.0	1.5	1.4	1.6	2.2	1.7
55Mn	0.013	0.043	3.8	4.4	3.8	3.7	4.8	4.4	6.3	4.7	7.5	6.2
57Fe	0.793	2.6	69	40	69	30	41	33	38	29	38	36
59Co	0.003	0.010	0.116	0.058	0.164	0.048	0.072	0.048	0.061	0.069	0.062	0.086
60Ni	0.013	0.043	1.9	1.2	3.4	0.409	0.925	0.425	0.417	0.597	1.3	0.454
63Cu	0.005	0.017	5.4	4.6	3.9	5.1	4.3	4.2	2.6	5.5	1.8	3.3
66Zn	0.232	0.773	89	74	79	93	73	55	80	92	121	107
75As	0.420	1.4	< 0.420	< 0.420	< 0.420	<0.420	<0.420	<0.420	<0.420	< 0.420	< 0.420	<0.420
77Se	0.320	1.1	28	23	23	19	19	22	3.5	4.1	2.5	3.4
88Sr	0.001	0.003	0.342	0.423	0.396	0.258	0.562	0.374	0.295	0.264	0.369	0.328
95Mo	0.001	0.003	0.069	0.062	0.055	0.048	0.069	0.048	0.083	0.062	0.074	0.052
107Ag	0.001	0.003	0.047	0.044	0.037	0.031	0.030	0.031	0.013	0.037	0.006	0.018
111Cd	0.043	0.143	<0.043	< 0.043	<0.043	<0.043	<0.043	<0.043	<0.043	0.052	0.047	<0.043
118Sn	0.011	0.037	0.380	0.149	0.378	0.311	0.347	0.254	0.171	0.248	0.324	0.353
121Sb	0.001	0.003	0.003	0.003	0.005	0.003	0.003	0.003	0.003	0.003	0.003	0.003
137Ba	0.001	0.003	1.2	1.0	0.999	1.1	1.5	0.909	1.4	1.5	3.1	1.9
202Hg	0.033	0.110	< 0.033	< 0.033	< 0.033	< 0.033	0.061	< 0.033	<0.033	0.146	< 0.033	0.041
205TI	0.001	0.003	0.006	0.005	0.005	0.008	0.009	0.005	0.005	0.004	0.004	0.004
208Pb	0.001	0.003	0.005	0.004	0.007	0.005	0.012	0.004	0.003	0.005	0.011	0.005
238U	0.001	0.003	0.002	0.001	0.001	< 0.001	0.001	0.001	0.003	0.001	0.003	0.004

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

C	lient Sample	ID	ERIMF-8	ERIMF-9	ERIMF-10	ERIMF-11	ERIMF-12	ERIMF-13	ERIMF-14	ERIMF-15	ERIMF-16	LNLK-11
Lab	oratory Samp	le ID	021	022	023	024	025	026	027	028	029	030
W	/et Weight (m	ıg)	85.5	75.2	102.5	79.5	95.2	42.6	123.4	153.3	103.4	71.7
D	ry Weight (m	g)	39.2	35.5	42.6	40.1	38.6	20.3	49.7	57.2	47.4	32.8
	Moisture (%)		54.2	52.8	58.4	49.6	59.5	52.3	59.7	62.7	54.2	54.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.018	0.018	0.014	0.011	0.025	0.016	0.021	0.011	0.018	0.014
11B	0.096	0.320	0.102	0.116	<0.096	0.116	< 0.096	0.109	<0.096	< 0.096	0.102	<0.096
23Na	3.1	10.3	2,278	2,590	2,637	2,432	2,951	1,918	2,668	2,789	3,098	4,504
24Mg	0.069	0.230	946	1,102	969	955	1,091	1,043	1,101	928	1,058	922
27Al	0.060	0.2	2.4	2.0	2.0	1.5	1.7	3.7	3.6	1.5	1.5	1.5
31P	52	173	13,600	13,067	12,641	13,106	13,184	13,585	12,304	12,351	13,489	13,792
39K	0.992	3.3	9,150	9,426	9,867	9,733	10,494	10,707	10,123	8,940	10,657	9,017
44Ca	10	33	407	446	420	394	525	374	510	422	496	489
49Ti	0.158	0.5	1.3	1.1	1.3	0.952	1.3	1.2	1.3	0.952	0.952	0.657
51V	0.030	0.100	0.039	0.042	0.046	0.042	0.042	0.053	0.055	0.039	0.047	0.043
52Cr	0.099	0.330	1.8	1.9	2.0	1.8	2.1	2.5	2.5	1.5	1.9	1.7
55Mn	0.013	0.043	5.7	6.0	8.3	5.7	9.9	4.5	9.3	6.6	5.4	6.5
57Fe	0.793	2.6	40	41	41	30	61	62	57	38	54	48
59Co	0.003	0.010	0.103	0.051	0.064	0.074	0.065	0.102	0.168	0.061	0.062	0.048
60Ni	0.013	0.043	0.737	1.0	0.890	0.674	1.3	1.9	2.0	0.395	0.863	0.458
63Cu	0.005	0.017	5.1	2.0	2.5	1.9	3.8	5.3	3.8	6.1	5.5	4.6
66Zn	0.232	0.773	112	98	117	109	125	120	135	130	123	98
75As	0.420	1.4	< 0.420	< 0.420	<0.420	< 0.420	< 0.420	<0.420	<0.420	< 0.420	< 0.420	<0.420
77Se	0.320	1.1	5.8	5.0	5.0	5.9	3.6	4.5	11	3.2	4.2	0.711
88Sr	0.001	0.003	0.290	0.260	0.273	0.229	0.433	0.325	0.362	0.274	0.395	0.353
95Mo	0.001	0.003	0.067	0.082	0.082	0.067	0.097	0.074	0.097	0.082	0.082	0.078
107Ag	0.001	0.003	0.033	0.013	0.015	0.013	0.011	0.041	0.053	0.034	0.037	0.032
111Cd	0.043	0.143	<0.043	0.047	<0.043	<0.043	0.058	<0.043	<0.043	< 0.043	< 0.043	<0.043
118Sn	0.011	0.037	0.409	0.512	0.239	0.258	0.268	0.405	0.330	0.356	0.324	0.227
121Sb	0.001	0.003	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.003	< 0.001	0.004
137Ba	0.001	0.003	1.7	1.9	2.5	1.5	2.7	3.2	2.8	2.4	1.9	3.6
202Hg	0.033	0.110	0.039	< 0.033	0.035	<0.033	< 0.033	< 0.033	0.050	0.247	< 0.033	0.038
205TI	0.001	0.003	0.005	0.003	0.004	0.006	0.009	0.001	0.003	0.004	0.003	< 0.001
208Pb	0.001	0.003	0.004	0.009	0.004	0.003	0.003	0.004	0.007	0.003	0.003	0.004
238U	0.001	0.003	0.002	0.005	0.007	0.003	0.005	< 0.001	0.001	0.003	0.001	< 0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

C	Client Sample	ID	LNLK-12	LNLK-13	LNLK-14	LNLK-15	LNLK-16	LNLK-17	LNLK-18	LNLK-19	LNLK-20	ERWSF-1
Lab	oratory Samp	le ID	031	032	033	034	035	036	037	038	039	040
٧	/et Weight (m	ıg)	74.3	117.5	147.3	162.5	307.5	135.0	164.1	221.4	200.0	18.6
	ry Weight (m	g)	35.9	55.3	65.7	62.9	125.3	56.5	72.3	93.1	86.5	10.7
	Moisture (%)		51.7	52.9	55.4	61.3	59.3	58.1	55.9	57.9	56.8	42.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.009	0.014	0.014	0.011	0.009	0.009	0.008	0.014	0.010	<0.005
11B	0.096	0.320	<0.096	< 0.096	<0.096	0.107	<0.096	<0.096	<0.096	< 0.096	< 0.096	<0.096
23Na	3.1	10.3	2,220	2,558	2,621	2,932	2,544	2,171	1,659	2,104	2,508	1,970
24Mg	0.069	0.230	772	761	541	784	697	868	688	665	643	733
27Al	0.060	0.2	0.823	1.7	1.1	1.5	0.617	1.1	0.454	0.698	0.531	2.1
31P	52	173	12,826	12,809	11,839	11,982	11,058	11,906	11,399	11,631	12,211	11,038
39K	0.992	3.3	7,953	8,833	7,734	7,488	7,209	7,508	7,202	8,073	8,393	7,615
44Ca	10	33	343	413	364	469	335	420	280	308	321	268
49Ti	0.158	0.5	0.751	0.845	0.845	0.939	0.657	0.939	0.657	0.751	0.657	0.657
51V	0.030	0.100	<0.030	0.036	0.039	0.038	< 0.030	< 0.030	<0.030	0.031	< 0.030	<0.030
52Cr	0.099	0.330	1.5	1.7	1.6	1.7	1.3	1.5	1.2	1.5	1.4	1.6
55Mn	0.013	0.043	6.5	5.3	6.9	4.9	5.5	7.3	5.2	5.0	4.4	2.7
57Fe	0.793	2.6	31	40	35	37	33	43	27	28	36	24
59Co	0.003	0.010	0.050	0.062	0.049	0.065	0.036	0.048	0.030	0.061	0.041	0.036
60Ni	0.013	0.043	0.172	0.621	0.343	0.421	0.098	0.360	0.082	0.323	0.172	0.319
63Cu	0.005	0.017	4.1	5.1	3.9	4.5	4.6	4.5	3.7	3.9	4.0	5.2
66Zn	0.232	0.773	93	91	87	81	76	96	80	81	71	86
75As	0.420	1.4	< 0.420	< 0.420	< 0.420	<0.420	< 0.420	<0.420	<0.420	< 0.420	< 0.420	< 0.420
77Se	0.320	1.1	0.846	1.1	1.0	1.1	0.904	1.1	1.0	1.2	1.1	6.9
88Sr	0.001	0.003	0.273	0.259	0.231	0.268	0.183	0.269	0.171	0.218	0.203	0.147
95Mo	0.001	0.003	0.057	0.057	0.057	0.071	0.057	0.078	0.050	0.042	0.071	0.050
107Ag	0.001	0.003	0.026	0.011	0.014	0.009	0.016	0.032	0.039	0.044	0.021	0.063
111Cd	0.043	0.143	< 0.043	< 0.043	< 0.043	<0.043	<0.043	0.043	<0.043	0.043	< 0.043	< 0.043
118Sn	0.011	0.037	0.431	0.230	0.457	0.375	0.161	0.200	0.294	0.215	0.340	0.081
121Sb	0.001	0.003	0.003	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001	0.003	0.003
137Ba	0.001	0.003	3.6	2.5	2.1	1.5	2.1	5.5	2.6	2.8	2.1	0.396
202Hg	0.033	0.110	<0.033	< 0.033	< 0.033	<0.033	< 0.033	0.046	0.431	< 0.033	< 0.033	<0.033
205TI	0.001	0.003	0.001	0.002	< 0.001	0.001	0.001	< 0.001	< 0.001	0.002	0.001	0.002
208Pb	0.001	0.003	0.007	0.003	0.003	0.004	0.003	0.003	0.001	0.003	0.001	0.005
238U	0.001	0.003	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

C	Client Sample I	D	ERWSF-2	ERWSF-3	ER-01	ER-02	ER-03	ER-04	ER-05	ER-05-Dup	ER-06	ER-07
Lab	oratory Samp	le ID	041	042	043	044	045	046	047	048	049	050
W	/et Weight (m	g)	39.5	9.5	94.5	184.4	231.6	39.6	264.7	260.1	40.8	106.3
D	ry Weight (m	g)	19.1	5.7	51.4	97.9	94.8	25.0	117.2	118.5	30.5	53.7
	Moisture (%)		51.6	40.0	45.6	46.9	59.1	36.9	55.7	54.4	25.2	49.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.011	0.006	0.023	0.009	0.016	0.015	0.016	0.015	0.014	0.014
11B	0.096	0.320	0.125	0.179	<0.096	<0.096	<0.096	<0.096	<0.096	< 0.096	0.114	<0.096
23Na	3.1	10.3	2,645	2,168	2,332	1,688	2,265	2,245	2,386	2,797	2,438	2,101
24Mg	0.069	0.230	976	663	636	605	698	716	785	763	893	912
27AI	0.060	0.2	2.8	2.1	1.1	0.424	0.398	0.505	0.874	0.773	1.3	1.1
31P	52	173	13,599	10,077	10,826	10,042	11,471	11,154	11,944	12,835	14,288	13,282
39K	0.992	3.3	8,944	7,684	7,763	6,313	7,187	8,130	7,502	9,252	9,874	8,367
44Ca	10	33	354	312	468	303	321	324	457	401	325	300
49Ti	0.158	0.5	0.892	0.845	0.657	0.469	0.563	0.751	0.657	0.723	1.0	0.890
51V	0.030	0.100	0.048	< 0.030	0.033	<0.030	< 0.030	< 0.030	< 0.030	< 0.030	0.044	< 0.030
52Cr	0.099	0.330	2.2	1.3	1.6	1.1	1.2	1.3	1.4	1.3	1.9	1.5
55Mn	0.013	0.043	5.1	3.9	4.5	2.6	4.1	4.2	7.9	8.3	5.8	5.8
57Fe	0.793	2.6	87	36	37	33	30	30	38	43	55	46
59Co	0.003	0.010	0.085	0.036	0.056	0.032	0.029	0.037	0.044	0.058	0.075	0.068
60Ni	0.013	0.043	0.928	0.172	0.601	0.041	0.041	0.131	0.155	0.153	0.700	0.233
63Cu	0.005	0.017	4.6	2.4	3.7	3.4	3.4	4.4	4.1	4.3	4.4	3.6
66Zn	0.232	0.773	100	62	82	83	80	79	77	82	101	113
75As	0.420	1.4	< 0.420	< 0.420	< 0.420	<0.420	< 0.420	<0.420	< 0.420	< 0.420	< 0.420	0.451
77Se	0.320	1.1	5.8	5.1	7.0	5.6	7.9	8.9	6.9	6.8	8.9	6.7
88Sr	0.001	0.003	0.200	0.140	0.296	0.230	0.248	0.210	0.244	0.209	0.275	0.242
95Mo	0.001	0.003	0.106	0.042	0.057	0.042	0.021	0.021	0.064	0.057	0.043	0.057
107Ag	0.001	0.003	0.053	0.044	0.028	0.012	0.012	0.023	0.016	0.017	0.024	0.021
111Cd	0.043	0.143	0.043	< 0.043	< 0.043	<0.043	< 0.043	<0.043	< 0.043	< 0.043	0.055	< 0.043
118Sn	0.011	0.037	0.552	0.255	0.072	0.069	0.161	0.027	0.263	0.309	0.119	0.215
121Sb	0.001	0.003	0.008	0.005	0.003	0.003	< 0.001	< 0.001	0.003	0.003	0.003	<0.001
137Ba	0.001	0.003	0.692	0.415	0.455	0.356	0.396	0.554	0.494	0.371	0.515	0.968
202Hg	0.033	0.110	< 0.033	0.061	0.158	<0.033	< 0.033	0.122	< 0.033	0.049	< 0.033	<0.033
205TI	0.001	0.003	0.003	0.003	0.005	0.003	0.004	0.005	0.005	0.008	0.017	0.020
208Pb	0.001	0.003	0.009	0.004	0.003	0.001	0.001	0.001	0.005	0.006	0.004	0.001
238U	0.001	0.003	<0.001	<0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

C	lient Sample	ID	ER-07-Dup	ER-08	ER-08-Dup	ER-09	ER-10	ER-11	ER-12	ER-13	ER-14-Dup 1	ER-14-Dup 2
Lab	oratory Samp	le ID	051	052	053	054	055	056	057	058	059	060
W	/et Weight (m	ıg)	67.4	171.7	181.9	333.9	32.0	74.3	197.0	228.9	142.2	250.8
D	ry Weight (m	g)	34.6	73.8	82.7	139.2	20.8	32.6	86.5	89.8	56.7	92.1
	Moisture (%)	<u></u>	48.7	57.0	54.5	58.3	35.0	56.1	56.1	60.8	60.1	63.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.012	0.012	0.014	0.014	0.016	0.009	0.016	0.012	0.014	0.016
11B	0.096	0.320	<0.096	<0.096	<0.096	<0.096	<0.096	< 0.096	<0.096	<0.096	< 0.096	<0.096
23Na	3.1	10.3	2,071	2,689	2,820	3,048	2,393	1,828	2,512	2,612	2,264	2,893
24Mg	0.069	0.230	887	694	731	798	692	736	693	798	797	778
27Al	0.060	0.2	0.687	1.2	1.3	0.346	0.664	0.650	0.428	0.511	0.849	1.4
31P	52	173	13,187	12,643	13,427	14,021	11,830	11,538	12,343	13,240	11,874	13,145
39K	0.992	3.3	9,489	8,637	9,685	9,191	7,078	7,883	9,151	9,038	7,811	8,776
44Ca	10	33	272	266	291	339	282	241	302	345	351	361
49Ti	0.158	0.5	0.779	0.890	0.779	1.0	0.723	0.667	0.667	0.637	0.637	0.820
51V	0.030	0.100	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	<0.030	0.033
52Cr	0.099	0.330	1.3	1.3	1.5	1.5	1.3	1.1	1.2	1.3	1.3	1.5
55Mn	0.013	0.043	5.9	3.4	3.8	5.8	5.5	6.2	5.9	5.9	4.1	4.1
57Fe	0.793	2.6	36	32	36	43	27	31	32	36	35	36
59Co	0.003	0.010	0.058	0.041	0.045	0.071	0.047	0.046	0.019	0.033	0.042	0.053
60Ni	0.013	0.043	0.081	0.103	0.135	0.108	0.126	0.189	0.072	0.032	0.287	0.186
63Cu	0.005	0.017	3.2	4.1	4.5	3.9	3.4	3.5	3.7	4.5	3.5	4.0
66Zn	0.232	0.773	104	78	84	88	74	78	76	79	75	77
75As	0.420	1.4	0.476	< 0.420	<0.420	< 0.420	< 0.420	<0.420	<0.420	< 0.420	< 0.420	<0.420
77Se	0.320	1.1	6.8	8.2	9.0	9.7	4.8	6.1	8.8	10	6.9	7.0
88Sr	0.001	0.003	0.203	0.323	0.329	0.251	0.224	0.233	0.197	0.286	0.273	0.263
95Mo	0.001	0.003	0.050	0.043	0.050	0.036	0.043	0.036	0.036	0.041	0.041	0.034
107Ag	0.001	0.003	0.019	0.019	0.021	0.019	0.011	0.017	0.017	0.030	0.018	0.018
111Cd	0.043	0.143	<0.043	< 0.043	< 0.043	< 0.043	< 0.043	<0.043	<0.043	< 0.043	0.054	<0.043
118Sn	0.011	0.037	0.235	0.384	0.290	0.205	0.168	0.195	0.057	0.407	0.274	0.255
121Sb	0.001	0.003	<0.001	0.003	0.003	0.003	< 0.001	< 0.001	<0.001	0.003	0.003	0.003
137Ba	0.001	0.003	0.824	0.515	0.556	0.535	0.597	0.535	0.309	0.460	0.570	0.570
202Hg	0.033	0.110	< 0.033	<0.033	<0.033	<0.033	< 0.033	0.640	<0.033	< 0.033	< 0.033	<0.033
205TI	0.001	0.003	0.018	0.009	0.010	0.018	0.009	0.009	0.009	0.010	0.010	0.010
208Pb	0.001	0.003	0.001	0.003	0.004	0.003	0.001	0.001	0.001	0.003	0.001	0.004
238U	0.001	0.003	< 0.001	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Notes:

ppm = parts per million

DL = detection limit

LOQ = Limit of Quantification 10x signal to noise ratio

< = less than detection limit

mg = milligrams

% = percent

Clie	ent Sample ID	STPD-02	STPD-02 (Duplicate)		STPD-13	STPD-13 (Duplicate)		ERIMF-10	ERIMF-10 (Duplicate)	
Laborato	ory Sample ID	002	002	RPD	013	013	RPD	023	023	RPD
T-4-I D-	. \	0/	(Duplicate)			(Duplicate)	•	4.	(Duplicate)	
	Weight (mg)		9.8	(0/)).5	(01)		2.6	(04)
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.005	0.023	0.030	=	0.062	0.058	6.7	0.014	0.014	-
11B	0.096	0.112	0.106	-	<0.096	<0.096	-	<0.096	<0.096	-
23Na	3.1	2,845	2,527	11.8	3,165	2,903	8.6	2,637	2,458	7.0
24Mg	0.069	779	819	5.0	802	774	3.6	969	1,044	7.5
27Al	0.060	2.4	3.6	40.0	5.4	3.8	34.8	2.0	1.7	16.2
31P	52	12,864	12,301	4.5	13,040	11,267	14.6	12,641	13,087	3.5
39K	0.992	9,399	8,074	15.2	9,031	7,906	13.3	9,867	9,393	4.9
44Ca	10	385	391	1.5	411	363	12.4	420	443	5.3
49Ti	0.158	0.738	0.922	=	1.1	0.922	=	1.3	0.952	=
51V	0.030	0.035	0.042	=	0.071	0.039	=	0.046	0.044	=
52Cr	0.099	1.9	2.1	10.0	3.4	2.7	23.0	2.0	2.1	4.9
55Mn	0.013	5.5	5.2	5.6	3.8	3.4	11.1	8.3	8.4	1.2
57Fe	0.793	58	55	5.3	69	57	19.0	41	38	7.6
59Co	0.003	0.080	0.079	1.3	0.164	0.098	50.4	0.064	0.057	11.6
60Ni	0.013	1.2	1.3	8.0	3.4	2.4	34.5	0.890	0.989	10.5
63Cu	0.005	4.9	4.8	2.1	3.9	3.5	10.8	2.5	2.3	8.3
66Zn	0.232	72	72	0.0	79	68	15.0	117	111	5.3
75As	0.420	< 0.420	< 0.420	-	< 0.420	< 0.420	-	< 0.420	< 0.420	-
77Se	0.320	22	21	4.7	23	21	9.1	5.0	5.0	0.0
88Sr	0.001	0.319	0.397	21.8	0.396	0.376	5.2	0.273	0.271	0.7
95Mo	0.001	0.055	0.048	13.6	0.055	0.041	29.2	0.082	0.074	10.3
107Ag	0.001	0.039	0.037	5.3	0.037	0.035	5.6	0.015	0.013	14.3
111Cd	0.043	< 0.043	< 0.043	=	< 0.043	< 0.043	=	< 0.043	< 0.043	-
118Sn	0.011	0.198	0.289	37.4	0.378	0.295	24.7	0.239	0.183	26.5
121Sb	0.001	0.003	0.003	=	0.005	0.003	=	0.003	0.003	-
137Ba	0.001	0.799	0.763	4.6	0.999	0.954	4.6	2.5	2.3	8.3
202Hg	0.033	< 0.033	< 0.033	=	<0.033	< 0.033	=	0.035	< 0.033	-
205TI	0.001	0.009	0.008	=	0.005	0.004	=	0.004	0.004	-
208Pb	0.001	0.004	0.003	=	0.007	0.004	=	0.004	0.004	-
238U	0.001	0.001	0.001	=	0.001	0.001	=	0.007	0.006	-

ppm = parts per million

RPD = Relative Percent Difference

DL = detection limit

< = less than detection limit

% = percent

mg = milligrams

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%.

Minimum DQOs apply to individual samples at concentrations above 10x DL.

 $\mbox{\bf Bold}$ indicates DQO exceedance attributed to small sample size.

Clie	ent Sample ID	LNLK-20	LNLK-20 (Duplicate)		ER-07	ER-07 (Duplicate)		ER-13	ER-13 (Duplicate)	
Laborata	ory Sample ID	039	039	RPD	050	050	RPD	050	058	RPD
		039	(Duplicate)		050	(Duplicate)		058	(Duplicate)	
Total Dry	Weight (mg)	86	5.5		53	3.7		8	9.8	
Parameter	DL (ppm)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)	(ppm)	(ppm)	(%)
7Li	0.005	0.010	0.009	-	0.014	0.014	-	0.012	0.010	-
11B	0.096	< 0.096	<0.096	-	<0.096	0.126	-	<0.096	<0.096	-
23Na	3.1	2,508	2,409	4.0	2,101	2,334	10.5	2,612	2,759	5.5
24Mg	0.069	643	694	7.6	912	962	5.3	798	799	0.1
27AI	0.060	0.531	0.625	-	1.1	1.1	0.0	0.511	0.519	-
31P	52	12,211	13,242	8.1	13,282	13,717	3.2	13,240	13,435	1.5
39K	0.992	8,393	8,924	6.1	8,367	9,175	9.2	9,038	9,452	4.5
44Ca	10	321	362	12.0	300	347	14.5	345	356	3.1
49Ti	0.158	0.657	0.657	-	0.890	0.890	-	0.637	0.637	-
51V	0.030	< 0.030	< 0.030	-	< 0.030	< 0.030	-	< 0.030	< 0.030	-
52Cr	0.099	1.4	1.4	0.0	1.5	1.6	6.5	1.3	1.4	7.4
55Mn	0.013	4.4	5.0	12.8	5.8	6.7	14.4	5.9	5.7	3.4
57Fe	0.793	36	33	8.7	46	54	16.0	36	35	2.8
59Co	0.003	0.041	0.043	4.8	0.068	0.074	8.5	0.033	0.031	6.3
60Ni	0.013	0.172	0.212	20.8	0.233	0.305	26.8	0.032	0.040	-
63Cu	0.005	4.0	4.3	7.2	3.6	4.0	10.5	4.5	4.5	0.0
66Zn	0.232	71	79	10.7	113	121	6.8	79	80	1.3
75As	0.420	< 0.420	<0.420	-	0.451	0.464	=	< 0.420	< 0.420	-
77Se	0.320	1.1	0.846	-	6.7	7.7	13.9	10	10	0.0
88Sr	0.001	0.203	0.227	11.2	0.242	0.307	23.7	0.286	0.289	1.0
95Mo	0.001	0.071	0.057	21.9	0.057	0.057	0.0	0.041	0.041	0.0
107Ag	0.001	0.021	0.023	9.1	0.021	0.022	4.7	0.030	0.027	10.5
111Cd	0.043	< 0.043	< 0.043	=	< 0.043	0.055	=	< 0.043	< 0.043	-
118Sn	0.011	0.340	0.215	45.0	0.215	0.529	84.4	0.407	0.498	20.1
121Sb	0.001	0.003	0.003	-	< 0.001	0.003	-	0.003	0.003	-
137Ba	0.001	2.1	2.0	4.9	0.968	1.0	3.3	0.460	0.460	0.0
202Hg	0.033	< 0.033	< 0.033	-	< 0.033	< 0.033	-	< 0.033	< 0.033	-
205TI	0.001	0.001	0.001	-	0.020	0.023	14.0	0.010	0.011	9.5
208Pb	0.001	0.001	0.001	-	0.001	0.003	-	0.003	0.001	-
238U	0.001	< 0.001	< 0.001	=	< 0.001	< 0.001	=	< 0.001	< 0.001	-

ppm = parts per million

RPD = Relative Percent Difference

DL = detection limit

< = less than detection limit

% = percent

mg = milligrams

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%.

Minimum DQOs apply to individual samples at concentrations above 10x DL.

 $\mbox{\bf Bold}$ indicates DQO exceedance attributed to small sample size.

Clie	ent Sample ID	ER-14-Dup 1	ER-14-Dup 1 (Duplicate)		ER-14-Dup 2	ER-14-Dup 2 (Duplicate)	
Laborato	ory Sample ID	059	059	RPD	060	060	RPD
Total Dru	(Majaht (ma)	56	(Duplicate)		0	(Duplicate) 2.1	
Parameter	Weight (mg) DL (ppm)			(%)			(%)
71 i	0.005	(ppm) 0.014	(ppm) 0.011	(76)	(ppm) 0.016	(ppm) 0.008	(76)
11B	0.003	< 0.014	<0.096	_	<0.016	< 0.006	-
23Na	3.1	2,264	2,189	3.4	2,893	1,958	38.5
23Na 24Mg	0.069	797	729	8.9	778	715	8.4
24Ng 27Al	0.069	0.849	0.610	0.9	1.4	0.571	0.4
31P	52	11,874	11,450	3.6	13,145	10,721	20.3
39K	0.992	7,811	7,617	2.5	8,776	6,193	34.5
44Ca	10	351	329	6.5	361	338	6.6
44Ca 49Ti	0.158	0.637	0.592	-	0.820	0.546	0.0
51V	0.136	< 0.037	< 0.030	_	0.020	< 0.030	_
52Cr	0.030	1.3	1.3	0.0	1.5	1.2	22.2
55Mn	0.033	4.1	3.7	10.3	4.1	3.7	10.3
57Fe	0.793	35	27	25.8	36	28	25.0
59Co	0.003	0.042	0.038	10.0	0.053	0.036	38.2
60Ni	0.013	0.287	0.129	-	0.186	0.049	-
63Cu	0.005	3.5	3.4	2.9	4.0	3.2	22.2
66Zn	0.232	75	68	9.8	77	68	12.4
75As	0.420	<0.420	< 0.420	-	<0.420	< 0.420	-
77Se	0.320	6.9	6.3	9.1	7.0	6.2	12.1
88Sr	0.001	0.273	0.230	17.1	0.263	0.253	3.9
95Mo	0.001	0.041	0.034	18.7	0.034	0.027	23.0
107Ag	0.001	0.018	0.018	0.0	0.018	0.016	11.8
111Cd	0.043	0.054	< 0.043	-	< 0.043	< 0.043	-
118Sn	0.011	0.274	0.282	2.9	0.255	0.070	-
121Sb	0.001	0.003	0.003	=	0.003	< 0.001	-
137Ba	0.001	0.570	0.478	17.6	0.570	0.460	21.4
202Hg	0.033	< 0.033	< 0.033	=	< 0.033	< 0.033	-
205TI	0.001	0.010	0.009	=	0.010	0.008	-
208Pb	0.001	0.001	0.001	-	0.004	0.001	-
238U	0.001	< 0.001	< 0.001	-	<0.001	< 0.001	-

ppm = parts per million

RPD = Relative Percent Difference

DL = detection limit

< = less than detection limit

% = percent

mg = milligrams

Data Quality Objectives:

Laboratory Duplicates - RPD \leq 40% for all elements, except Ca and Sr, which are \leq 60%.

Minimum DQOs apply to individual samples at concentrations above 10x DL.

				Accuracy/Pr	ecision (Samples	001 to 018)				
Parameter	Detection Limit (ppm)	Certified Value (ppm)	Observed Conc. 1 (ppm)	Observed Conc. 2 (ppm)	Observed Conc. 3 (ppm)	Observed Conc. 4 (ppm)	Observed Conc. 5 (ppm)	Mean Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.5	1.5	1.2	1.3	1.5	1.4	115	7.5
11B	0.096	4.5	4.7	4.8	4.6	4.6	4.8	4.7	105	2.3
23Na	3.1	14,000	16,962	17,152	14,905	16,355	16,938	16,463	118	5.6
24Mg	0.069	910	1,057	1,049	948	1,064	1,090	1,042	114	5.2
27AI	0.060	197	212	187	180	204	195	196	99	6.5
31P	52	8,000	8,875	9,088	8,330	9,354	9,315	8,992	112	4.6
39K	0.992	15,500	17,844	18,463	15,724	18,989	18,467	17,897	116	7.2
44Ca	10	2,360	2,552	2,538	2,379	2,649	2,548	2,533	107	3.8
49Ti	0.158	12.24	13	14	11	12	11	12	100	9.3
51V	0.030	1.57	1.6	1.9	1.6	2.0	1.7	1.8	113	10.0
52Cr	0.099	1.87	2.0	2.1	1.9	2.1	2.1	2.0	109	3.8
55Mn	0.013	3.17	3.5	3.6	3.3	3.8	3.6	3.6	112	5.1
57Fe	0.793	343	399	404	365	414	391	395	115	4.7
59Co	0.003	0.25	0.291	0.300	0.272	0.308	0.305	0.295	118	5.0
60Ni	0.013	1.34	1.6	1.6	1.4	1.5	1.6	1.6	116	5.5
63Cu	0.005	15.7	18	18	17	19	19	18	116	4.6
66Zn	0.232	51.6	63	63	59	60	61	61	118	2.9
75As	0.420	6.87	8.0	7.9	7.0	7.8	8.0	7.7	112	5.8
77Se	0.320	3.45	3.9	3.9	3.5	3.7	3.9	3.8	110	5.4
88Sr	0.001	10.1	12	12	10	12	12	11	113	4.6
95Mo	0.001	0.29	0.352	0.380	0.304	0.325	0.331	0.338	117	8.5
107Ag	0.001	0.0252	0.035	0.030	0.028	0.031	0.030	0.031	122	9.1
111Cd	0.043	0.299	0.363	0.386	0.375	0.352	0.386	0.372	125	4.0
118Sn	0.011	0.061	0.069	0.069	0.061	0.088	0.076	0.072	119	14.0
121Sb	0.001	0.011	0.010	0.010	0.010	0.010	0.010	0.010	92	0.0
137Ba	0.001	8.6	8.2	8.4	8.6	8.8	8.4	8.5	98	2.8
202Hg	0.033	0.412	0.521	0.495	0.462	0.467	0.475	0.484	118	5.0
205TI	-	-	_	-	-	=	-	-	=	-
208Pb	0.001	0.404	0.372	0.460	0.431	0.551	0.400	0.443	110	16.0
238U	0.001	0.05	0.051	0.059	0.051	0.060	0.053	0.055	110	7.5

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of <20% was established for all elements.

DORM-4 used for all elements except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

				Accuracy/Pr	ecision (Samples	019 to 029)				
Parameter	Detection Limit (ppm)	Certified Value (ppm)	Observed Conc. 1 (ppm)	Observed Conc. 2 (ppm)	Observed Conc. 3 (ppm)	Observed Conc. 4 (ppm)	Observed Conc. 5 (ppm)	Mean Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	1.3	1.5	1.4	1.3	1.4	114	6.0
11B	0.096	4.5	5.5	5.4	5.7	5.1	5.1	5.4	119	5.1
23Na	3.1	14,000	16,681	15,101	15,458	15,291	16,462	15,798	113	4.6
24Mg	0.069	910	1,102	1,065	1,074	1,158	1,102	1,100	121	3.3
27Al	0.060	197.2	190	189	202	172	179	186	94	6.2
31P	52	8,000	8,771	9,004	8,872	8,988	9,405	9,008	113	2.7
39K	0.992	15,500	19,032	17,251	17,987	18,667	19,877	18,563	120	5.4
44Ca	10	2,360	2,775	2,719	2,807	2,739	2,808	2,770	117	1.5
49Ti	0.158	12.24	13	15	13	12	14	13	107	7.7
51V	0.030	1.57	1.9	1.7	1.6	1.7	2.0	1.8	114	7.9
52Cr	0.099	1.87	2.2	2.2	2.2	2.1	2.2	2.2	116	2.5
55Mn	0.013	3.17	3.9	3.9	4.0	3.9	4.1	4.0	125	2.0
57Fe	0.793	343	446	439	427	419	432	432	126	2.4
59Co	0.003	0.25	0.319	0.324	0.308	0.308	0.332	0.318	127	3.3
60Ni	0.013	1.34	1.8	1.7	1.7	1.7	1.7	1.7	128	4.0
63Cu	0.005	15.7	21	21	19	20	20	20	128	3.0
66Zn	0.232	51.6	60	63	62	63	61	62	120	2.1
75As	0.420	6.87	7.6	7.7	7.6	7.8	7.8	7.7	112	1.2
77Se	0.320	3.45	3.7	3.6	3.5	3.7	3.6	3.6	104	2.4
88Sr	0.001	10.1	12	12	12	12	12	12	118	2.1
95Mo	0.001	0.29	0.372	0.364	0.379	0.364	0.357	0.367	127	2.3
107Ag	0.001	0.0252	0.037	0.033	0.031	0.031	0.033	0.033	132	6.8
111Cd	0.043	0.299	0.417	0.386	0.391	0.355	0.355	0.381	127	7.0
118Sn	0.011	0.061	0.080	0.069	0.067	0.074	0.079	0.074	121	7.8
121Sb	0.001	0.011	0.017	0.013	0.012	0.013	0.010	0.013	117	19.0
137Ba	0.001	8.6	9.2	8.8	9.5	9.2	8.1	9.0	104	5.9
202Hg	0.033	0.412	0.489	0.500	0.516	0.502	0.491	0.500	121	2.2
205TI	-	-	-	-	-	-	-	-	-	-
208Pb	0.001	0.404	0.618	0.625	0.475	0.484	0.514	0.543	134	14.0
238U	0.001	0.05	0.071	0.059	0.056	0.056	0.065	0.061	123	11.0

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of <20% was established for all elements.

DORM-4 used for all elements except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

				Accuracy/Pr	ecision (Samples	030 to 047)				
Parameter	Detection Limit (ppm)	Certified Value (ppm)	Observed Conc. 1 (ppm)	Observed Conc. 2 (ppm)	Observed Conc. 3 (ppm)	Observed Conc. 4 (ppm)	Observed Conc. 5 (ppm)	Mean Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.5	1.4	1.6	1.3	1.5	1.5	121	7.1
11B	0.096	4.5	5.3	5.3	5.2	5.6	5.4	5.3	118	2.7
23Na	3.1	14,000	16,547	15,501	15,809	15,445	15,090	15,678	112	3.5
24Mg	0.069	910	1,061	1,002	1,025	1,021	950	1,012	111	4.0
27AI	0.060	197.2	209	226	220	221	210	217	110	3.4
31P	52	8,000	9,647	8,853	9,011	8,792	8,396	8,940	112	5.1
39K	0.992	15,500	17,884	18,501	17,833	16,948	17,293	17,692	114	3.4
44Ca	10	2,360	2,857	2,697	2,695	2,635	2,583	2,694	114	3.8
49Ti	0.158	12.24	12	14	13	12	12	13	104	5.8
51V	0.030	1.57	1.8	1.8	1.7	1.6	1.5	1.7	107	9.4
52Cr	0.099	1.87	2.3	2.1	2.1	2.1	1.9	2.1	113	6.6
55Mn	0.013	3.17	4.0	3.7	3.8	3.6	3.5	3.7	118	4.8
57Fe	0.793	343	427	400	403	395	381	401	117	4.2
59Co	0.003	0.25	0.323	0.297	0.296	0.286	0.281	0.297	119	5.4
60Ni	0.013	1.34	1.7	1.6	1.6	1.6	1.5	1.6	120	5.3
63Cu	0.005	15.7	19	19	20	19	19	19	123	2.5
66Zn	0.232	51.6	68	62	64	62	62	64	124	4.0
75As	0.420	6.87	7.9	7.4	7.4	7.5	7.4	7.5	109	2.7
77Se	0.320	3.45	3.8	3.7	3.9	3.8	3.7	3.8	109	1.8
88Sr	0.001	10.1	12	12	12	11	11	12	115	4.5
95Mo	0.001	0.29	0.347	0.332	0.340	0.357	0.325	0.340	117	3.6
107Ag	0.001	0.0252	0.032	0.028	0.033	0.028	0.030	0.030	120	7.6
111Cd	0.043	0.299	0.444	0.376	0.405	0.367	0.338	0.386	129	10.0
118Sn	0.011	0.061	0.084	0.085	0.075	0.075	0.071	0.078	128	8.0
121Sb	0.001	0.011	0.011	0.011	0.014	0.014	0.011	0.012	110	12.0
137Ba	0.001	8.6	9.8	10	9.5	10	9.8	9.9	115	2.8
202Hg	0.033	0.412	0.586	0.508	0.536	0.519	0.536	0.537	130	5.6
205TI	-	-	-	-	-	=	=	-	=	-
208Pb	0.001	0.404	0.546	0.45	0.485	0.517	0.341	0.468	116	17.0
238U	0.001	0.05	0.070	0.064	0.061	0.063	0.052	0.062	124	11.0

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of <20% was established for all elements.

DORM-4 used for all elements except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

				Accuracy/Pr	ecision (Samples	048 to 057)				
Parameter	Detection Limit (ppm)	Certified Value (ppm)	Observed Conc. 1 (ppm)	Observed Conc. 2 (ppm)	Observed Conc. 3 (ppm)	Observed Conc. 4 (ppm)	Observed Conc. 5 (ppm)	Mean Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	1.4	1.4	1.3	1.5	1.4	113	6.2
11B	0.096	4.5	5.3	5.4	4.4	4.4	5.0	4.9	109	9.5
23Na	3.1	14,000	15,965	16,978	16,716	16,468	15,732	16,372	117	3.2
24Mg	0.069	910	1,042	1,015	1,073	1,044	1,049	1,045	115	2.0
27AI	0.060	197.2	194	190	180	186	181	186	94	3.1
31P	52	8,000	9,184	9,430	9,492	9,203	9,028	9,267	116	2.1
39K	0.992	15,500	18,265	18,117	19,935	18,278	17,001	18,319	118	5.7
44Ca	10	2,360	2,761	2,749	2,785	2,629	2,618	2,708	115	2.9
49Ti	0.158	12.24	12	13	13	12	13	13	103	4.4
51V	0.030	1.57	1.9	1.7	2.0	1.8	1.6	1.8	113	9.8
52Cr	0.099	1.87	2.2	2.1	2.2	2.1	2.1	2.2	115	2.6
55Mn	0.013	3.17	4.0	3.7	4.0	3.8	3.9	3.9	123	3.1
57Fe	0.793	343	424	410	435	419	418	421	123	2.2
59Co	0.003	0.25	0.317	0.301	0.321	0.305	0.297	0.308	123	3.3
60Ni	0.013	1.34	1.7	1.6	1.7	1.6	1.5	1.6	119	3.6
63Cu	0.005	15.7	20	20	20	19	18	19	123	5.3
66Zn	0.232	51.6	63	63	63	59	62	62	120	2.6
75As	0.420	6.87	7.7	7.6	7.9	7.3	7.3	7.6	110	3.3
77Se	0.320	3.45	3.7	3.8	3.9	3.8	3.7	3.8	110	2.4
88Sr	0.001	10.1	13	12	12	12	12	12	120	2.6
95Mo	0.001	0.29	0.362	0.369	0.334	0.305	0.320	0.338	117	8.1
107Ag	0.001	0.0252	0.036	0.035	0.034	0.031	0.030	0.033	132	8.6
111Cd	0.043	0.299	0.452	0.465	0.439	0.385	0.385	0.425	142	8.8
118Sn	0.011	0.061	0.078	0.069	0.086	0.070	0.066	0.074	121	11.0
121Sb	0.001	0.011	0.014	0.011	0.011	0.008	0.011	0.011	100	18.0
137Ba	0.001	8.6	9.5	9.7	8.6	8.2	8.9	9.0	105	6.8
202Hg	0.033	0.412	0.528	0.494	0.485	0.468	0.487	0.493	120	4.5
205TI	-	-	-	-	-	=	=	-	-	-
208Pb	0.001	0.404	0.561	0.499	0.622	0.540	0.464	0.537	133	11.0
238U	0.001	0.05	0.065	0.059	0.074	0.065	0.058	0.064	129	9.8

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of <20% was established for all elements.

DORM-4 used for all elements except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

				Accuracy/Pr	ecision (Samples	058 to 060)				
Parameter	Detection Limit (ppm)	Certified Value (ppm)	Observed Conc. 1 (ppm)	Observed Conc. 2 (ppm)	Observed Conc. 3 (ppm)	Observed Conc. 4 (ppm)	Observed Conc. 5 (ppm)	Mean Observed Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	1.1	1.4	1.3	1.3	1.3	104	8.2
11B	0.096	4.5	5.1	5.1	5.1	4.8	5.0	5.0	111	2.5
23Na	3.1	14,000	15,738	14,935	15,911	15,246	16,171	15,600	111	3.2
24Mg	0.069	910	948	893	982	945	1,022	958	105	5.0
27Al	0.060	197.2	201	190	206	192	190	196	99	3.8
31P	52	8,000	7,566	7,318	8,012	8,225	8,263	7,877	98	5.3
39K	0.992	15,500	16,692	15,726	16,962	17,426	16,483	16,658	108	3.8
44Ca	10	2,360	2,798	2,380	2,712	2,577	2,543	2,602	110	6.2
49Ti	0.158	12.24	11	11	10	11	11	11	88	3.6
51V	0.030	1.57	1.8	1.7	1.8	1.9	1.8	1.8	115	3.0
52Cr	0.099	1.87	2.1	2.0	2.1	2.1	2.2	2.1	112	3.4
55Mn	0.013	3.17	3.4	3.0	3.5	3.3	3.4	3.3	104	5.0
57Fe	0.793	343	393	352	398	370	380	378	110	4.9
59Co	0.003	0.25	0.286	0.271	0.291	0.286	0.275	0.282	113	2.9
60Ni	0.013	1.34	1.5	1.4	1.6	1.5	1.5	1.5	113	4.3
63Cu	0.005	15.7	19	17	19	18	17	18	116	6.1
66Zn	0.232	51.6	58	55	57	59	58	57	111	2.5
75As	0.420	6.87	6.7	6.4	7.0	7.0	7.0	6.8	99	4.0
77Se	0.320	3.45	2.8	3.0	3.3	3.4	3.5	3.2	93	9.0
88Sr	0.001	10.1	12	10	11	11	11	11	110	5.1
95Mo	0.001	0.29	0.355	0.332	0.318	0.318	0.298	0.324	112	6.5
107Ag	0.001	0.0252	0.030	0.025	0.029	0.029	0.029	0.028	113	6.7
111Cd	0.043	0.299	0.342	0.354	0.342	0.354	0.319	0.342	114	4.2
118Sn	0.011	0.061	0.088	0.074	0.081	0.075	0.076	0.079	129	7.3
121Sb	0.001	0.011	0.011	0.011	0.011	0.011	0.011	0.011	100	0.0
137Ba	0.001	8.6	8.7	8.6	8.7	8.1	8.7	8.6	100	3.1
202Hg	0.033	0.412	0.470	0.408	0.431	0.474	0.499	0.456	111	8.0
205TI	=	=	=	=	=	=	=	=	=	=
208Pb	0.001	0.404	0.488	0.591	0.616	0.494	0.503	0.539	133	11.0
238U	0.001	0.05	0.062	0.060	0.067	0.066	0.066	0.064	129	4.8

ppm = parts per million

% = percent

RSD = Relative Standard Deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of \leq 20% was established for all elements.

DORM-4 used for all elements except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

TESTING LOCATION (Please Circle)

NAUTILUS ENVIRONMENTAL

Bernalby 8664 Commerce Court Burnaby, British Columbia, Canada VSA ANT Phone 604.420.8773

Galgary, #4, 6125 12 Street SE Calgary, Alberta, Canada T2H 2K1 Phone 403 253 7121

Chain of Custody

May 19 2020 Page, 1, of 6.

Company									
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Coetact				Contact					
Email	perses@nauflusenvironmental ca	Senviconmen	tal ca.		ames/bonnie		MO I		proset tepis
Sample Collection By:				Sample Type: Grab (O OR Composite	O	unua		
SAMPLE ID	DATE	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	Track 10 #:	NTS	le2 lato1		
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STPD-04	N/A	N/A	sõõe		504		*		
STPD-05	N/A	N/A	s66a		2003		*		
- STPD-06	N/A	N/A	566a		300		*		
STPD-07	N/A	N/A	eggs		£90				
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				2. Courter	Fed EX Stat Present	ON			
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TESTING LOCATION (Please Circle)

NAUTILUS

Burnaby 2664 Commerce Court 6ursaby, British Columbia, Carada VSA 4N7 Phore 604.420.8773

Calgary #4, 6125 12 Scr

#4, 6125 12 Street SE Calgary, Alberta, Canada 72H 2K1

Phone 403 253.7121

35 100

erta, Canada

Chain of Custody

May 19 2020 Page 2 of 6.

30 Receipt Temperature (°C) he collection, landing or transport of the sample, application or exterpretation SAMPLE DESCRIPTION AND COMMENTS (LABORATORY) date to the sample as received the laterity in whole or in part is assumed the or subsity in lenited to the cost of the text requested. The test needs only (Praject # 2020-113) ANALYSES REQUIRED of the test data or results to part or its whole. Total Selenium dw × S NA S/N 18.30 Nautilus Environmental (Burnaby) SAMPLE RECEIPT DETAILS (LABORATORY) Composite O COMMENTS GENERIC CHESINE Commen Ly 6. Initials Present on South 211-14-1 3030 4. Ice Present In Cooler? RECEIVED BY (LABORATORY) 5. Seal Present? Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted. Inch 10#1 810 HO 1910 james/bonnie 410 0 510 810 610 O.R. Š Fedex 09 TELEMHERINTICS INC. Sample Type: Grab O # OF CONTAINERS AND VOLUME (#.g. 1 x 20 L) City/State/Zip Soud Condition? Company Address Contact Involce To: Phone PO No. . Total No. of Emall neglinen Courier MATRIX **s66a 8668** eggs 6889 6009 5550 4995 egge side 5660 ames@nsuffuserwironmental.ca. bornie@hautiliasenvironmental.ca Nautilus Environmental (Burnaby) SPECIAL INSTRUCTIONS/COMMENTS (CLIENT) TIME N/A N/A N/A N/A N/A N/A N/A NVA N/A N/A RELINQUISHED BY (CLIENT) DATE N/A N/A N/A N/A N/A N/A N/A N/A N/A NA City/State/Zip Sample Collection By: SAMPLE ID STPD-14 STPD-11 STPD-12 STPD-13 STPD-15 STPD-16 ERIMF-4 ERIMF-6 ERIMF-5 ERUMF-7 Company Address Contact Phone Email Report to:

NAUTILUS

Burnalby 8664 Commerce Court Burnaby, British Columbia, Canada VSA AN7 Phone 604-420.8773

Chain of Custody

Calgary
44, 6125 12 Street SC
Calgary, Alberta, Canada
72H 2KT
Phone 403,253,7121

May 19 2020 Page 3 of 6

Report to:				Invoice To:				ANALYSES REQUIRED	1
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v ERIMF-11	N/A	N/A	siste		634		-		
ERIMF-12	N/A	N/A	s66e		SEO		*		
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ERIMF-14	N/A	N/A	*66*		480		×		
ERIMF-15	N/A	N/A	6995		028		×		100
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SPECIAL IN	SPECIAL INSTRUCTIONS/COMMENTS (CLIENT)	MENTS (CLIE)	ND)	SAMPLE RECE	SAMPLE RECEIPT DETAILS (LABORATORY)	ORY)	SAMPLE DESC	SAMPLE DESCRIPTION AND COMMENTS (LABORATORY)	TS (LABORATORY)
				1. Total No. of Containers	(10 4. toe Present	N/A	(Project)	(Project # 2020-113)	
				2. Courter	FedEx Steal	Q'IN			
				3. Good Condition?	(F)/ N & hittats Present on Small				
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S NAUTILUS ENVIRONMENTAL

BE64 Commerce Court
Burnaby, British Columbia, Canada
V6A 4N7
Phone 604.420.8773

Chain of Custody

Calgary #4, 6125 12 Street SE

Calgery, Alberta, Canada T2H 2K1 Phone 403,253,7121

Dervie Dervie OR Composite O CA ID # COMMENTS COS COS COS COS COS COS COS C	Report to:				Invoice To:					ANALYSES REQUIRED		_
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LNIK-12 N/A N/B 8995 C52 LNIK-13 N/A N/A 6995 C52 LNIK-14 N/A N/A 6995 C34 LNIK-15 N/A N/A 6995 C34 LNIK-15 N/A N/A 6995 C34 LNIK-15 N/A N/A 6995 C34 LNIK-16 N/A N/A 6995 C35 LNIK-19 N/A N/A 6995 C35 SPECIAL INSTRUCTIONS/COMMENTS (CLIRNT) LTGEN CONSTRUCTIONS/COMMENTS (CLIRNT) C35 RELINQUISHED BY (CLIENT) RECENTED BY (LABORATORY) C36 RECENTED MACHALIA C36 C36 </td <td>SAMPLEID</td> <td>DATE</td> <td>TIME</td> <td>MATRIX</td> <td># OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)</td> <td>1000</td> <td>COMMENT</td> <td>10</td> <td>ilai2 listoT</td> <td></td> <td></td> <td></td>	SAMPLEID	DATE	TIME	MATRIX	# OF CONTAINERS AND VOLUME (e.g. 1 x 20 L)	1000	COMMENT	10	ilai2 listoT			
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APPENDIX F

Laboratory Toxicity Report



Evaluation of the reproductive effects of selenium on redside shiner (Richardsonius balteatus)

Final Report (revised)

December 7, 2020

Submitted to: Teck Coal Ltd.

Sparwood, BC



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APPENDIX A – Redside shiner (Richardsonius balteatus) exposure data



SIGNATURE PAGE

Report By: Bonnie Lo, MET

Environmental Toxicologist

Reviewed By: James Elphick, R.P.Bio Environmental Toxicologist

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.



1.0 INTRODUCTION

In collaboration with Minnow Environmental Inc. and Golder Associates Ltd., Nautilus Environmental Company Inc. conducted a laboratory exposure using field collected redside shiners (RSC, *Richardsonius balteatus*) to characterize effects of maternally-transferred selenium on early life stage development of RSC. Eggs were fertilized in the field and transported to the Nautilus Environmental laboratory (Burnaby, BC) for rearing. Viable eggs were reared until completion of yolk sac absorption and assessed for mortality, length, weight and deformities.

This report summarizes the methods and results from the laboratory exposures. Additional details associated with field collection efforts and interpretation of the data have been reported separately.

2.0 METHODS

2.1 Fertilization

Nautilus Environmental scientists were deployed into the field once field crews observed spawning behavior and morphological features suggesting ripe fish were present. Fish were anaesthetized using clove oil and eggs and milt were expressed by application of gentle pressure to the abdomen.

Milt was collected from males using a glass pipette and pooled from a minimum of two males for each fertilization event in a small plastic container that was kept cold. Eggs were expressed onto a glass microscope slide and transferred to a Petri dish. A combination of wet and dry fertilization was used. A small volume of pooled milt (approximately 1 or 2 drops) was added to each batch of eggs and the eggs gently mixed. After a short period of dry fertilization (i.e., in the absence of water), a sufficient volume of reconstituted moderately hard water (USEPA, 1985) was added to cover the eggs and the eggs were allowed to fertilize under wet conditions for several minutes. Eggs were then transferred to a plastic container with approximately 1 L of laboratory water. Additional details regarding method development for fertilization are provided in Section 3.1.

Fertilized eggs were transported by a Nautilus Environmental scientist via vehicle and air; the containers were filled with no headspace and sealed and packaged with bubble wrap and ice packs in coolers. Care was taken to minimize mechanical disturbance and temperature fluctuations, and the eggs were inspected at airport security so that X-ray would not be required.



If eggs were being held overnight prior to transport, efforts were made to maintain holding temperature at 11 - 14°C, consistent with the range measured at the collection sites. Transportation of eggs occurred between one hour and two days post fertilization.

2.2 Tissue collection

Following expression of eggs and just prior to fertilization, a sample of ripe eggs was collected for selenium analysis. Egg samples were frozen and stored at -20 °C following arrival at the laboratory. Additional subsamples were collected from the adult females by Minnow Environmental.

2.3 Test methods

Rearing conditions are summarized in Table 1. Upon arrival at the laboratory, temperature was recorded and the containers were placed in an environmental control testing chamber held at 14 ± 2°C. To minimize stress following transport and allow equilibration to laboratory conditions, eggs were not transferred to rearing containers until at least 12 hours after arrival. Eggs were provided continuous aeration throughout rearing. Water renewals (approximately 80%) occurred daily and water quality parameters (temperature, dissolved oxygen, pH) were measured before and after water renewal. Conductivity of water was measured daily.

When eggs from a female were observed using a dissection microscope to have reached the gastrula stage, which generally occurred three or four days following arrival at the laboratory, an assessment of fertilized eggs was conducted; eggs were assumed to be unfertilized if the egg did not form a gastrula. Fertilized eggs were counted and divided into replicate containers, targeting four replicates, each with 50 fertilized eggs. Due to the varying number of collected and fertilized eggs, the number of replicates and eggs per replicate varied across females.

Eggs were monitored daily for mortality and hatch. When observed, hatched fish were transferred to a 2-L rearing container that corresponded to the same replicate. Except for volume, rearing conditions remained the same. Observations regarding hatch and mortality were recorded daily. When yolk sac absorption was complete (20 to 21 days post fertilization), the fish were euthanized using tricaine mesylate (CAS 886-86-2). All fish were assessed for deformities using a Graduated Severity Index (GSI) (Table 2) as described and used by Holm et al. (2003) and Rudolph et al. (2008). Twenty fish from each replicate were randomly selected and measured for individual fish length; when the number of fish per replicate was less than twenty, length of all fish was measured. Following length and deformity assessments, fish were pooled and dried at 60°C for a minimum of 24 hours after which dry weight was measured.



Table 1. Rearing conditions for redside shiners.

Test type	Static renewal, daily
Test duration	Until yolk sac absorption (20 to 21 days post fertilization)
Rearing water	Reconstituted moderately hard water
Test organism allocation	Variable due to different number of viable fertilized eggs; targeted 50 eggs per replicate
Test vessel, test volume	1L containers (eggs) and 2L containers (hatched fish)
Aeration	Continuous gentle aeration
Temperature	14 ± 2 °C
Lighting	16 h light: 8 h dark photoperiod; 100-500 lux
Endpoints	Survival, length, weight, deformities

Table 2. Graduated Severity Index (GSI) for evaluating larval fish deformities.

		Cate	egory	_
GSI	Skeletal	Craniofacial	Finfold	Edema
0	Normal backbone. (≤15°)	Normal jaw, face and head.	All fins present and normal.	No fluid accumulation in head or pericardial cavity.
1	Slight (15-44°) lordosis, scoliosis or kyphosis. Unlikely to impair fish movement.	Slightly reduced (<20%) or malformed eye or jaw. Unlikely to impair feeding ability or sight.	One or two fins slightly (<50%) reduced in size or slightly malformed. Unlikely to impair fish movement.	Slight (<20% of volume of normal) fluid accumulation, but unlikely to impair sight, movement or feeding.
2	Moderate (45-89°) lordosis, scoliosis or kyphosis. Likely to impair fish movement.	Moderately (20-49%) reduced or malformed eye or jaw. Likely to impair feeding ability or sight.	More than two fins slightly reduced in size or slightly malformed, or 1 or 2 moderately (≥50%) deformed fins. Likely to impair fish movement.	Moderate (20-49% of normal volume) fluid accumulation. Likely to impair sight, movement or feeding.
3	Severe (≥90°) lordosis, scoliosis or kyphosis. Fish movement likely to cease or be greatly impaired.	Severely (≥50% or missing) reduced or malformed eye or jaw. Feeding ability or sight severely impaired.	One or more missing fins, or two or more moderately (≥50%) deformed. Swimming ability severely impaired.	Severe (≥50% of normal volume) fluid accumulation. Greatly reduced sight, movement or feeding.



2.4 QA/QC

Several laboratory QA/QC measures were implemented to ensure the data produced were reliable. Actions included:

Husbandry

- Laboratory water was measured for chlorine (weekly) and total metals (by ICP scan) approximately monthly to confirm water was of suitable quality. Water quality in rearing containers was monitored daily for temperature, dissolved oxygen, conductivity and pH.
- Appropriate test conditions were maintained (e.g., room temperature, water temperature, lighting, aeration). Daily monitoring was documented; deviations were documented and their implications on data quality considered.
- Laboratory staff had prior experience with rearing early life stage fish.
- Standard laboratory and good house-keeping practices were utilized on laboratory instrumentation and materials to reduce the risk of cross-contamination between batches of eggs and exposure containers.

Deformity assessments

- Deformity analyses were conducted by technicians with training and experience in fish deformity analyses.
- The test containers were labelled in a manner to prevent the technician from knowing the identity of any fish.
- An *a priori* framework was used for the GSI scoring system (Table 2).
- Photographs were taken from a representative selection of fish (deformed and normal) and used as a guide for the GSI framework.
- A minimum of 10% of the larval fish were examined by a secondary observer not involved in the original scoring.



3.0 RESULTS

3.1 Fertilization

Manual expression and fertilization of RSC gametes had not been conducted prior to this study and modifications to methods used for fertilization events were necessary between fertilization attempts. The first attempt to express eggs (10 females from Loon Lake and 3 from ERIMF) did not result in viable eggs. Pressure was applied to the abdomen of females and eggs were expressed; however, observations made in the days following fertilization indicated that the eggs were not developing (eggs were white, perivitelline space not visible). Moderate pressure had been required to express these eggs and some of the expressed eggs were clumped together and were of a range of sizes. These results suggested the eggs were not sufficiently ripe. The Gonadal Somatic Index for the females collected during the first fertilization event ranged from 9 to 20%.

During the second fertilization event, females that did not express eggs with light pressure to the abdomen were considered to be not sufficiently ripe. Eggs that were readily expressed with light pressure were uniform in size and well coated in ovarian fluid. The perivitelline space (space between the plasma membrane and chorion) was observed when assessed 15 minutes following fertilization. The Gonadal Somatic Index of ripe females used in the study ranged from 5 to 26%.

Fertilization rates were variable, ranging from 4 to 92% with a mean of 52% (Table 3). After the first four successful fertilization events, the mean fertilization rate was 40%, suggesting that efforts to optimize fertilization methods were warranted. During the initial four rounds of fertilization, the duration of the dry fertilization period was between 5 to 10 minutes while the wet fertilization period was between 10 to 15 minutes. It was hypothesized that higher fertilization rates might be observed if a shorter dry fertilization period was used, since the small size of the eggs made them potentially subject to drying during the dry fertilization period. To test this hypothesis, eggs from one newly expressed female were separated into two groups; one group was dry fertilized for approximately two minutes and the second group for approximately 15 minutes. The short dry fertilization period resulted in a fertilization rate of 68% while the longer period saw a significantly lower rate of 25%. Following this trial, fertilization methods were revised to include a short dry fertilization period of 2 minutes. The mean fertilization rate of eggs increased to 69% following implementation of this method development (Figure 1). The majority of the fish that were fertilized with the longer dry fertilization period were from the Loon Lake (LNLK) reference area and ERIMF.



100% 0 8 Δ 0 Δ Δ 80% 0 0 Δ 0000 0 Fertilization (%) 60% 0 Δ △ before 8 40% Oafter A Δ 20% Δ Δ 0 Δ 0% LNLK ER **ERIMF ERWSF** STPD n=10 n=16 n=14 n=13 n=3

Figure 1. Fertilization rates before and after method optimization.

3.2 Rearing

Water quality remained acceptable throughout rearing. Eggs were successfully transported to the laboratory by a combination of vehicle and plane. Upon arrival, there was no evidence of damaged eggs or mortalities. There was no evidence of fungal growth during rearing and, therefore, prophylactic treatment of eggs with an anti-fungal treatment was not required.

Larval RSC were terminated once yolk sac absorption was complete. This occurred 20 to 21 days post fertilization and was consistent across females and collection sites. Feeding behaviour was not observed during rearing; a small number of extra fish from the first successful fertilization event were reared in the presence of food and used to assess whether feeding of hatched fish was necessary. Once these additional fish were active, they were provided newly hatched *Artemia* nauplii; however, these fish showed no signs of feeding (chasing or consumption of *Artemia*) prior to complete yolk sac absorption.

Mean (and standard deviation) survival from fertilized egg to termination of the fish following yolk sac absorption of RSC originating from the Loon Lake (LNLK) reference site was $84.3 \pm 23.9\%$. Survival ranged from 81 to 100% for eggs from nine of the ten females; eggs from the remaining female exhibited low survival (18%) (Table 3). This female also exhibited a low rate of fertilization (12%) which yielded only 38 fertilized eggs. Other females also exhibited low fertilization rate but produced a high rate of survival; therefore, the reason for low survival in eggs from this one fish



are not known. The overall high survival of the fish originating from the Loon Lake imply that it would be reasonable to use the Loon Lake reference site to compare performance observed in RSC originating from exposure sites. The results also suggest that the rearing methods used in this study were suitable for successful rearing of early life stage RSC.

3.3 Survival, growth and deformity assessments

Survival was generally high across sites with a mean and standard deviation of $84.6 \pm 17.3\%$. In addition to the one Loon Lake female discussed above, eggs from one fish originating from Koocanusa Reservoir (ER) also exhibited low survival (23%) (Table 3). Due to personnel constraints, this female had been held overnight in a minnow trap before being manually expressed. The eggs were observed as sticky and clumped following fertilization, notably different from the other batches of ripe eggs, and had a low rate of fertilization (6%). None of the other females were held overnight prior to gamete collection.

Growth (dry weight and length) was consistent across sites. Mean (and standard deviation) dry weight was 0.35 ± 0.05 mg and ranged from 0.22 to 0.46 mg. Fish length was 7.2 ± 0.4 mm and ranged from 6.5 to 7.9 mm.

Similar to the other endpoints, there did not appear to be a relationship between incidence of deformities and collection site. When considering fish with any deformity (GSI scores of 1 or more), the mean (\pm standard deviation) incidence of deformity was 10.4 \pm 18.4% and ranged between 0 and 100%. The female that yielded an incidence of deformity of 100% was the Loon Lake female that also produced low survival and fertilization. Of the 38 fertilized eggs reared, only seven survived until termination, all of which exhibited a mild deformity. For fish with significant or multiple deformities (GSI of 2 or more), the mean (\pm standard deviation) percent of deformed fish was 7.0 \pm 11.2% and ranged between 0 and 47.3%.



 Table 3.
 Redside shiner survival, growth and incidence of deformities

Site	Female ID		urvi an : (%)	± SD	Fertilization (%)		.eng ean (mr	± SD	•	fish	ht per I D (mg)	deforn	nity mo	re)	deform or	nity mo	ce of (GSI 2 re) SD (%)
STPD	1	79	±	10	61	7.8	<u>+</u>	0.3	0.34	± ±	0.01	2.8	±	3.3	2.0	± ±	2.5
STPD	2	96	±	4.9	64	7.3	±	0.2	0.34	±	0.01	1.1	±	1.2	1.1	±	1.2
STPD	3	76	±	N/A	19	7.6	±	N/A	0.33	±	N/A	0	±	N/A	0	±	N/A
STPD	4	88	±	6.8	47	7.1	±	0.1	0.28	±	0.00	1.7	±	2.9	0	±	0.0
STPD	5	92	±	2.0	46	7.1	±	0.1	0.28	±	0.01	1.5	±	1.3	1.5	±	1.3
STPD	6	90	±	5.5	44	7.2	±	0.4	0.35	±	0.00	4.7	±	6.6	4.7	±	6.6
STPD	7	90	±	14	58	6.8	±	0.0	0.26	±	0.04	9.6	±	6.6	9.6	±	6.6
STPD	8	84	±	3.1	65	6.8	±	0.2	0.28	±	0.01	4.4	±	1.8	4.4	±	1.8
STPD	9	89	±	17	74	7.2	±	0.2	0.34	±	0.01	5.6	±	0.6	4.7	±	1.7
STPD	10	82	±	8.7	59	7.3	±	0.2	0.4	_ ±	0.00	7.7	+	1.9	6.9	±	1.4
STPD	11	94	±	5.9	87	7.1	±	0.1	0.29	_ ±	0.01	1.6	+	2.2	1.1	±	1.2
STPD	12	88	±	2.2	53	7.1	±	0.2	0.29	_ ±	0.01	3.6	±	2.0	3.6	±	2.0
STPD	13	46	±	37	40	7.3	±	0.1	0.31	±	0.01	4.2	±	5.9	2.8	±	3.9
STPD	14	91	<u>+</u>	7.2	74	7.3	±	0.2	0.36	<u>+</u>	0.01	16	±	19.3	11	±	12.3
STPD	15	90	±	5.9	65	7.3	±	0.1	0.34	±	0.01	2.7	±	0.5	2.7	±	0.5
STPD	16	90	±	8.4	93	6.9	±	0.1	0.28	±	0.00	23	±	19.7	5.5	±	4.0
ERIMF	4	87	±	0.94	44	7.0	±	0.2	0.24	±	0.01	0	±	0.0	0	±	0.0
ERIMF	5	98	±	5.0	89	7.4	±	0.2	0.35	±	0.01	1.1	±	2.2	1.1	±	2.2
ERIMF	6	88	±	N/A	13	6.7	±	N/A	0.32	±	N/A	14	±	N/A	14	±	N/A
ERIMF	7	70	±	2.3	22	7.2	±	0.0	0.37	±	0.02	21	±	9.5	16	±	3.0
ERIMF	8	83	±	N/A	10	7.4	±	N/A	0.4	±	N/A	0	±	N/A	0	±	N/A
ERIMF	9	100	±	N/A	4	7.5	±	N/A	0.42	±	N/A	0	±	N/A	0	±	N/A
ERIMF	10	95	±	3.7	52	7.4	±	0.2	0.34	±	0.00	6.8	±	6.5	5.4	±	4.5



												Inci	den	ce of	Incid	len	ce of
		Si	urvi	val		ı	.eng	gth	Dry w	/eig	ht per	defor	nity	(GSI 1	deform	nity	(GSI 2
	Female	me	an	± SD	Fertilization	me	ean	± SD		fish	1	or	mo	re)	or	mo	re)
Site	ID		(%)	(%)		(mr	n)	mean	± S	D (mg)	mear	ı ± S	SD (%)	mean	± S	SD (%)
ERIMF	11	64	±	N/A	23	6.7	±	N/A	0.35	±	N/A	32	±	N/A	24	±	N/A
ERIMF	12	42	±	12	39	6.5	±	0.2	0.33	±	0.05	51	±	21.7	47	±	27.3
ERIMF	13	78	±	N/A	15	6.7	±	N/A	0.39	±	N/A	44	±	N/A	44	±	N/A
ERIMF	14	59	±	27	38	7.0	±	0.4	0.45	±	0.26	7.1	±	10.1	2.4	±	3.4
ERIMF	15	94	±	5.7	24	7.1	±	0.5	0.30	±	0.01	20	±	19.2	13	±	12.8
ERIMF	16	79	±	N/A	24	6.6	±	N/A	0.30	±	N/A	50	±	N/A	39	±	N/A
LNLK	11	95	±	4.2	87	7.5	±	0.1	0.40	±	0.01	8.3	±	15.3	4.4	±	7.5
LNLK	12	91	±	13	71	7.3	±	0.2	0.41	±	0.00	3.7	±	5.2	1.2	±	1.7
LNLK	13	81	±	13	82	7.4	±	0.0	0.38	±	0.03	0.68	±	1.4	0.68	±	1.4
LNLK	14	93	±	6.0	36	7.5	±	0.2	0.36	±	0.02	1.7	±	3.3	0.56	±	1.1
LNLK	15	85	±	9.3	43	7.3	±	0.2	0.35	±	0.04	1.7	±	3.5	0.58	±	1.2
LNLK	16	18	±	N/A	12	6.6	±	N/A	0.41	±	N/A	100	±	N/A	43	±	N/A
LNLK	17	94	±	3.4	39	7.5	±	0.1	0.35	±	0.01	0.0	±	0.0	0.0	±	0.0
LNLK	18	100	±	N/A	6.5	6.9	±	N/A	0.37	±	N/A	9.1	±	N/A	9.1	±	N/A
LNLK	19	87	±	10.0	45	7.3	±	0.1	0.41	±	0.04	0.0	±	0.0	0.0	±	0.0
LNLK	20	99	±	1.4	26	7.3	±	0.0	0.38	±	0.00	0.0	±	0.0	0.0	±	0.0
ERWSF	1	69	±	7.1	67	7.5	±	0.1	0.36	±	0.01	5.7	±	4.2	0.0	±	0.0
ERWSF	2	85	±	17	68*	6.5	±	0.1	0.22	±	0.00	20	±	6.3	18	±	6.2
ERWSF	3	94	±	5.2	69	6.8	±	0.1	0.22	±	0.01	2.0	±	1.9	2.0	±	1.9
ER	1	95	±	3.0	41	7.4	±	0.1	0.40	±	0.03	4.9	±	1.6	2.3	±	1.7
ER	2	94	±	7.9	71	7.5	±	0.3	0.44	±	0.01	2.0	±	2.8	1.5	±	1.9
ER	3	23	±	N/A	5.7	7.0	±	N/A	0.31	±	N/A	60	±	N/A	20	±	N/A
ER	4	93	±	4.5	90	7.5	±	0.0	0.34	±	0.01	0.69	±	1.2	0.69	±	1.2
ER	5	97	±	3.0	76	7.5	±	0.1	0.35	±	0.00	2.0	±	1.6	0.0	±	0.0
ER	6	92	±	7.1	62	7.4	±	0.1	0.28	±	0.02	1.6	±	1.1	1.6	±	1.1
ER	7	92	±	3.4	76	7.6	±	0.1	0.32	±	0.02	2.2	±	1.8	1.7	±	1.1
ER	8	99	±	1.9	77	7.9	±	0.1	0.44	±	0.01	1.5	±	2.0	1.0	±	1.2



Site	Female ID	Survival mean ± SD (%)	Fertilization (%)	Length mean ± SD (mm)	Dry weight per fish mean ± SD (mg)	Incidence of deformity (GSI 1 or more) mean ± SD (%)	Incidence of deformity (GSI 2 or more) mean ± SD (%)
ER	9	97 ± 4.1	85	7.9 ± 0.1	0.36 ± 0.01	0.99 ± 1.1	0.45 ± 0.9
ER	10	90 ± 5.1	57	7.5 ± 0.2	0.36 ± 0.01	6.9 ± 2.9	5.8 ± 2.2
ER	11	96 ± 3.4	87	7.5 ± 0.0	0.32 ± 0.01	2.1 ± 1.7	2.1 ± 1.7
ER	12	97 ± 4.7	82	7.7 ± 0.1	0.32 ± 0.01	2.7 ± 3.3	1.6 ± 2.1
ER	13	95 ± 6.2	85	7.9 ± 0.0	0.36 ± 0.04	1.6 ± 1.1	1.0 ± 1.2
ER	14	93 ± 6.2	75	7.8 ± 0.2	0.46 ± 0.02	3.8 ± 1.0	3.8 ± 1.0

^{*}Higher fertilization rate from fertilization method development

Overall, the high survival, consistent growth and generally low incidence of deformities suggest that limited differences between RSC collection sites and that the methods developed during this study were suitable for successful rearing of this species.



4.0 REFERENCES

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APPENDIX A – Redside shiner (<i>Richardsonius balteatus</i>) exposure data

avg dry Deformity Deformity Deformity weight avg dry Average trich-Se SRC-Se length GSI 1 or GSI 1 or GSI 2 or GSI 2 or per fish weight n Female unripe unripe (# of % Length SD more more SD more SD per fish Survival Survival mean more mean ID reps) Fertilization (mm) mean (%) (%) mean (%) (%) (mg) SD (%) SD (%) Site ovary ovarv (mm) 1 36.8 3.3 0.015 79 **STPD** 35 4 61 7.8 0.29 2.8 2.0 2.5 0.34 10 **STPD** 35.0 7.3 1.2 1.2 0.35 0.0051 96 4.9 2 35 4 64 0.18 1.1 1.1 **STPD** 3 1 7.6 0 0 0.31 25.9 31 19 76 3 0 0.0034 6.8 **STPD** 4 47 7.1 0.14 1.7 2.9 0 0.28 88 35.7 39 0.0061 **STPD** 5 30.5 34 3 46 7.1 0.29 1.5 1.3 1.5 1.3 0.3 92 2.0 0.0016 **STPD** 6 27.8 28 2 44 7.2 0.43 4.7 6.6 4.7 6.6 0.35 90 5.5 2 **STPD** 7 42.4 41 58 6.8 0.015 9.6 6.6 9.6 6.6 0.26 0.038 90 14 0.0069 **STPD** 8 36.6 36 3 65 6.8 0.24 4.4 1.8 4.4 1.8 0.28 84 3.1 17 **STPD** 9 30.4 28 3 74 7.2 0.17 5.6 0.57 4.7 1.7 0.34 0.006 89 **STPD** 33.1 3 59 7.3 0.18 7.7 1.9 6.9 0.4 0.0046 82 8.7 10 30 1.4 0.0054 5.9 **STPD** 35.0 4 87 7.1 1.2 0.29 11 44 0.14 1.6 2.2 1.1 94 **STPD** 2 53 7.1 0.22 3.6 2.0 3.6 2.0 0.0056 88 2.2 12 35.4 34 0.29 2 37 **STPD** 43.0 42 40 7.3 4.2 5.9 2.8 3.9 0.31 0.0075 46 13 0.11 **STPD** 4 0.0065 14 29.6 30 74 7.3 0.16 16 19 11 12 0.36 91 7.2 **STPD** 15 36.8 33 2 65 7.3 0.14 2.7 0.5 2.7 0.5 0.34 0.01 90 5.9 0.0026 **STPD** 16 47.1 40 4 93 6.9 0.088 23 20 5.5 4.0 0.28 8.4 90 **ERIMF** 4 9.7 7.6 2 44 7.0 0.23 0 0 0 0 0.24 0.013 87 0.94 2.2 2.2 **ERIMF** 5 7.9 9.3 4 89 7.4 0.17 1.1 1.1 0.35 0.006 98 5.0 **ERIMF** 6 4.7 3.8 1 13 6.7 14 14 0.32 88 0.37 **ERIMF** 7 5.8 2 22 7.2 0.0074 21 9.5 16 3.0 0.016 70 2.3 5.7 **ERIMF** 8 14.4 12 1 10 7.4 0 0 0.4 83 **ERIMF** 9 7.7 1 7.5 0 0 0.42 10.3 4.0 100 2 2 4.5 **ERIMF** 10 9.1 52 7.4 0.18 6.8 6.5 5.4 0.34 0.0011 95 3.7 **ERIMF** 10.2 12 1 23 6.7 32 0.35 11 24 64 8.5 2 22 12 **ERIMF** 12 6.7 39 6.5 0.16 51 47 27 0.33 0.045 42 **ERIMF** 13 5.0 5.3 1 15 6.7 44 44 0.39 78 0.44 27 2 38 **ERIMF** 14 23.2 20 7.0 7.1 10 2.4 3.4 0.45 0.26 59 **ERIMF** 5.7 2 15 8.4 6.4 24 7.1 0.46 20 19 13 13 0.3 0.015 94 **ERIMF** 16 8.5 8.4 1 24 6.6 50 39 0.3 79

LNLK	11	1.5	1.2	4	87	7.5	0.097	8.3	15	4.4	7.5	0.4	0.0096	95	4.2
LNLK	12	1.5	1.4	2	71	7.3	0.22	3.7	5.2	1.2	1.7	0.41	0.001	91	13
LNLK	13	1.8	1.3	4	82	7.4	0.031	0.68	1.4	0.68	1.4	0.38	0.035	81	13
LNLK	14	1.7	1.4	4	36	7.5	0.16	1.7	3.3	0.56	1.1	0.36	0.021	93	6.0
LNLK	15	2.1	1.4	4	43	7.3	0.17	1.7	3.5	0.58	1.2	0.35	0.04	85	9.3
LNLK	16	1.8	1.5	1	12	6.6		100		43		0.41		18	
LNLK	17	2.6	2	2	39	7.5	0.15	0	0	0	0	0.35	0.0076	94	3.4
LNLK	18	1.8	1.7	1	6.5	6.9		9.1		9.1		0.37		100	
LNLK	19	1.6	1.6	4	45	7.3	0.12	0	0	0	0	0.41	0.036	87	10.0
LNLK	20	2.0	1.6	2	26	7.3	0.049	0	0	0	0	0.38	0.0037	99	1.4
ERWSF	1	16.9	20	2	67	7.5	0.057	5.7	4.2	0	0	0.36	0.0081	69	7.1
ERWSF	2	12.9	13	2	68	6.5	0.078	20	6.3	18	6.2	0.22	0.00036	85	17
ERWSF	3	14.3	11	3	69	6.8	0.064	2.0	1.9	2.0	1.9	0.22	0.013	94	5.2
ER	1	24.4	22	4	41	7.4	0.14	4.9	1.6	2.3	1.7	0.4	0.027	95	3.0
ER	2	16.8	18	4	71	7.5	0.27	2.0	2.8	1.5	1.9	0.44	0.0057	94	7.9
ER	3	30.3	25	1	5.7	7.0		60		20		0.31		23	
ER	4	27.8	22	3	90	7.5	0.026	0.69	1.2	0.69	1.2	0.34	0.0068	93	4.5
ER	5	38.9	27	4	76	7.5	0.085	2.0	1.6	0	0	0.35	0.0038	97	3.0
ER	6	18.7	19	4	62	7.4	0.084	1.6	1.1	1.6	1.1	0.28	0.024	92	7.1
ER	7	5.9	14	4	76	7.6	0.064	2.2	1.8	1.7	1.1	0.32	0.019	92	3.4
ER	8	40.4	36	4	77	7.9	0.14	1.5	2.0	1.0	1.2	0.44	0.0068	99	1.9
ER	9	35.2	26	4	85	7.9	0.063	0.99	1.1	0.45	0.91	0.36	0.011	97	4.1
ER	10	27.3	16	4	57	7.5	0.15	6.9	2.9	5.8	2.2	0.36	0.0062	90	5.1
ER	11	19.6	18	4	87	7.5	0.027	2.1	1.7	2.1	1.7	0.32	0.0073	96	3.4
ER	12	41.3	38	4	82	7.7	0.098	2.7	3.3	1.6	2.1	0.32	0.013	97	4.7
ER	13	25.8	23	4	85	7.9	0.031	1.6	1.1	1.0	1.2	0.36	0.035	95	6.2
ER	14	22.7	16	4	75	7.8	0.17	3.8	0.98	3.8	0.98	0.46	0.016	93	6.2

									GSI		
	Famala		# fish	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	Female ID	Rep	assessed in replicate	# normai fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
STPD	1	В	32	30	2	1	22	2	0	0	1
3170	1	Ь	32	30	2	1	3	0	0	1	0
STPD	1	С	40	38	2	2	22	3	3	0	0
							27	3	3	0	0
STPD	1	D	42	42	0	0	N/A				
STPD	1	Е	40	40	0	0	N/A				
STPD	2	В	50	49	1	1	49	1	1	3	3
STPD	2	С	40	40	0	0	N/A				
STPD	2	D	45	44	1	1	23	2	1	0	2
STPD	2	Е	50	50	0	0	N/A				
STPD	3	В	25	25	0	0	N/A				
STPD	3	С	N/A	N/A	N/A	N/A	N/A				
STPD	3	D	N/A	N/A	N/A	N/A	N/A				
STPD	3	Ε	N/A	N/A	N/A	N/A	N/A				
STPD	4	В	46	46	0	0	N/A				
STPD	4	С	40	38	2	0	14	0	1	0	0
							31	0	0	1	0
STPD	4	D	44	44	0	0	N/A				
STPD	4	Ε	N/A	N/A	N/A	N/A	N/A				
STPD	5	В	47	46	1	1	11	3	3	0	3
STPD	5	С	45	45	0	0	N/A				
STPD	5	D	44	43	1	1	30	3	1	0	1
STPD	5	Е	N/A	N/A	N/A	N/A	N/A				
STPD	6	В	43	39	4	4	4	3	0	0	0
							5	3	3	0	0
							10	2	1	0	3
							15	2	3	0	3
STPD	6	С	15	15	0	0	N/A				
STPD	6	D	N/A	N/A	N/A	N/A	N/A				

									GSI		
			# fish		# fish with deformity	# fish with deformity					
	Female	_	assessed in	# normal	GSI 1 or	GSI 2 or	Fish	a.			
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
STPD	6	E	N/A	N/A	N/A	N/A	N/A				
STPD	7	В	40	38	2	2	5	0	1	1	2
CTDD							10	3	0	3	0
STPD	7	C	7	6	1	1	7	0	0	3	1
STPD	7	D	N/A	N/A	N/A	N/A	N/A				
STPD	7	E	N/A	N/A	N/A	N/A	N/A				
STPD	8	В	43	41	2	2	19	3	3	3	3
							25	3	3	0	0
STPD	8	С	40	39	1	1	29	2	0	0	2
STPD	8	D	33	31	2	2	1	3	0	0	0
							2	3	2	3	2
STPD	8	Е	N/A	N/A	N/A	N/A	N/A				
STPD	9	В	35	33	2	1	10	0	0	0	1
							18	0	3	0	0
STPD	9	С	49	46	3	3	23	2	0	0	0
							25	3	3	2	3
							40	3	3	3	3
STPD	9	D	40	38	2	2	24	0	1	1	3
							28	0	2	0	0
STPD	9	Е	N/A	N/A	N/A	N/A	N/A				
STPD	10	В	36	34	2	2	9	3	0	0	0
							27	2	0	0	0
STPD	10	С	44	40	4	3	2	3	0	0	0
							3	3	0	0	0
							16	0	0	0	1
							17	0	1	0	2
STPD	10	D	12	11	1	1	2	2	3	0	1
STPD	10	E	N/A	N/A	N/A	N/A	N/A			-	
STPD	11	В	44	42	2	1	19	3	0	0	1

					# fish with	# fish with			GSI		
			# fish		deformity	deformity					
	Female		assessed in	# normal	GSI 1 or	GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							37	0	0	0	1
STPD	11	С	49	48	1	1	5	3	0	0	0
STPD	11	D	45	45	0	0	N/A				
STPD	11	Е	50	50	0	0	N/A				
STPD	12	В	45	44	1	1	25	3	2	3	3
STPD	12	С	20	19	1	1	3	1	1		1
STPD	12	D	N/A	N/A	N/A	N/A	N/A				
STPD	12	Ε	N/A	N/A	N/A	N/A	N/A				
STPD	13	В	36	33	3	2	4	3	0	0	2
							6	0	0	0	1
							26	0	0	0	2
STPD	13	С	1	1	0	0	N/A				
STPD	13	D	N/A	N/A	N/A	N/A	N/A				
STPD	13	E	N/A	N/A	N/A	N/A	N/A				
STPD	14	В	50	48	2	2	5	3	0	0	0
							31	2	0	0	2
STPD	14	С	47	27	20	13	1	1	0	0	0
							2	1	0	0	0
							3	1	0	0	0
							8	1	0	0	0
							15	2	0	0	0
							16	3	0	0	0
							17	2	0	0	0
							21	2	0	0	0
							22	3	0	0	0
							23	2	0	0	0
							26	3	0	0	0
							27	2	0	0	0
							28	1	0	0	0

									GSI		
					# fish with	# fish with					
			# fish		deformity	deformity					
	Female		assessed in	# normal	GSI 1 or	GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							29	1	0	0	0
							32	3	0	0	0
							33	3	0	0	0
							39	3	0	0	0
							41	3	0	0	0
							42	2	0	0	0
							43	1	0	0	0
STPD	14	D	42	34	8	6	2	3	2	0	3
							15	2	0	0	2
							26	2	0	0	1
							30	3	3	3	3
							39	2	3	2	3
							40	2	0	0	0
							41	1	0	0	0
							42	1	0	0	0
STPD	14	Е	26	26	0	0	N/A				
STPD	15	В	43	42	1	1	40	0	2	0	2
STPD	15	С	33	32	1	1	25	3	2	0	2
STPD	15	D	N/A	N/A	N/A	N/A	N/A				
STPD	15	Е	N/A	N/A	N/A	N/A	N/A				
STPD	16	В	46	42	4	1	39	1	0	0	0
							40	1	0	0	0
							41	1	0	0	0
							44	2	0	0	0
STPD	16	С	39	36	3	3	27	3	0	0	0
	10	Č	33	20	J	J	38	3	0	0	0
							39	2	0	0	0
STPD	16	D	49	37	12	1	19	1	0	0	0
JIID	10	D	73	31	12	1	20	1	0	0	0

					# fish with	# fish with			GSI		
			# fish		deformity	deformity					
	Female		assessed in	# normal	GSI 1 or	GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							25	1	0	0	0
							30	0	0	0	1
							36	1	0	0	0
							37	0	0	0	1
							39	1	0	0	0
							40	1	0	0	0
							42	2	0	0	0
							43	1	0	0	0
							45	1	0	0	0
							47	1	0	0	0
STPD	16	Ε	20	10	10	2	1	1	0	0	0
							2	1	0	0	0
							3	1	0	0	0
							5	1	0	0	0
							12	2	0	0	0
							13	3	3	1	3
							15	1	0	0	0
							17	1	0	0	0
							18	1	0	0	0
							19	1	0	0	0
ERIMF	4	В	13	13	0	0	N/A				
ERIMF	4	С	44	44	0	0	N/A				
ERIMF	4	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	4	E	N/A	N/A	N/A	N/A	N/A				
ERIMF	5	В	51	51	0	0	N/A				
ERIMF	5	С	45	45	0	0	N/A				
ERIMF	5	D	50	50	0	0	N/A				
ERIMF	5	Ε	23	22	1	1	5	3	0	3	3
ERIMF	6	В	7	6	1	1	1	0	1	0	2

			# £: - b		# fish with	# fish with			GSI		
	Female		# fish assessed in	# normal	deformity GSI 1 or	deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	# normai fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
ERIMF	6	С	N/A	N/A	N/A	N/A	N/A	JKEIELAI	Cramoraciai	riiiloiu	Lucilla
ERIMF	6	D	N/A	N/A N/A	N/A	N/A	N/A				
ERIMF	6	E	N/A	N/A	N/A N/A	N/A	N/A				
ERIMF	7	В	36	31	N/A	5	10	3	0	0	0
EKIIVIF	,	В	30	31	5	5					
							23 29	0	3	0	2
								1	2	0	2
							30	0	0	0	2
							33	3	0	0	1
ERIMF	7	С	11	8	3	2	2	2	3	1	2
							3	2	0	0	0
							7	0	0	0	1
ERIMF	7	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	7	E	N/A	N/A	N/A	N/A	N/A				
ERIMF	8	В	19	19	0	0	N/A				
ERIMF	8	С	N/A	N/A	N/A	N/A	N/A				
ERIMF	8	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	8	Е	N/A	N/A	N/A	N/A	N/A				
ERIMF	9	В	4	4	0	0	N/A				
ERIMF	9	С	N/A	N/A	N/A	N/A	N/A				
ERIMF	9	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	9	E	N/A	N/A	N/A	N/A	N/A				
ERIMF	10	В	46	45	1	1	40	2	0	0	0
ERIMF	10	С	35	31	4	3	1	1	0	0	0
							22	3	0	0	0
							28	2	0	0	0
							32	3	2	0	1
ERIMF	10	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	10	Е	N/A	N/A	N/A	N/A	N/A				
ERIMF	11	В	25	17	8	6	7	0	0	0	2

						,, 6 , 1, -, 2			GSI		
	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							10	2	3	0	3
							12	3	1	0	1
							14	3	1	1	3
							15	2	2	0	3
							18	0	0	0	1
							22	3	0	0	1
							25	0	0	0	1
ERIMF	11	С	N/A	N/A	N/A	N/A	N/A				
ERIMF	11	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	11	Е	N/A	N/A	N/A	N/A	N/A				
ERIMF	12	В	25	16	9	7	1	2	0	0	2
							7	3	3	2	3
							10	3	3	0	3
							13	0	0	0	1
							15	1	0	0	0
							16	2	3	0	3
							23	1	0	0	2
							24	3	0	0	0
							25	2	0	0	1
ERIMF	12	С	3	1	2	2	2	2	0	0	3
							3	0	1	2	3
ERIMF	12	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	12	Е	N/A	N/A	N/A	N/A	N/A				
ERIMF	13	В	18	10	8	8	1	3	3	0	3
	-		_	-	-	-	3	3	3	0	3
							4	2	3	0	3
							8	0	0	0	2
							10	0	0	0	2
							12	0	1	0	2
							1 +4	5	±	3	_

					# fish with	# fish with			GSI		
			# fish		deformity	deformity					
	Female		assessed in	# normal	GSI 1 or	GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema 3 2 0 1 0 1 0 2 0 3 3 3 2 2 0 0 0 0 0 0
							17	0	1	0	3
							18	0	0	0	2
ERIMF	13	С	N/A	N/A	N/A	N/A	N/A				
ERIMF	13	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	13	Ε	N/A	N/A	N/A	N/A	N/A				
ERIMF	14	В	20	20	0	0	N/A				
ERIMF	14	С	21	18	3	1	6	3	0	0	0
							9	0	0	0	1
							18	1	0	0	0
ERIMF	14	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	14	Е	N/A	N/A	N/A	N/A	N/A				
ERIMF	15	В	49	46	3	2	32	2	3	2	3
							43	2	0	0	0
							49	0	0	0	1
ERIMF	15	С	9	6	3	2	4	3	0	0	0
							5	0	0	0	2
							49	1	0	0	0
RIMF	15	D	N/A	N/A	N/A	N/A	N/A				
RIMF	15	Е	N/A	N/A	N/A	N/A	N/A				
RIMF	16	В	38	19	19	15	1	3	3	3	3
							2	3	0	3	3
							3	2	1	0	3
							4	1	2	0	2
							9	0	2	0	2
							10	1	0	0	2
							12	3	0	0	0
							13	1	0	0	0
							15	2	0	0	0
							18	2	0	0	0

									GSI		
	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							20	1	0	0	0
							26	2	1	0	3
							27	3	3	0	3
							29	2	0	0	1
							30	0	0	0	1
							33	2	0	0	0
							36	2	0	0	1
							37	3	0	0	1
							38	1	0	0	0
ERIMF	16	С	N/A	N/A	N/A	N/A	N/A				
ERIMF	16	D	N/A	N/A	N/A	N/A	N/A				
ERIMF	16	Ε	N/A	N/A	N/A	N/A	N/A				
LNLK	11	В	45	31	14	7	16	1	0	0	0
							23	1	0	0	0
							33	1	0	0	0
							34	1	0	0	0
							35	3	2	2	0
							37	1	0	0	0
							38	2	0	0	0
							39	1	0	0	0
							40	2	0	0	0
							41	1	0	0	0
							42	2	0	0	0
							43	2	0	0	0
							44	2	3	0	3
							45	2	0	0	0
LNLK	11	С	52	51	1	1	18	0	0	0	2
LNLK	11	D	48	48	0	0	N/A				
LNLK	11	Е	47	47	0	0	N/A				

									GSI		
	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
LNLK	12	В	41	38	3	1	6	0	2	0	2
							29	1	0	0	0
							32	1	0	0	0
LNLK	12	С	37	37	0	0	N/A				
LNLK	12	D	N/A	N/A	N/A	N/A	N/A				
LNLK	12	E	N/A	N/A	N/A	N/A	N/A				
LNLK	13	В	49	49	0	0	N/A				
LNLK	13	С	41	41	0	0	N/A				
LNLK	13	D	37	36	1	1	35	0	0	0	2
LNLK	13	Е	34	34	0	0	N/A				
LNLK	14	В	43	43	0	0	N/A				
LNLK	14	С	47	47	0	0	N/A				
LNLK	14	D	45	42	3	1	22	0	0	0	1
							36	0	0	0	1
							40	0	2	1	3
LNLK	14	Ε	4	4	0	0	N/A				
LNLK	15	В	43	40	3	1	18	0	0	0	1
							35	0	0	0	1
							43	3	2	0	2
LNLK	15	С	40	40	0	0	N/A				
LNLK	15	D	49	49	0	0	N/A				
LNLK	15	Е	10	10	0	0	N/A				
LNLK	16	В	7	0	7	3	1	0	1	0	0
							2	0	0	0	1
							3	2	0	0	1
							4	2	2	0	3
							5	0	0	0	1
							6	3	3	0	1
							7	0	0	0	1

									GSI		
			# C:-L		# fish with	# fish with					
	Female		# fish assessed in	# normal	deformity GSI 1 or	deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
LNLK	16	C	N/A	N/A	N/A	N/A	N/A	Siteretai	Cramoracia	Timola	Lucina
LNLK	16		N/A	N/A	N/A	N/A	N/A				
LNLK	16	E	N/A	N/A	N/A	N/A	N/A				
LNLK	17	В	46	46	0	0	N/A				
LNLK	17	С	30	30	0	0	N/A				
LNLK	17	D	N/A	N/A	N/A	N/A	N/A				
LNLK	17	Е	N/A	N/A	N/A	N/A	N/A				
LNLK	18	В	11	10	1	1	11	3	1	2	1
LNLK	18	С	N/A	N/A	N/A	N/A	N/A				
LNLK	18	D	N/A	N/A	N/A	N/A	N/A				
LNLK	18	Е	N/A	N/A	N/A	N/A	N/A				
LNLK	19	В	47	47	0	0	N/A				
LNLK	19	С	42	42	0	0	N/A				
LNLK	19	D	48	48	0	0	N/A				
LNLK	19	Е	29	29	0	0	N/A				
LNLK	20	В	49	49	0	0	N/A				
LNLK	20	С	10	10	0	0	N/A				
LNLK	20	D	N/A	N/A	N/A	N/A	N/A				
LNLK	20	Е	N/A	N/A	N/A	N/A	N/A				
ERWSF	1	В	37	36	1	0	24	1	0	0	0
ERWSF	1	С	23	21	2	0	8	1	0	0	0
							9	1	0	0	0
ERWSF	1	D	N/A	N/A	N/A	N/A	N/A				
ERWSF	1	Е	N/A	N/A	N/A	N/A	N/A				
ERWSF	2	В	44	32	12	11	5	0	0	0	1
							17	0	2	0	0
							20	2	0	1	2
							23	3	0	0	3
							27	2	0	2	3

									GSI		
	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
							31	3	0	0	3
							32	3	2	0	3
							34	2	0	0	3
							35	3	1	0	1
							36	3	0	2	2
							37	2	3	2	3
							44	0	3	3	3
ERWSF	2	С	31	26	5	4	4	2	0	0	2
							13	0	0	0	1
							15	3	0	0	0
							30	2	0	0	0
							31	3	3	2	3
ERWSF	2	D	6	5	1	1	4	2	0	2	1
ERWSF	2	E	N/A	N/A	N/A	N/A	N/A				
ERWSF	3	В	54	52	2	2	35	3	0	0	0
							36	2	2	0	2
ERWSF	3	С	45	44	1	1	1	3	3	2	3
ERWSF	3	D	38	38	0	0	N/A				
ERWSF	3	E	N/A	N/A	N/A	N/A	N/A				
ER	1	В	48	45	3	2	3	3	3	1	3
							13	1	0	0	0
							42	3	0	1	0
ER	1	С	46	44	2	0	10	1	0	0	0
							29	1	0	0	0
ER	1	D	49	46	3	1	9	2	1	0	1
							33	1	0	0	0
							40	1	0	0	0
ER	1	Ε	35	34	1	1	18	3	0	1	0
ER	2	В	48	48	0	0	N/A				

									GSI		
	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish				
Site	remale ID	Rep		# normai fish	more		ID	Skeletal	Craniofacial	Finfold	Edema
ER	2	С	51	48	3	more 2	8	3		3	
EK	2	C	21	48	3	2	12	0	1 0	0	3 1
							25	2	0	0	0
ER	2	D	48	47	1	1	6	3	3	3	3
ER	2	E	41	41	0	0	N/A				
ER	3	B	5	2	3	1	1	0	0	0	1
	_		_		_		2	1	0	0	0
							3	0	2	1	3
ER	3	С	N/A	N/A	N/A	N/A	N/A				
ER	3	D	N/A	N/A	N/A	N/A	N/A				
ER	3	Е	N/A	N/A	N/A	N/A	N/A				
ER	4	В	48	47	1	1	23	3	0	0	0
ER	4	С	48	48	0	0	N/A				
ER	4	D	15	15	0	0	N/A				
ER	4	Е	N/A	N/A	N/A	N/A	N/A				
ER	5	В	49	48	1	0	30	0	0	0	1
ER	5	С	52	50	2	0	10	1	0	0	0
							20	1	0	0	0
ER	5	D	47	46	1	0	40	0	1	0	0
ER	5	Ε	47	47	0	0	N/A				
ER	6	В	49	48	1	1	40	0	2	0	3
ER	6	С	48	47	1	1	25	3	1	0	0
ER	6	D	41	40	1	1	30	3	0	0	0
ER	6	Е	12	12	0	0	N/A				
ER	7	В	46	45	1	1	35	3	1	1	2
ER	7	С	48	48	0	0	N/A				
ER	7	D	45	43	2	1	5	0	2	1	3
							45	0	0	0	1
ER	7	Ε	44	43	1	1	30	0	1	3	3

			# fish		# fish with deformity	# fish with deformity	GSI				
	Female		assessed in	# normal	GSI 1 or	GSI 2 or	Fish				_
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
ER	8	В	49	49	0	0	N/A				
ER	8	С	50	50	0	0	N/A				
ER	8	D	48	46	2	1	10	0	0	0	1
							25	2	0	0	1
ER	8	Ε	50	49	1	1	35	3	1	0	0
ER	9	В	55	55	0	0	N/A				
ER	9	С	47	47	0	0	N/A				
ER	9	D	47	46	1	0	7	0	0	0	1
ER	9	Е	55	54	1	1	10	3	0	1	3
ER	10	В	48	43	5	4	1	2	3	0	3
							2	3	2	1	3
							3	3	2	2	3
							5	2	2	1	2
							20	0	0	0	1
ER	10	С	42	39	3	2	9	2	1	1	2
							10	3	0	0	0
							40	0	0	0	1
ER	10	D	44	41	3	3	9	2	3	1	3
							10	2	2	2	3
							40	2	2	0	3
ER	10	Е	30	29	1	1	15	2	1	0	3
ER	11	В	50	49	1	1	30	0	0	0	2
ER	11	С	46	45	1	1	30	1	1	0	3
ER	11	D	48	48	0	0	N/A				
ER	11	E	47	45	2	2	24	0	0	0	2
							25	3	0	1	1
ER	12	В	53	53	0	0	N/A			_	
ER	12	С	45	42	3	2	19	1	1	0	2
		•		.=	-	_	30	0	0	0	2

	Female		# fish assessed in	# normal	# fish with deformity GSI 1 or	# fish with deformity GSI 2 or	Fish		GSI		
Site	ID	Rep	replicate	fish	more	more	ID	Skeletal	Craniofacial	Finfold	Edema
			Торигосто				35	0	0	0	1
ER	12	D	53	53	0	0	N/A				
ER	12	Е	48	46	2	1	10	1	2	0	0
							15	1	0	0	0
ER	13	В	43	42	1	0	30	0	1	0	0
ER	13	С	47	47	0	0	N/A				
ER	13	D	49	48	1	1	5	0	3	3	1
ER	13	Е	49	48	1	1	7	0	3	0	1
ER	14	В	50	48	2	2	13	3	3	2	3
							46	2	0	0	1
ER	14	С	44	42	2	2	10	1	2	0	3
							13	3	3	2	1
ER	14	D	43	42	1	1	21	0	0	1	2
ER	14	Е	48	46	2	2	1	0	0	0	3
							21	3	3	1	3

	las	Initia K C		Final \		Quality o	y Mea	asurei	ments			190	13P-
Client:			04.1				Start	Date &	Time:	Mili	11014	1967	LOSI
Sample ID:	MA						Stop	Date &	Time:	Tur	2512	ادرح	
Work Order #:	211		-					Test Sp	ecies:	Redside	e shiner		
ERIMFI	20		-				Days						
Concentration	0	1		2		3		L		5		6	
	init.	new	old	new	old	new	old	new	old	new	old	new	eld
Temperature (°C)	12.5	15.40	14.5	15.0	14.5	14,0							
DO (mg/L)	8:13	H1+10	19.2	10.3	9.3	10.2							
pH	7.8	7.7	7.8	7.9	7.8	77			/	-9			
Cond. (µS/cm)	738	33	3		27	34	1	in the said or in the said of the said					
Initials	300	CI	20		SU		/						
ERIMEZ.							Days		-				
Concentration	0			7	7		2	4		5			0
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	12-2	15.20		15.0	14.5	TICW	Olu	HEAA	Olu	new	Olu	Hew	Ulu
DO (mg/L)	7.5	71.16°		10.3	9,2				_				
pH		077	78	7.9			-				-		
Cond. (µS/cm)			38		7.8				-				
Initials					17		/	- Area					
initials	BIL	CA	U(D	8-		3				alexander de		
ERIMF3							Days						
Concentration	O			7	7	3		L	1	5	5	6	2
	init.	new	old	new	old	new	old	new	old	new	old	new_	old
Temperature (°C)	12-0			18.0	14.5				0.0				
DO (mg/L)	7.5	7.1.4		10.3	9.3				115-20				
pH 7.7 @		-77	7.8	7.9	7.5								
Cond. (µS/cm)	326	-		3:	7.3	-			100				
Initials	BOL				p.				77		117.77		
midalo		L	~\	1 0)									
ERIMF4							Days						
Concentration	0			1	_	1	5	Ц		5		6	
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	12:0		14.5	15.0	14.5	152	15.0	1572	150	14.5	140	14.0	13.5
DO (mg/L)	6.2	11-16	19.3	10.3	9.3	10.0	9,8,	120	98	10.2	10.3	10.2	10.1
pH 7→0	1231	-7.7	7.7	7.9	7.8	7√6	25	76	7-7	7.5	7.5	7.7	7.7
Cond. (µS/cm)	331	33		32		3	39		γo		38	34	
Initials	BEL	C	nl		SL.		-	2		im			if
Thermometer:	<u>T-9</u>	DC) meter	:_00		pН	meter:	ρИ	-3			meter:	
	Co	ntrol								Analys	sts:	BAL/A	
Hardness*		/_											K JL
Alkalinity*	_/										wed by:		
* mg/L as CaCO3										Date re	viewed	201	91151
Sample Description	1:	7											
								74					

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements Embrio Start Date & Time: Ma Client: Sample ID: Stop Date & Time: Tow Work Order #: Test Species: Redside shiner 10091 Days Concentration init. new old new old new old new old new old new old 145 EN-15-014.7 1573 Temperature (°C) 1500 1572 140 13.5 15.0 14.5 14.0 0,0 9,8 DO (mg/L) 10.3 9.2 9.3 10,3 102 10.2 7.6 76 76 рН 7.8 7.5 3,5 7.5 7.7 Cond. (µS/cm) 317 340 333 341 339 Initials BRL Nuis CMP 3 10.5 CH Days Concentration init. new old new old new old new old new old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. old old old old old new old new new new new new Temperature (°C) DO (mg/L) Hq Cond. (µS/cm)

Thermometer:	T-7 DO	meter: DO-3	pH meter:	C-Hq :	Conductivity	meter: cond - 3
	Control				Analysts:	BPL/AWD/CI
Hardness*						YYL/KJL
Alkalinity*					Reviewed by	: SS
* mg/L as CaCO3	/				Date reviewed	2019/12/19
Sample Descriptio	n:					GITAL .
Comments:						

Initiale

lient:		K C	oal		7		Star	t Date &	Tingle:	Ma	1151	1960	2057
ample ID:	N/A			e e		• (Stop	Date &	Time:	June	-5/2	-019	
/ork Order #:								Test Sp	ećies:	Redsid	e shiner		
ERIMF4					,		Days						
Concentration		1	-	8	3	0		10)	l j		1	7
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14.0	1410	14.0	14.0	14.0	13.5	14.0	14.0	1342	135	140	13.5
DO (mg/L)		10.2	9,9	ioil	10.0	10,3	10.1	10.3	10.1	29	98	lou	99
рН		76	7.6	76	75	75	75	7.5	7.5	25	75	7.5	7.5
Cond. (µS/cm)	ľ.	33		33		33		3	38	73	8	33	
Initials		CM	R	CM	2	Ch	AR .	C	30		~	Can	
STPDOI					,		Days						
Concentration		-		8		9		10		1)	9-1	17	
E RESERVA	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		140	140	140	1400	14,0	140	14.0	13.5	142	13.5	14,0	13.5
DO (mg/L)		10.2	10.0	lou	9.9	10.3	10.2	10.3	10.0	9,9	25	1001	9.8
pH		76	75	76	715	7.5	7.4	7.5	7.5	75	بند	7.5	75
Cond. (µS/cm)				33		33		33	9	3	330		نا
Initials		CN	rl	Ci	Ne	Cr	ng	35		K		Cons	
							Days						
Concentration											A 115	1000	9[
1 0 1 1 1	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)												THE STREET	
DO (mg/L)											124		
pH													
Cond. (µS/cm)												n to	
Initials													
	,												
							Days						
Concentration					_						149		
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)												him	
DO (mg/L)													
pH													
Cond. (µS/cm)											100		
Initials													
Thermometer:	T-0) meter:	: D0) -3	pH	meter:	ρH	-3			meter:	
	Co	ntrol			_				MIN	Analys	sts:	BPL/	AUD/
Hardness*	/											1727	
Alkalinity*	1/]			SS	
mg/L as CaCO3	(1	Date re	viewed:	2010	7/12/1
Sample Description						2							

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements MR Hatch Exb-10 pek Coal Start Date & Time: May 15 Client: Sample ID: Stop Date & Time: Jone Work Order #: NIA Test Species: Oncorhynchus mykiss Sp Real stale Show ERIMF4 Days Concentration 17 8 16 init. new old old new old old new new new old new old 14.0 Temperature (°C) 13,5 135 CYI 13.5 14.0 14-4 14.0 140 14.9 140 DO (mg/L) 10.3 10.3 9/5 lorl 100 10.1 120 10 100 75 75 76 76 206 7.5 pH 7.5 312 339 Cond. (µS/cm) 332 Initials KIL KIZ 886 30-1009 Days Concentration 14 17 ini new old new old new old new old new old old new 13.5 135 14.0 14.0 Temperature (°C) CPI 13.5 14.0 140 142 9.9 DO (mg/L) 1000 98 ici 10.0 10.3 101 (0.0 100 10.0 10.7 7.5 75 7.5 76 рН 7.5 7.4 7-5 7-5 26 339 334 372 Cond. (µS/cm) 322 Initials dow warge. 1010 14)~ 300 BPL Days Concentration init. new old new old old old old new new new new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. new old new old new old new old new old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Conductivity meter: 601 - 3 DO meter: DO-3 pH meter: pH-3 Thermometer: BPL/ALD/CHP Control Analysts: Hardness*

Comments:

Alkalinity*

Sample Description:

* mg/L as CaCO3

Reviewed by:

Date reviewed:

ample ID:	10	WIA			-	-	Stal	t Date &	x Time:	pau	7/7/3	2015	
Vork Order #:		15/12			7	-	510	Toot Sr	k µme:	20	ne /	THYKISS	
		NIN				-		rest of	recies:			mykiss ~Sh'	
							Days			FEC		2371	-Q
Concentration	1	5	}	0		1	O	1	1	1	2		
ERINF 04	init.	new	old	new	old	new	old	new	old	WINESE STREET	CHECKE BUILD		7.1
Temperature (°C)	/	11044	/	11046	/	HOW	/	HEW	Olu /	new	old	new	old
DO (mg/L)	1	100	/		/		/		/				
pH			1		/		1	-	/	_	/		
Cond. (µS/cm)			/		/		/	1	/	/	/		
Initials		/		/	<i>(1)</i>	/		/		/	Table 1		- 270500
inidais						1				/			-
				1	-		Dave						-
Concentration		1 3	3	> 0	\		Days				2	-	-
ST? D - 01	init	new	old	new	old	1000	old	1	old	1	And the second	14.00	- 11
Temperature (°C)	/	14.0	//	19.0	July /	new 14.0		new	14.6	14.0	old	new	old
DO (mg/L)		10.0	11	10.6	-	10.0	10.0		9.8		10-6		,
pH		7.5/	1	7.5	/	75	76	7.6		76			
Cond. (µS/cm)				33	1				75	7 6	73		
Initials	-	BZ		_	1300		30		33 5/88		33		
IIIIuais	BR		-				30	14	Erise-	Prwo	1BG		
>	9.			HOTCH	Dayo	\							
Concentration	1				-		Days						_
Concentration						C-275	PON			- Free Land	1 1000		-
T(90)	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	-						-						
DO (mg/L)	1				-	-		-				-	
pH				-				1000					
Cond. (µS/cm)				-		-	-	-					-
Initials								100					
0							Days						
Concentration		Aller Total				***************************************		15 15 15 15 15 15 15 15 15 15 15 15 15 1		20000			1 00200
	init	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)						-							
DO (mg/L)													
pH	1												
Cond. (µS/cm)								_					
Initials													
	T-9	DO	meter:	50-	3	pH	meter:	QH	-3	Cond	uctivity	meter:	Car
Thermometer:										Analys	ts: CV	40,35	~,D
	Cor	ntrol											
Hardness*	Cor	ntrol	•										
	Cor	ntrol	•									2010	

Embryo-Alevin Freshwater Toxicity Test

Initial and Final Water Quality Measurements Hatch. 35-Start Date & Time: Hay 15/2019 Client: Teck Comp Stop Date & Time: Sample ID: NIA June 5/2015 Work Order #: NIA Test Species: Oncorhynchus mykiss Redside Shower Days 18 14 16 Concentration 12 init. old new old new old new new old old new new old Temperature (°C) 14-0 14.0 140 14.0 140 17.0 14.0 14.0 14.0 10. L 10.0 10.0 99 DO (mg/L) 10.2 [0. Z 10-0 75 pH 7-4 76 7-3 7.67.5 76 75 3-6 333 Cond. (µS/cm) 332 377 333 333 Initials 1/05 32 KILIBR 145430 1/88 Days 18 15 17 16 Concentration init new old new old new old new old old new new old Temperature (°C) 14-0 14-0 14-0 14-0 135 140 14-14-0 140 190 14-9.9 10.1 10.3 107 10.1 10.0 DO (mg/L) 10.E 1000 79 10.0 10-0 pH 73 7.5 74 7-4 7-3 2-7-6 7-5 74 7.5 75 373 332 33> Cond. (µS/cm) 37 L 324 333 CMP/97 Initials 850 KJL KSL 1-100 180 Days Concentration init. new old new old old new new old old old new new Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. new old new old old old new new new old old new Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: DO meter: Do - 3 pH meter: PH-3> Conductivity meter: Cond-3 Control Analysts: COURSE KILAWD Hardness* Alkalinity* Reviewed by: * mg/L as CaCO3 Date reviewed: 2019/12/18

Comments:

Sample Description:

Client:		Teck	Coo	LL .			Start	Date 8	Time:	Man	15/20	902	030	
Sample ID:	N.	A										5/20	4	
Vork Order #:	-N	14	-			100		rest Sp	ecies:	Medsid	٤ .	shiner		in the
						147-13	Da	ys						
Concentration		1	9	2	0	2	-1	2	2	2	う	2	4	
ERIMF-04	init.	new	old	new	old	new	old		old	new	old	new	old	new
Temperature (°C)		14.0	135	14.0	14.0	140/	14,0	The Co	14.0					
DO (mg/L)		10.0	0.4	101	9.9		10.0	47"	9/9			Page 1		
pH		77	2.5	75	7.5	7.5	7.5		1.4					
Cond. (µS/cm)		33	2	3	33	35-33								
Initials		60		8	8-	ĊM	9.							
											- 5			
0		10				1 2		lys 2 2		2	2	2	//	1
Concentration	58575200	19	ON WAY OF	Salton and annual	0	2	Contract Contract	22			-	93515639	Towns on the	STREAK.
3795-61 Tomorphism (90)	init.	new 14-0	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			14-0	14.0		/	13.5							
DO (mg/L)		10.0	(00)	10.1	9.8	-	ial							-
pH Cond. (μS/cm)		34	7.5	7.5	7.5 33	7.5 % 33	7.5					1		
Initials	1	30	37		37	À.	0		_		-			-
iiiudis	1	131		1	3.0	ĊN	u						1291	_
							Da	ays			77 #25 7			
Concentration														
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														
	_	-												
Concentration					-		Da	ays			-			
Gondendadon	init.	new.	old	new	old	new	old	Provide de la constante de la	old	and the second	old	The state of	old	' new
Temperature (°C)	SHALES.	TICW	Olum	HEW	Old	new	Olu	new	olu	new	old	new	010	Filew
DO (mg/L)														
pH						1								
Cond. (µS/cm)												-		
Initials														
DO meter:	Do	-3		pН	meter:	o P	1 - 3		Cond	uctivity	meter:	co n	4-3	
									1					
Head	Co	ntrol								Analys	ts:	BPL/A		
Hardness*	1								-	D		-	KJL	
Alkalinity* * mg/L as CaCO3	1			-		_]		wed by:		SS 019117	110
mg/L as GacOs				90						Date rev	/lewed		019111	-116
	1:				40									

Embryo-Alevin Toxicity Test Daily Mortality

Concentration	Rep				Day	of Te	est - No	o. of N	lortal	ities			71	Total Dead
		1	2	3	4	5	6	7	8	9	10	(1	12	Eggs/Embryos/ Alevins
ERIMFI	1	0.0	52	3/			1							noturable
ERIMFZ	2	0	216		T'									noturable
ERIMF3	3	0	165	_		/	,							not viable
ERIMF4	4	0	RZU	-98-	One	43			100				>	65 Feet 82 w
STPDOI	1	Ó	72										->	196 Fest 126.
	2		10- F	DOW	165 -									
	3		7	_										
	4		-	Elcuis			CP							
ERIMT4B	1			0	0	0	80	0	1	0	0	0	D	
ERIMF4C	2		/		1		2	13	Î	Ó	0			
STAKI B	3	/	/	1			8		0	0	0#			198
STPD-01 C	4	/		1	-		7		0	13	-			#hatchlings som
STP D-OID		/			-	1	9		D	0	0		1	
STPDOLE	3			7	7	1	19	1	0	00	0	1	-	
	4					-								
	1				-	-	-						-	
	2		-		-								-	
	3	-				-				-				
	4				-		-						-	
	1							-					_	
	2			,	-		-						_	
	3													
	4													
	1												_	
	2													
	3							- 1						
	4													
	1													
	2													
	3													
	4													
ech Initials		CMP	BEL	A	N	in	chp	0	in	Cine	BEL	0	Carl	

Embryo-Alevin Toxicity Test Daily Mortality

						Daily	Mor	talit	У					
Client: Sample ID:	100 RSC	K (100 A Fer	47.200	70	St A St	tart Da top Da Te	ate & ate & st Sp	Time: ecies:	Mc Reds	ly \{ side sl	19 (20 niner	8	2030
Concentration	Rep				Day	of Te	st - N	o. of	Mortal	ities	-			Total Dead
		13	14	15	10	17	130	19	20	21	22	23	24	Eggs/Embryos Alevins
ERTHF 4B	1	0	0	0	0	5	0	0	=	_			_	
ERITHF4C	2			li		+		-1-	-					
STEDOLB	3					-			_					15-16
STROOLC	4		1			1		+	-		-	-	_	
518001D	1								_					
STROOLE	2	工	1	7	1	4	1	4				-		
	3													
	4													
	2				-					_				
	3			-										
	4													
	1													
	2													
	3													

Tech Initials

Comments:

Reviewed by:
Version 1.1 Issued October 6, 2015

Date reviewed:

Nautilus Environmental Company Inc.

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NA	

Start Date & Time: May 15/209
Stop Date: Tow 12007
Test Species: Redside shiner

ID	-				Day of	F Test	No. of	natch	-				
Beach lend	.1	2	3	4	5	Q	7	8	9	10	11	12	Comments
ERIMF-04B	-	-	-	-	-	-	3876	0	0	0	9	P	
040	-	-	-	-	-		er po	0	0	0	7	4	
						9							
STPD-01-13	_	-	_	-	-	-	0	0	0	0	0	0	
01-C	-	-	_	_	-	-	0	Ð	2	1	-		
01-10	^	^	-	_	`	-	0	0	C	10	-		
1 01-E	~	-	-	_	-	-	0	0	1	0	1	V	
													1
	-												
	, Y												
Tech Initials	~40	30-	0	-		Ou.	~	Che	Chall	201		ONP	

Comments:	

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck
Sample ID:	N/A
Work Order #:	NIE

Start Date & Time: May 15/19
Stop Date: July 1209
Test Species: Redside shiner

ID					Day o	f Test -	No. of	hatch	- III				al al
	13	14	(5	16	17	18	19	70	21	22	23	24	Comments
ERIMF OUB	0	2	8	2	_								- N-5-2-1723
-04 C	O	3	42	0								~	
STPD-01-13	0	3	34	2 40									
01-0	0	34	0	40	_						-		e la lavin
0110	0	3	34	5	_						-		
01-6	U	6	33	0							-		
									_				
										-			
				- N	11								
													*
										-			
	-									-	-		
		-								+	-		
	-									+	_	-	
										-	-		
ech Initials	0	00	KIL	24	~					-	_		

Comments:	(1) 3 are deformed (Skeletal, cranio facial)	
	· · · · · · · · · · · · · · · · · · ·	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck
Sample ID:	N/A
Work Order #:	NA

Start Date & Time: Hay 15/2019
Stop Date: Trest Species: Redside shiner

1 2 3 4 5 6 7 8 9 10 11 12 Comments ERIM-OHS 0 0 0 0 0 STEND-G-G	ID				Day	of Test	No. of	Mortal	ities (ha	atch)				
-04C 0 0 0 0 0 0 0 0 0 0 0 0 0		ı	2	3	4	5	6	7	8	9	10	J f	12	Comments
-0+C 0 0 0 0 0 0 0 0 0 0 0 0 0	ERIMI-OHB		1	-	-	-	-	-	+		~	-	-	
01-C	-040	-	-	1	_	-	-	0	0	0	0	0	0	110118
01-C	578D-01-B	`	-	_	_	-	-	_	_	_	_	_	_	E U DESCRIPTA
01-0		_	_	-	-	-	-	-						THE WAR ALL DO
01-6		_	-	_	-	-	-	-	-					1 5 11215
			-				-	-	-	0	0	0		
									19.					
													72	
														•
Tech Initials COUP 30 M in which a One cire 30 M corp														

Comments:	18		الكاردة والمسا	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: May 15/2019
Stop Date: Jon 17 2019
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (h	atch)				
	13	14	15	طا	17	18	19	20	21	22	23	24	Comments
ERING-OUB	-	_	0	9	Ø	0	0	٥	0	¢.		_	
04 C	0	2	0					0					
								0		-	-	_	
STPD-01-B	-	-	0					0					
01-0	0	0	0					1		-		-	
01-10	-	-	0					0	-	_			
01-E	0	0	0	7	1	T	1	σ	1				
		5							-				
													1-16-11-15
													3 36972
-													*
-													
									1				
_	2												
													•
									0.2				
												-	
												1	
Tech Initials	CIENT	BEL		47~	0.0.			60	BRI				

Client: Sample ID: Vork Order #:	N/A N/A	K C	oal		Em	Dery 4	Star Stop	Date 8	Time:	Ma Redsid	w 7/			
LNIK-11						r	Days							
Concentration	6		1		2		3	4		5		6		
	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	10.5	12)	14.0	14.2	C.71	14.0	13.5	140	140	14.0	14.0	14.0	13.5	
DO (mg/L)	/	10.0	2,4	12.2	101	10.2	9,9	101	9,8	10.2	9.8	10.3	10.0	
pH		7.6	73	7.5	7.4	77	7.5	75	みら	76	75	75	7.4	
Cond. (µS/cm)	/		دها	33	8	34	1	3	77	33	9	33	8	
Initials	sex		_	11	w		nf		~	Cm	Q -	CM		
LNLK-12							Days							
Concentration	0	1			7		3	4		5		H.0 6		
	init.	new	old	new	old	new	old	new	old	new	old ,	new	old	
Temperature (°C)	17.5	1572	142	14~	14-0	140	13.5	14,0	140	14,0		19.0	13.5	
DO (mg/L)	1	10,3	120	102		10.2	9.8	10.1	100	10.7	9.9	10.3	10.1	
pH	1	7-6	24	75	7 3	77	75	75	24	76	7.5	75	7.5	
Cond. (µS/cm)	1		10		2				37	33		33	10	
Initials	186		34° 338			341 CMP		A-		23	9	CM		
IIIIdis	· KE		2	l w	u_	CM		16-		1 Cmp		CIN	Υ	
1 NLK - 17						Days								
LNIK-13 Concentration	Ð		1		?	1	3		4	5		21406		
	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	10.5	150	142	145	140	14.0	13.5	1473	14,2	14,0		19.0	14,0	
DO (mg/L)	1	10.0	10.3	10/2	10.2	10.2	10.0	10.1	9.8	5.01	100	10.7	10.0	
pH	/	76	74	75	7.5	77	75	- /	24	76	7.5	7.5	7.4	
Cond. (µS/cm)	/		40	_	38	3:	_	34	37			334		
Initials							ND Y	3		33 C	.0	Civ		
ilitials	JOK	1 1		W			NA		~		м	Cu	d	
ERIMF-05							Days							
Concentration	0		1		2		3	4	1	5		6		
_ (C) (CE 100	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	10.5	1500	140	145	140	140	13.5	140	170	14.0	14.0	14.0	140	
DO (mg/L)	1	10,0	10,0	10,2	10.3	10.2	9.9	104	9,8	10.2	9.9	10.3	1.01	
pH	1	76	7.4	7.5	7.4	7.7	7.5	245		7.6	75	7.5	7.5	
Cond. (µS/cm)			240	33		3:			37	33	9	33	-	
Initials	186		-		n-		ne		N		nl	CM		
Thermometer:	7-9		meter:	_ D o	- 3		l meter:	_ρH	-3				cond-	
Handa *	Coi	ntrol								Analys	sts:	BFL/	ALO/	
Hardness*	/						-		-				KILI	
Alkalinity*	/]		-	202		
* mg/L as CaCO3	/									Date re	viewed	2010	1112119	
Sample Description	:													
Comments:						38								

ample ID:	NA	, ,	Oal		E		Star	t Date 8		June	718/		
Vork Order #:	NIA							Test Sp	ecies:	Redside	e shiner		
LNIK-11							Days						
Concentration	1	7	-	8		9		l to)	1		17	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14-0	13.5	1410	13/5	140	13.5	13.5	13.5	140	13.5	14.0	14.0
DO (mg/L)		103	10.0	9,9	9.9	10.1	10.0	10.0	10-1	10.1	[0.]	10.7	(O.)
pH	/	7.8	7.5	25	25	7.5	7.5	7.5	7.5	75	طب	74	76
Cond. (µS/cm)		33	5	33	8	33	6	3	31	33	4	31	
Initials		BO	r I	A	_	Ć	we	Ch		m.	356	(4)	1
										100 10011	Olinov		
LNLK-12.							Days					1	
Concentration	1	7	-	8		0		1	O	l i	1	17	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	1	14.0	:4.0	14,0	136	140	13.5	35	13-5	140	13.5	14.0	140
DO (mg/L)	1	10.3	10-1	9,9	9,8	10-1	10.0	10.0	poul	121	10.1	10-3	[0.7
pН	1	7.5	7.5	75	75	7.5	7.6	75	35	7-5	7-5	24	76
Cond. (µS/cm)		33	8	3.	35	33	6	33	39	3.	54	3	32
Initials		30	1	1	+	Ci	N	Co	w	w	185-	10	1-
							HI- X-						
LNLK-13							Days					LLLis	
Concentration		=	7	8			1	li		1	1	1	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14-0	14.0	1410	135	140	13.5	135	135	140	13.5	14.0	140
DO (mg/L)		10.3	10.1	9,9	9,9	101	99	1000	104	1.01	10.0	103	122
pH		7.5	7.5	7-5	カト	75	7.5	7.5	7.5	15	75	74	75
Cond. (µS/cm)		3	38	3	38	33	(3	39	131	4	37	
Initials		(35	2	The state of	8	Ca	ď	CA	N		125-	16	14
ERZMF-05							Days				16.		
Concentration		7	-	8		(1	11)	11	(1	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			14.0		13/5	1400	135	13.5	135	C.Y1	12.5	14.0	14.0
DO (mg/L)			10.0	9,9	9,8	10-1	10-0	1000	levi	121	10.0	103	(0.5
pH			7.6	74	345	7.5	7.5	7.5	7.5	7.5	7.5	74	
Cond. (µS/cm)		3	35	37	8	33	Ý	3:	39	31	7	3	12
Initials		1	350	1	y -	Ci	n	C	w	w	100-	K	N
	T.q			D0-				. рн -			luctivity	meter:	60-0
Thermometer:		-								Analys	ste.	BP4/	ALD/
		ptrol					_		-		,		
Hardness*		atrol			1					rinary		YYL/	
Thermometer: Hardness* Alkalinity* * mg/L as CaCO3		ptrol									wed by:	44r/	k3L

Client:	-	x Co	- 0		7	wper		t Date A	2 Time		15-1-			
Sample ID:	411/		av				Stor	Date &	& Time: & Time:	Man	3/8/12	2014		
Work Order #:								Test Sp	pecies:	Redsid	e shiner			
Concentration							Da	ys						
1	1	3	į.	4	1 5	5		G	1	7	15	ŝ		9
INCK-11	пеж	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	4.0	14.0	14.0	14.0	14.0	14.0	160-0	13.5	14.0	14-6	100.0	14. 6		1
DO (mg/L)	10-1	10.0	10.6						10.0	9-8			7	/
pH	7.3	7.5		7.5		7.5	7.5	76	75		7.5			
Cond. (µS/cm)	3	32	33	3	33	3	33		33			38	1	
Initials	KTL	lest-	Aus	NB2-	Au	0/32	8			ne		el 05C	1	
(bac)									THE				1	
Concentration							Da	ys						
1		3	1~	1	15		1	6	17		12	š	7	9
LNUK-12	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	19.0	14.0	14-6	14-0	14.6	14.0	13-5	14.0	14.0	140	13.5		/
DO (mg/L)	10-1	10.1	100	9-8	10.0	99	10-0	100	,0.0	9.9	10.2	10./	mi	/
pH	7.3	7.5	2.6		76		7.5	7.5	75		7-4	76	/	
Cond. (µS/cm)	3	37	32	, 3	3	33	33	,2		23		38	1	
Initials	KIL	1950	Aud	1384	Acus	0/352	13	Q-		2		BR	7.	
300			125											
Concentration							Da	ys						
	13		1-	4	17		1 0	9	(7		18			19
MUK-13			d new old		new old		new	old	new	old	new	old	new	old
Temperature (°C)	140	14-0	14.0	140	(4-0	140	14.0	13:5	14-0	140	14.0	13.5		1
DO (mg/L)		(0.1	10.0	9.5	10.0		10.0	10.0	10.0	99	(0.2			1
pH	7.84	7-6	7.0	75	7,5	75	7.2	7-5	25	> C				/
Cond. (µS/cm)		32	37		32	3>	342	- Star	2,2	, 5	32	, &	1	
Initials	KIYB	pu	AWO	1952	sut	1914	35		B	0-		2/85		
Concentration		3		-1	, ,		Da							
15084				7	(:			6	1.		18			15
EREM-05		old			new		new		new			old	new	old
	14-0	14.6			14.0		14-0	14.0	14-0		14-0	135		/
DO (mg/L)	10.2		10.0	17.00	10.0	19.0	10.0		10.0		(0.)			/
pH	7.4		76		2-6	75	7-5	75		75	7.5			/
Cond. (µS/cm)		32		37		33	37			37	33			_
Initials	K54/	BC	qu	0/82	ac	Das	36	r	536		and	BTZ		
DO meter:	1	70-	3	pН	meter:	8 F	· - >	>	Condu	uctivity	meter:	Cor	-ol -	3
	Cor	itrol								An	alysts:	KTCT	SR A	30
Hardness*	/									7.41		cmp		_ v
Alkalinity*	/	H								Review	ed by:			
* mg/L as CaCO3											iewed:		1/121	K
Sample Descr	ription:													

Version 1.1; Issued April 22, 2014

lient:	Icek	(oa)				laten	Start	Date &	€€ Tim/e:	Man	18/2	1019		
ample ID:	NIA							Date &		は、た	2	2019		
/ork Order #:	NIA						Т	est Sp	ecies:-	Oncorh	nchus	mykiss '	ex-	
				CI-						Rich	Stole	Shine		
74.							Days							
Concentration	12	13	38		14		5	1×	2	1=	7	i	3	
LNLK-11	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	/	14.0	M.p	140	142	14.2	14,0	140	13.5	14-0	14.0	14.0	1410	
DO (mg/L)		10-1	10/0	100	9.8	100	10-0	10.0	10.0	10-0	9.8	10.2	9.9	
pH		73	7.5	7.6	75	7.4	75	7.5	7.6	7.5	7.5	7.5	7.5	
Cond. (µS/cm)	/	33	V	33	33	31	53	33	2	33	53	338		
Initials		147	-	-	_	A		BO	_	8	SL	CME)	
	•			124										
		16.1		3		7.1	Days							
Concentration	17	1	3	12	1	1	5	(I	9	1	7	1	3	
LNLF-12	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	14.0	140	14.0	140	140	140	14.0	13.5	14-0	14.0	14.0	13.5	
DO (mg/L)	10.3	[0-1	1001	10,0	98	10,0	9,9	10.0	(0.0)	10.0	9.9	10.2	10.1	
pH	7.4	7-3	73	2.6	25	3.6	75	7.5	7.5	7.5	7.6	75	7.6	
Cond. (µS/cm)	332		32	,	333	3	33	3:	12	3	33	33		
Initials	KLYE	e K)~		2	0		BOL		3	3-	ĊM	£	
							Days							
Concentration	12 13			12	1	1	5	10	9	(7	18		
TNTK-13	init.	new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)	14.0	140	140	140	LYP	14.0	14.0	14.0	13.5	N.0	14.0	14.0	13.5	
DO (mg/L)	10-3	101	10.1	100	9.9	10,0	98	10.0	100	10.0	9.9	10.2	101	
pH	7-4	7.3	7.6	7.6	35	36	7.5	7.5	7.5	75	7.6	75	74	
Cond. (µS/cm)	332	31	2		333		333	3	37	3	33	33	3	
	KSY86L	1	ال		4	1			.g~		ود		2	
Initials	KINGE								- Ann					
Initials	KINGEL											DO VICTOR		
Initials	KJYEE			1 16			Days							
Concentration		13		14		1	Days	1	6	1	7	i	8	
	i Z	new	old	14 new	old	1000-Turning	Days 5	ELECTRON OF	old	new (7 old	new	STATISTICS AND ADDRESS.	
Concentration	12	new	old	rational in	1	new	5 old	new	old	new	100000000000000000000000000000000000000	new	old	
Concentration ERIMF-05	۱Z init.	new	675m A-122m	new	old	new	5 old	new	-	new 14.0	old	new ⋈-0	old 13.5	
Concentration ERIMF-05 Temperature (°C)	1 Z init.	new ly.o	01d	new 17.0	old)4,0 },9	new 11.0	old /7/5	14-0 (e. 0	old (4-0	14.0	old 14.0	new ⋈-0	old 13.5	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH	1 Z init. 14.0 10.3	14.0	old LY.	new 17/0 10,0	old 14.0 9.9 25	new 11.0 10/0 入を	old 17,5 10-0	14-0 (e. 0	old (14-0 10-0 7-5	14.0	old 14.0 9.9 7.5	new N-0 10-2 2.5	old 13.5 10.0	
Concentration ERIMF-05 Temperature (°C) DO (mg/L)	i Z init. 14.0	14.0 (94 7.3	01d 140 (0.1	new 17/0 10,0	old)4,0 },9	new 11.0 10/0 入を	old /7/5	new 14-0 (e. 0 74	old (14-0 10-0 7-5	14.0	old (4.0 9.9 7.4	new H·O 10·2 7.5	old 13.5 10.0 7.5	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	17 init. 14.0 10.3 7.4 331	14.0 (94 7.3	old 140 (0.1	new 14.0 10.0 7-1	old 14.0 1.9 25 333	new 11.0 10.0 7.6 3	old 17,0 10-0 7,5 33	new 14-0 (e. o 7-4 57	old 14-0 10-0 7-5	14.0	old (4.0 9.9 7.4	new H·O 10·2 7.5	old 13.5 10.0	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	17 init. 14.0 10.3 7.4 331	new 14.0 (01 7.3)	old 140 (0.1	new 140 10,2 74	old 14.0 9.9 25	new 11.0 10.0 7.6 3	old 17,5 10-0	new 14-0 (e. o 7-4 57	old 14-0 10-0 7-5	14.0	old (4.0 9.9 7.5	new N-0 10-2 2.5 3 CM	10.00 10.00 15.5 10.00 15.5 38	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	1 Z init. 14.0 10.3 7.4 33 L YSUGA	14.0	old 140 [0.1 75	new 140 10,2 74	old 14.0 1.9 25 333	new 11.0 10.0 7.6 3	old 17,0 10-0 7,5 33	new 14-0 (e. o 7-4 57	old 14-0 10-0 7-5	14.0 (0.1 7.5 85	old (4.0 9.9 7.3	new N-0 10-2 2.5 3 CM	10.00 10.00 15.5 10.00 15.5 38	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	1 Z init. 14.0 10.3 7.4 33 L YSUGA	new 14.0 (01 7.3)	old 140 [0.1 75	new 140 10,2 74	old 14.0 1.9 25 333	new 11.0 10.0 7.6 3	5 old 17,0 10-2 7.5 33	new 14-0 (e. o 7-4 57	old 14-0 10-0 7-5	14.0	old (4.0 9.9 7.3	new H.O 10-2 2.5 3: cu / meter:	10.00 10.00	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer:	1 Z init. 14.0 10.3 7.4 33 L YSUGA	14.0	old 140 [0.1 75	new 140 10,2 74	old 14.0 1.9 25 333	new 11.0 10.0 7.6 3	5 old 17,0 10-2 7.5 33	new 14-0 (e. o 7-4 57	old 14-0 10-0 7-5	Cond	old (4.0 a.a 7.)	mew N.O. 10-2 2.5 2.5 CM meter:	old 13.5 10.0 12.5 10.0 13.5 10.0 13.5 10.0 13.5 1	
Concentration ERIMF-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: Hardness*	1 Z init. 14.0 10.3 7.4 33 L YSUGA	14.0	old 140 [0.1 75	new 140 10,2 74	old 14.0 1.9 25 333	new 11.0 10.0 7.6 3	5 old 17,0 10-2 7.5 33	new 14-0 (e. o 7-4 57	old 14.0 10.0 7.5 52	Cond Analys	old (4.0 9.4 7.5 7.5)	mew N.O. 10-2 2.5 2.5 CM meter:	old 13.5 10.0 12.5 38 2/BR	

	11/A								/					
/ork Order #:	N/A						Stop	Date 8	Time:	M.	me 7-1	2019		
	VIA	-	.//					Test Sp	ecies:	Redide	sh	Iner	100	
Hatels				- 1		(D)	Da	ys						
Concentration	ĵ	1	9	2	0	2	1.	27	2	2	3	2.	4	
LNC14-11	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	/	14.0	13.5	/	14.0									
DO (mg/L)		10.0	10.1	/	10.0		L P grad					20.00		
рН		7.5	7.5		7.6									
Cond. (µS/cm)		3	36	132	35									
Initials		3	p	/ 1	39-						HI	11-1		
					_	_	Da	iys						
Concentration		1	^		20	2			-2	2	3	-	7 4	
LNLK-17	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	Old	14.0			14.0	HEW	Olu	HEAA	Oid	HEAN	old	HEN	Olu	HOW
DO (mg/L)			10.0	/	9.9									
pH	1	0-0,		/	7.6									
Cond. (µS/cm)	1	7.5	7.4	12.	35			-			-			
Initials			36											
initials		B			300							1		
					_		D:	ays			-			
Concentration	1	1 19			,0	7	-1		22	23		2	4	
LNL14-13	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	Old	14-0	14.0	Hew	N.0	new	olu	new	olu	Hew	Olu	Hew	Olu	HICAN
DO (mg/L)	1	10.0	9.8	1	9.9									
pH	1	7.5	7.8	/	7.6			1						
Cond. (µS/cm)	1		36	1/-										
Initials			SC.	13	35									
muais		1 6	3.0	1/ .				l						
	7							ays						
Concentration		THE RESIDENCE	19	3	20	2	-1	2	Charles Service State	2	Of the Party of th	5	4	The same
ERIMF-05	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	1	14.0	14.0	/	14.0									
DO (mg/L)		[0.0	95	/	10.0									
рН	1	7.5	7.5	/	76									
Cond. (µS/cm)		3	36	1 3	ラケ									
Initials		G	50	/ 8	382									
DO meter:	00) -3		_ ph	l meter:	p)	1 - 3		Cond	ductivity	meter:	000	9-3	
	Co	ntrol								Analys	its:	BPL/	AUD/	CMB
Hardness*		/											1 K36 €	
Alkalinity*										Review	wed by:		SS	31
* mg/L as CaCO3	1								19)	Date rev	viewed:	_ 2	019112	811.
Sample Description														•
Sample Description	:	N-1-												

Embryo-Alevin Toxicity Test Daily Mortality

Client: Sample ID:	1ei	K(Da			St	art Da	te & T	ime:	Ma	× 18	1/19		
Vork Order #:	NIV	+			-		Tes	t Spe	cies:	Redsi	de shi	iner		the Darker Contract
							3			7 10 00	uo 0///	1101		
Concentration	Rep			Uv	Day	of Te	st - No	o. of N	lortal	ities				Total Dead
		1	2	3,0	4	5	6	7	8	9	10	l I	12	Eggs/Embryos/ Alevins
LN-K-11	1	0	0	206/31	_		/							
LNHK-12	2		1	87/35		-/								
LNLK-13	3			218/47	. 0									
ERIMF-05	4	1		173/2										
	1				Blin									
	2													
	3			-										
LNLY-11 B	1			-	(2)	0	Ô		0	-	-	^	0	
C	2			/	0	0	4	0	0	0	0	0	1	
D	3		1	1		0			+					
Ę	4		/			0			1					
Ŧ	1	/			I	0			1					
	2													
LNLK-12 B	3			_	0	1								
Č	4				1	0								
	1													
LNLK-13 B	2			/	0	0								
C	3		-	4	-	Ó		\perp	-	-				
D	1		/			0			-	+-+			-	
E F	2	/	1			1			-	1				
7	3	/			-	1			-	++				
ERIMF-05F	A CONTRACT			1	0	1								
				1	1	Ò								
	2					0								
E	and a	/			1	0	T	7		1	l	1	V	
	4													
	1													
	2	-	-	-										
	3		-	+										
Tech Initials	4			00.	1	Chall	Cano	0.01					leas d	
i con initials		AWO	41	BPL	1 /	CNI	CAN	1011	N	conp	Col	Im	EN	

Comments:			
Reviewed by: Version 1.1 Issued October 6, 20	SS 015	Date reviewed:	2010 12 19 Nautilus Environmental Company Inc.

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Teck (oa)	Start Date & Time: May 19/2019
Sample ID:	N/A	Stop Date & Time: The 7/2019
Work Order #:	NA	Test Species: Redside shiner

Concentration	Rep		Day of Test - No. of Mortalities												
Name of the last		13	14	15	16	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins	
	1												_	10-1/11	
	2													-244-7	
	3													Was day	
	4								-				10		
	1														
	2														
	3								7-110						
	4														
TNTK-11 B	1	9	9	0	0	1	W\$0					-			
c	2		1	1	1	0	o	_	_				-		
D	3						1								
É	4						1								
1	1						0								
	2														
LNLK-12 B	3				1	3									
ć	4				1	0		_					_		
	1				٥		1	_					-		
LNLK-13 B	2				1			-			-				
Ĺ	3							_		-			-		
D	4														
P	1							_		-			_		
r	2														
	3														
ERIMF. 05 B	4													Marie Company	
L	1							-						-	
D	2							-	-						
É	3	7		1	7	2					-		-		
	4														
	1														
	2														
	3														
	4														
Tech Initials		W		D	20.	BSU	60-		-					+	

			- 1				1		1		
É	3	丁		T	7	2				-	
	4										
	1										
	2										
	3										
	4										
ech Initials		isu	~	D	300	BSU	60-				
omments:	Fr.										6
Reviewed by: ersion 1.1 Issued Octob			22					ewed:		12/20	

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #: N/A

Start Date & Time: May 18 / 2019
Stop Date: June 7 / 2019
Test Species: Redside shiner

ID					Da	y of T	est -	No. of	hatch					
	. 1	2	3	4	5		و	7	8	9	.(0	11	12	Comments
-NLK-11 B	-											-	-	
C	7-	-	+									-	-	
O	-										_	-	-	
5	-	+										-	-	
F	1											-	-	
LN 4K-12 B	-											-	7	
C	-	-											2	
WK-13 B	=										-	-	1	
ت		-									-		340	
ENLY D	-		-									-	-	3 13
ء	-	-									-	-	12	
F	-	_									-	-	1	
ER IMF-05 B	-	-									_	-	.3.	
_											-	-	8	
D	-		-									-	-	
E	=										-	_	-	
							-							
								74	1					
			-											
							3 11 65	1.	-					
										1				•
Tech Initials	-	0 1		00 4	_	10	_	-		- 6	? Cms	7 1	KIL	

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #: \(\nu\) \(\nu\)

Start Date & Tighe:

Stop Date:

Test Species: Redside shiner

ID					Day o	of Test	- No. of	hatch					-
	13	14	15	(6)	17	18	19	20	21	22	23	24	Comments
WUX-11 B	19	-	-	18	9 -						-		_
	11	-	-	19	22		-	-					
D	7	-	-	35	6	_						_	
8	-	-	-	46	3	-				_			
Ŧ	_		-	10	6								exten
NLK-12 B	30	_	-	8	1-					and the		e .	
	23	구											
NLK-13 B	31	-	-	10	3		-				_	-	
٥	_	-	-	30	11					_	_	-	
D	-	-	-	32-									
E	16	-	-	6	15	_				-	-		
Ŧ	4	_	-	14-								-	
ERIMFOS B	2	8	-	36	_					-			
2	20	-	- 55	365	-	C-E						_	
Ō	-	-	- 3	-54C	04	_	_					_	
É	2	0	21	_						-	-	_	
			V.										
ech Initials	711	2	~	38L	20.	_				-			

Comments:		

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck	Start Date & Time:
Sample ID: N/A	Stop Date:
Work Order #: NA	Test Species:

Start Date & Time: Hamis /2019
Stop Date: 700 7 12019
Test Species: Redside shiner

· ID				Day	of Tes	t - No. o	f Morta	alities (hatch)				
10	1	. 2	3	ч	5	6	7	8	9	(0)	11	12	Comments
inuk-11 B	7-												1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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D													
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F	_			-				-	+-	-			
LNLK-12 B													
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NLK-BB													
c											1		
D							-			-			
9													
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RIMAGE B													
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			1										
ech Initials	4-	YYL	982	200	case	CUP	BSL	~	CHR	che		× 11	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck	
Sample ID:	N/A	_
Work Order #:	NIA	_

Start Date & Time: May 18 /2019
Stop Date: Jone 7- /2019
Test Species: Redside shiner

, ID				Day	of Test	- No. o	f Mortal	ities (h	atch)				
	13	. 19	15	(%	12	18	19	20	21	22	23	24	Comments
LNLK-11 B	0	0	O	Ó	0	0	9	0	-				*
						O							
D				1		1			_			-	
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LNLK-12 B								1				_	
c								0					
LNLK-13 B								1					
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D													
E						1							
干					İ	1							
ERMITORB		٠.											
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D								T					
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			-									-	
Took Initials	41	~		Bei	-01/	00.	0.0	2.2				_	٥
Tech Initials	KSL	7.	~	1:20	Blin	BRU	58-	SSL					

ent: mple ID:	1	1/A	<u>೧</u> ೦೦೦	<u> </u>			Stop	Date &	Time:	Jul	201	19	
ork Order #:	N	14						Test Spe	ecies:	Redside	shiner		
I							Days						
Concentration	0	1		2		3		4		5		6	
LINE H	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0	142	140	140	1400	14,0	14.0	14.0	13.5	140	13.6	-	3.5
DO (mg/L)	1	101	9.8	10.2	99	10.3	10,0	10.3	101	99	28	10.1	100
pH	/	3	774	7.6	75	7.5	7.4	7.5	7.5	7/5	24	75	7.5
Cond. (µS/cm)	/	33	7	33		338		37	18	73	8	33	6
Initials	JEE	38	7+	C	mp	an	₹	SCL	_	۵	•	Con	2
	_	,	-				Days	1.					
Concentration	0	- 1		7	The state of the s	3		4	r selections	5		6	10 M 3 V/I
LNLE-15	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	اديا	140	14,0	14.0	1410	13.5	14-0		94	13/5	14.0	13.5
DO (mg/L)	-	15.1	7.7	10.2	9.9	7.5	10.0	7.5	7.5	25	20	7.5	7.6
pH	-	25		76	7.5	33	7.4						
Cond. (µS/cm)	1		37		39			100	38	338 A		336 Conf	
Initials	INE		322	cml C			u	(5)	85	13			1
		-					Days						
Concentration	0	1		1	2	1	2	1		5		6	
LNLK-186	init.	new	old	new old		new	old	new	old	new old		new old	
Temperature (°C)	14-0	14,2	140	140	140	14,0	13.5	14.0	H- 0	140	136	1400	13.5
DO (mg/L)	/	10,1	918	10.2	100	10.3	io.1	10.3	10.0	9.9	9,8	10.1	9.9
pH	1	26	74	74	7.5	75	7.5	7.5	7.5	75	77.7	475	7.5
Cond. (µS/cm)	/	3	37	3:	39	33	8	27	34	?	38	33	6
Initials	JRE		a	G	ME	Con			SL.		~	Cr	100
. 12													
LNLE 12	2		-				Days			_		1	
Concentration	0	25000	-	NAME OF TAXABLE PARTY.	2		3	E SPHENSES	1	120050	S	of the latest and	
EPIAN 55	init.	new	old	new	old	new	0ld 14,0	new	old	new,	old 135	new 140	13.5
Temperature (°C)	14-0	19/2	9.6	14.0	9.9	14.0	10.1	10.3	14.0	9.9	9.8		1000
DO (mg/L)	/	725	7.4	74	7.5	73	7.5	7.5	7.5	25	76		7.5
pH Cond. (μS/cm)	1	7 113	737	33		33		-	7.5	-	338	33	
Initials	100	-	331		ml	Cr			300		2	Civ	
Illiudis	उन्द		-		la r d		. (1				/50		
Thermometer:	T-9	_ DO) meter	:_Dc)-3	_ pl	l meter	: pti	1-3	Cond	ductivit	y meter 460/C	: <u>Coc</u>
	Co	ntret				J15 1 2 1				Analy	sts:		
Hardness*	/									Name of the Association	vv-v-ana		
Alkalinity*	/						1		1	Revie	wed by	: S	C .

LNLE 18							Days				L result		
Concentration	0		1		2		Ĵ		4	-		1	
	init.	new	old	new	old	new	old	new	old	new	old	CONTRACTOR OF	-14
emperature (°C)	140	14.0	14,0	1410	14.0	14.0	14.0	14.0	14.0	14/P	136	new 14.0	\3.5
DO (mg/L)	1	12.1	9.9	10.2	10.0	10.3	1.61	103	10.1	9,3	_	-	
pH	/	75	7,4	76	7.5	7.5	7.4	7.5	7.5	75	75	7.5	9.9
Cond. (µS/cm)	1	$\overline{}$	37	33		33							7.6
Initials	SRE	~	J.,	CN				33		33	0	33	
maais	360			Clo	W.	Cm	Υ	38	-			Ca	W.
LNICIS							Dave						
Concentration	0	1		7	,		Days	L		5		1	
	init.	new	old	new	old	new	old	CONTRACTOR AND ADDRESS		CHRIST-SCHOOL SECTION	A SECURITY OF THE PARTY OF	6	1000000
Temperature (°C)	14.0	14.0	14,0	14,0	140	14.0	14.0	new 14.0	old	new IY/	old	new 14.0	\3.5
DO (mg/L)	/	280		10.2	10.0	10.3	10.2	10.3	13.5	9,9		100	
pH	/	25	74	74	74	75	75	7.5		75	23	75	7.5
Cond. (µS/cm)	1		337	33	9	33	2		7.6	33			
Initials	385		4	CM		CIV			SIL			33	
	1-00	-	4	U	4	Lyv	11	12	0			Civ	4
LNLK 20							Days						
Concentration	O	1		5	7	3	Days	4		5		6	
	init.	new	old	new	old	new	old	new	old	new	old	CONTRACTOR OF THE PARTY OF THE	-14
Temperature (°C)	140	14,0	14,0	140	14.0	14,0	13.5		13.5	14~0	13/5	new 니니ㅁ	old
DO (mg/L)	1	10:58	9,8,	10.2	9,9	10.3	ioil	10.3	10.0	9,9	29,	10.1	(0.0
pH	/	74	25	7.6	74	75	7.5	7,5	7.5	25	76	75	75
Cond. (µS/cm)	1		37	33		33			38	378		33	
Initials	SEE	,			ul	CM			50			(1)	
					201	_ CI*		45	0	٥		CP	U
ERINF-OS							Days			1-			
Concentration	0	1		7	7	3	Dajo	4		<		1 0	
	init.	new	old	new	old	new	old	new	old	new	old	DOMESTIC OF	No. of Control of Control
Temperature (°C)	14-6	14.0	14,0	14,0	140	1410	14.0		13.5		13/5	new ill.b	13.5
DO (mg/L)	1	1201	9,9	10.2	1000	10.3	10.2	10.3	10.0	9,9	9,8	100	15.2
На	/	2	26	74	7.4	7.5	7.5	7.5	3.5	26	7.6	7.5	76
Cond. (µS/cm)	/	1	233	33		33			35			336	
Initials	186		~	CM		CA			30	33	8	CIV	
hermometer:	T-9 Cor	DO	meter:	X	-3		meter:	1.	3		uctivity BPL	meter:	Cond /Aws/
Hardness*	/	-								Allalys	ω.		
Alkalinity*	/									Review	ed by	SS	
mg/L as CaCO3									Г				1112119
ample Description										2.2.700		2010	11211

lient: ample ID:	N/A		oal		_	bryo	Star	t Date 8	Time:	7	111	1 1	
ork Order #:	١١٥							Date 8					
ork order #.	NIG							rest op	ecies.	Oncom	yrichus	HYNISS	
300							Days						
Concentration		7	-	8		9		10		11		(7	2
LNLK-14	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	Fis	13.5	13.5	140	135	140	14.0	14.0	N.O	14,2	14,0	140	140
DO (mg/L)		10.0	10.1	101	10.0	10.3	10.3	10-1	102	10.0	98	100	101
pH		7.5	7.5	15	7.5	7.4	7.4	7.3	75	7.6	7/25	7.6	75
Cond. (µS/cm)		33		33	4	33	2	3	32	-	333	3	33
Initials		CA	2	un /Br	12	ic	ア	14	n		2	A	
							Davis	_					-
Concentration		7		0	,		Days	10	2	ii			12
LNLK-15	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	540	13.5	13.5	14.0	13.5	14.0	14.0	14.0	1400	14.0	140	140	140
DO (mg/L)		1000	1.01	121	10.0	10.3	10.3	[2]	102	10,0	9.9	10.0	102
рН		75	7.5	75	7.5	74	74	7.)	73	76	7.5	26	75
Cond. (µS/cm)		33			24		2	-	-		333		33
Initials		Civ			100-) \)_		4		2
G)													
							Days						
Concentration		5	-	1	/	9		(1	2	1	1		2
LNIK-16	init.	new	old	new	old	new	old	ņew	old	new	old	new	old
emperature (°C)	THO .	13,5	13.5	CHI	13.5	14.0	14.0	140	(4.5	14,0	14,2	140	140
DO (mg/L)		10.0	loil	101	10.0	[0.]	10.2	1.01	10-1	19.0	9.8	10.0	102
pH		75	76	7-X	7.5	7.4	7.5	7-3	7-5	376	74	30 40	7.5
Cond. (µS/cm)		33			4	53	2	33	35		333	35	53
Initials		Ch	√6	ym	1856	k.	1	(A)	12	110	2	A	,
				-			Days	-					
Concentration		7		8	/		4	1	>	1	1		12
TNFK-1.+	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		13.5	135	140	13.5	14.5		14.0		14.0	IND	14,0	140
DO (mg/L)		100	101	121	10.1	(0.3	10.3	10.1	[0]		0.0	10,0	101
pH		75	节的	25	7.5	24	75	7.3	7-5	200	76	76	25
Cond. (µS/cm)		33		33			2	37-			73	35	
Initials		Car	2		1000	60		_	m		2	a-	_
The last transfer of				1	0.0								
	7-9	_ DC	meter	_1)	0-3	pH	meter:	PI	4-3	Cond	uctivity	meter:	NI
nermometer:										Analys	ts:	CIAU	0/0
	Co	ntrol					_			_			
Hardness*	Co	ntrol											
Hardness* Alkalinity* mg/L as CaCO3	Co	ntrol								Review	ved by:	S	3

Stop Date & Time:	Client:	Ke	ck	d oa	Final	water	mbry	10		GR		121	119	
Test Species: Oncorhynchus mykiss		- 1	IIA	0000			-					-		
Concentration Ni K-18 10 10 10 10 10 10 10	Work Order #:	-	IIA.					310						
Concentration The perature (**C) \$\frac{1}{2} \text{S} \$\frac{1}{2} \text{O} \$\frac{1}{2} \text{S} \$\frac{1}{2} \te	200000000000000000000000000000000000000		161				-		rest of	Jecles.	Oncom	iyrichus	IIIykiss	
Concentration The perature (**C) \$\frac{1}{2} \text{S} \$\frac{1}{2} \text{O} \$\frac{1}{2} \text{S} \$\frac{1}{2} \te								Davs						
Days Days	Concentration		1 7		1 8		9	Days	1	0	1	(1	>
Temperature (°C) \$\frac{1}{2}\$ \$\frac{1}{2}\$ \$\frac{1}{1}\$ \$\frac{1}{2}\$ \$\frac{1}{2}\$ \$\frac{1}{2}\$ \$\frac{1}{1}\$ \$\frac{1}{2}\$ \$\frac{1}{	LNLK-18	init.	and the following lives		new	old	new	old	new	ALCOHOL: NAME OF STREET	new	old	new	old
DO (mg/L) pH	Temperature (°C)		13.5											
Days Concentration Total Days					1		_							
Cond. (µS/cm) 339 334 322 332 333 335					1		_	15	_	7 0		-		
Initials	Cond. (µS/cm)		_				-			25				
Days Concentration T		1			_	/ 1								
Concentration 7 8 9 10 12 12 13 13 13 14 14 14 14 15 14 14 14					1 444	1-0-	17		-	, -		,-		9-
Concentration NIK-H								Davo					_	
Days Concentration Temperature (°C) 13.5	Concentration		7		1	-	1		1	2	1	1	1)
Temperature (°C) 135 135 14,0 15,5 14,0	LNLK-19	init	Service Control	1000 7000	Pour	old	Spinistra in the	-	CM2750401	Self-Self-rooting			-	100000
DO (mg/L) 10.0 9.8 0.1 10.0 0.3 10.1 10.7 9.9 9.6 10.2 0.5 0		unt												
Days Days				_						-			-	
Cond. (µS/cm) 335 334 322 337			-		1				-					
Days Days									-		7.6			
Days Days	The second secon			-								333	,	57
Concentration	illiudis		Lur	4	900/	BIC	1		10			1	A	
Concentration								125,7000						
NLK-20	Composition		1 1	7	-			Days						
Temperature (°C)		-	and the second	1	3		4		10		1)		1	2
DO (mg/L) pH The ph ph ph ph ph ph ph ph ph ph ph ph ph		init.									new	old	new	old
Days Concentration FORMATION Cond. (µS/cm) S39 S34 S32 FT S33 S37 S3			1.	1.6		13.5		_	14-0		14,0		14,0	
Cond. (µS/cm) SS9 SN4 SS2 I7L SS3 SN3					-	10.1				10.3	10,0	4.9		
Days Concentration T Y Q (0 1 12 12 13 14 14 14 14 14 14 14				7.5			7-4	7.6		-	76	7.5	76	w
Days					-	-						333	3	33
Days	Initials		Can	3	un,	135-	0	1	10	10		~		~
Concentration EQTMF-06 init new old n														
ECTMF-06 init new old								Days						
Temperature (°C) 13.5 13.5 14.0 14			1		8		9			(0			1	2
Temperature (°C)		init.			new	old	new	old	new	old	new	old	new	old
DO (mg/L) (0.0 q.9 (0.1 10.1 10.3 10.0 10.1 10.3 10.0 9.8 10.0 10.0 pH					190	13.5	14.0	20	14-2	14.0	14.0		140	
pH		-			101	10.1		10.0						
Sag Sag				75	7.5	7.6	7.4	7.6	23	7.5		W		
hermometer: DO meter: DO m					33		3							
hermometer: DO meter: DO m	Initials		Co	W	un	1880	6	V						
Hardness* Alkalinity* mg/L as CaCO3 Reviewed by: SS Date reviewed: 2019111129	Thermometer:	77	DO	meter:	100.	-3	рН	meter:	pti-		Condi	uctivity	meter:	coul
Hardness* Alkalinity* mg/L as CaCO3 Reviewed by: \$5 Date reviewed: 2019/11129		Cor	ntrol						-		Analys	ISPL	MMH	4/4
Alkalinity* mg/L as CaCO3 Reviewed by: SS Date reviewed: 2019/11/20	Hardness*	/								-	Allalys	is.		
mg/L as CaCO3 Date reviewed: 2019111120 ample Description:		/								-	Review	red by:	50	_
ample Description:	mg/L as CaCO3													1111120
										_	ate lev	ieweu.		11116
comments:	Sample Description													
***************************************	Comments:													

lient: ample ID:	N	A C	000	~	-	nbry			& Time: & Time:					-
Vork Order #:	14/	A												
ASSESSMENT OF THE PARTY OF THE	_ ~!	7						1651 5	pecies:	rea	cicle	shere		
							Da	ays						
Concentration	(San 370 San	\$28000A965271	3	Company of the last	4	1.	5	1	ما	1-	-	1	8	
よろろしょ	init.			new	old		old	new	old	new	old	new	old	new
Temperature (°C)		0.41	14.0	14.0	14-0	140	13.5	14.01	THIB					
DO (mg/L)		10.0	10.1	10.0	9.9	10.2	9.3	10.6	10:0					
pH		75	76	7.5	7.5	7.5	7.5	7.5	7.5					
Cond. (µS/cm)		37	32	3	33	338	3		210					
Initials		Br	h	8	gi.	Cm	g .	2/2	ŽL.					
	1							Will State of the						
							Da	ays		,				
Concentration		17	3	i	۲	1.	5	11	6	17	7	1	8	
rnnr-12	init.	new	old	new	old	new	old	ACCRECATE VALUE OF THE PARTY OF	old	new	old	new	old	new
Temperature (°C)		14.0		14.0	14.0	14.0	14.0	14.0	14.0	ELLIO YES	Old	10000	I I I I I I I I I I I I I I I I I I I	11011
DO (mg/L)		10.0	10.0	10.0	9.8	10.2	10.0		10.0					
pH		7.5	75	7.5	3.5		7.6	7.5/	7					
Cond. (µS/cm)			37		33	33		1	36					
Initials			3-		a	Cav			PL PL					
				4)	10	L (XV	· ·	200	10				-	_
				-			D	ays		_				-
Concentration		17	5		14	15		l	<u>_</u>	1:	1		8	1
LNUK-16	init	new	AND DESCRIPTION AS	new	HOLDER POWER	new	old	new	old	-	In the second	All the Parket of the Parket o	The second second	Series of
Temperature (°C)		14.0	14.0.	14.0	14.0	14,0	140	14. O		new	Old	new	old	new
DO (mg/L)		10.0	10.0	10.0	9.8	10.2	10.0		14.7					
pH		3.5	2 (7.5	7.5	7,5		10.0	16.0		-			-
Cond. (µS/cm)		33			333	33	75	7.5	7.5					
Initials					502				36				-	
madio		90		9	210	ĊM	ч	7	90					
		_						B8-	_	-			_	
Concentration		1	2		14	1		ays			^	1	^	
W4-17	init					DAMA	2		6		2	STORES CH	8	SENSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON AND ADDRESS OF
Temperature (°C)	D.H.L.				DIO	new				new	old	new	old	new
DO (mg/L)		14.0	19.0	14.0	14.0	1410	14.0	14.0	14/0					-
pH		10.0	20	10.0	9.8	10,2	10.1	10.6	101					
		75		7.5	75	75	7.5	7.5/	7.5					
Cond. (µS/cm)			3 2		333	338		/	36					
Initials		13	PL	2	×-	Cm	2	/ 2	Pho					
)O ===4===	1.	1 1				11	1						1	1
OO meter:	110)-3	_	pH	meter:	pn	-2		Condi	uctivity	meter:	100	oud.	-3
	0	1.				1.	-		1	Bi	L AU	10/0	oud.	142/
Unedn*	Con	trol								Analys	ts:	, ,	111	, ,
Hardness*	-/													
Alkalinity*	/									Review			SS	
mg/L as CaCO3										ate rev	iewed:	20	111111	129
Comple Desertation														
Sample Description:														-

Days Concentration 13 14 15 16 16 17 16 17 16 17 16 17 16 17 17	Client: Sample ID:		2010	cal		t	Zm b	Sta	rt Date	& Time:	14	any 21	1200	7	
Concentration							-	Sto				une	10/20	19	
Concentration 13	Work Order #:		3/4			+	-		Test Sp	pecies:	_Ke	dside	Sh	iness	
Temperature (**C)								D	ays						
Temperature (*C)		100000000000000000000000000000000000000	and the second second	Personal Control		14		15	11	٠	13	2	1	8	
DO (mg/L) pH		init.	new	old	new	old	new		new	old	new	old	new	old	new
Description			14.0	14.0	14.0	14.0	140	13.5	14.0	14.0	1				
PH	DO (mg/L)		10.0	10.0	[0.0	9.9	10.2	9.9	10.0	10:1					
Cond. (µS/cm) 732 333 755 333 755 352 352 353 355 353 355 353 355 353 355 353 355 353 355			7.9	76	7.5	7.5	75		2.5	14.6			1		
Initials	Cond. (µS/cm)		3	32	3	333			2/2						
12	Initials		18	e-	•	38-									
1 1 1 1 1 1 1 1 1 1		-		_			_								
Temperature (°C)	Concentration		1	2	1	4				1					
Temperature (*C)		init	Bruk St	and the second second	- Barrier	10000	A SECULATION OF	Cal Contract	O Mark Stranger	WATER THE PARTY	Park Sec.	6201230	Shirt Con	I THE COURSE OF	
DO (mg/L) pH		THE COLUMN									new	old	new	old	new
DAYS DayS		121													
Cond. (µS/cm)															
Initials															1
Days Concentration 12 14 15 16 16 16 16 16 16 16									13	36					
Concentration	Initials		3	0-	8	sc.	Ċ	w	. 8	r					
Concentration								D	ays				_		
Temperature (°C)	Concentration		1	3	i	4	13			(_					
Temperature (°C) DO (mg/L) pH 74 2.6 7.5 7.7 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5	LNUK-20	init	new	old	new	old	Mileson Contract	N DECEMBER OF	MUNICIPAL AND ADD	The second second	new	old	DOW	old	now
DO (mg/L) pH 75 76 75 75 75 75 75 75 75 75 75 75 75 75 75	Temperature (°C)		14-0	14.0							11011	Old	Sellen 9	Viu	LIEW
DA	DO (mg/L)						10.7	_					-		
Cond. (µS/cm) 532 733 7336 7376 Initials Esc. GSC CM ESC. Concentration 13 14 (C C C C C C C C	pH						35					-			
Initials	Cond. (µS/cm)								-						
Concentration 13					-,-										
Concentration 13	-														
init new old n	CRIMF-06								ays						
Temperature (°C)		W 70 00 00 00 00 00 00 00 00 00 00 00 00					15		-	6					
DO (mg/L)		init.	new	old	new	old	new	old	new	old	new	old	new	old	new
DO (mg/L) pH 1-4 1-5 10-0 10-0 10-0 10-0 10-0 pH 1-4 1-5 1-5 1-5 1-5 1-5 Cond. (µS/cm) 337 338 /336 Initials 750 750 750 750 DO meter: DO - 3 pH meter: PH - 3 Conductivity meter: Could - 3 BPL/Au D/Curl/WL/K- Analysts: Reviewed by: SS mg/L as CaCO3 maple Description:	Temperature (°C)		140	14.0	14.0	14.0	14.0	14.0							-110-17-5
Description: PH 34 3.5	DO (mg/L)		0.5	10.0	10.0										
Initials Sometiment Someti	рН		7-5	7.5	7.5										
Initials O meter: DO-3 pH meter: DH meter: DH-3 Conductivity meter: Coud3	Cond. (µS/cm)		3-		3										
DO meter: DO-3 pH meter: pH-3 Conductivity meter: Coud3 BPL/Aud)/Coud/WL/K- Analysts: Alkalinity* mg/L as CaCO3 ample Description:	Initials											-			
Control BPL/Aut)/Couply/L/K- Hardness* Alkalinity* Reviewed by: SS mg/L as CaCO3 Date reviewed: 2 019111129		1	2					11 -		,					
Alkalinity* mg/L as CaCO3 Reviewed by: SS Date reviewed: 201911129 ample Description:	o meter.	100)-3	_	pH	meter:	PI	H- ,)	Condu	uctivity	meter:	Ce	xid.	-3
Alkalinity* mg/L as CaCO3 Reviewed by: SS Date reviewed: 201911129 ample Description:	3	Con	trol								Analyst	L/Au	0/60	P/442	/KJ
mg/L as CaCO3 Date reviewed: 2.0(91)(1)29 ample Description:	Hardness*	/									. marys	~.			
ample Description: Date reviewed: 20111129		/			7						Review	ed by	<	S	
	mg/L as CaCO3														g
	ample Description:					0.0									-
											-			-	

Client: Sample ID: Nork Order #:	N N	IA IA	1.0cc				Stop	t Date & Date & Test Sp	Time: ecies:	Jan Ked	side	56	ines	
							Da	ays						
Concentration	10000000	12	Carter Street	1	No. of Part Street	13	COLUMN TO SERVICE	10	ON THE SHAPE OF	STATE OF THE	>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6	#3035F
LN14-14	init	new	old	-	old	new	old	new	old	new		new	old	new
Temperature (°C)				14.0	-/	14.0	14.0	17.0	4.0	140	14.0	14.0	14.0	
DO (mg/L) pH				7.5	1	10.2	7.5	10.6	9.8	10.0	10.0	7.9	7.8	
Cond. (µS/cm)				33	2 a	7.5	38	7.3	7.5	7.5	76			
Initials				30			50	33			SC		37	
				- 70				- 01			3 C	,		
							Da	ays						
Concentration		1	5	1	1	1	5	11	0	1	7	1	8	
LNLK-15	init	new	old.	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		4.0	1	14.0	14-0	14-0	14-0	14.0	14.0	14.0	14-0	14.0	14.0	
DO (mg/L)		10.0	/	10.0	9.9	10.7	9.9	10.0	9.9	10. 0	(0.0)	10.0	10.1	
рН		7.5		7.5			7.5	7.5	7.5		7.6	7.8	7.9	
Cond. (µS/cm)		33		33	3	13	338	33	6	30	+0	3	37	
Initials		130	L	8	5-	6	No.	. 330	L	E	386	ß	cu	
			-	-					-			-		
Concentration		1-	3	1	1	1	S	ays	6	1	7		8	
LNLK-16	init	new	SOLD DELLA	new	-	new	old	new	old	new	A SHOWING	new	old	new
Temperature (°C)			1	10,00	/	14.0	/	14.0	14.0	14.0	-	14.0	14.0	HICAN
DO (mg/L)			1		1	10.7	1	10.0	10.0	10.0	10.0	10.0	10.0	
рН					/	7.5	/	7.5	3.5	7.5	76	7.8	7.8	
Cond. (µS/cm)		/		/		3	35	_	360		0		37	
Initials		1		1			35-		Ev.		7~		5-	
	-	(-	,		9			ays						
LNIK.	10.00	The Contract of the Contract o	the second second	BISHIFT	TANKS TO SE	2505 KAU	15	PRINTS - N. P.	S. Personal	NEWSCHIEF	Transfer Control	1	MITA MARKET	2 Mar Orbit
Temperature (°C)	Hirr	new	old	new	old	new		new		new	old	new	old	new
DO (mg/L)				14.0	1	14.0	14.0	14.0	14.0	14.0		14.0	14.0	1
pH				7.5	1	7.5	7.6	10.0	10.1	10.0		10.0	10.0	
Cond. (µS/cm)				33	3		338		7.5 , b	7.5	7.6	25	28	
Initials					18-		99				10		37	
OO meter:	0	0-3	3		meter:		4-3	3			meter:	Cou co/a	d-	3
Handres *	Cor	itrol								Analys	ts:	-0/0	7/17	
Hardness*	/	/			_		-						0.0	
Alkalinity* mg/L as CaCO3	/				-			-	_			- 20		120
3 40 04000				*					L	rate rev	lewed:	20	MILL	127

lateh

Embryo-Alevin-Fry Freshwater Toxicity Test Water Quality Measurements

Client: Teck Coal Start Date & Time: Many 21/2019
Sample ID: MA Stop Date & Time: June 12019
Work Order #: Test Species: Roberte chine

							Da	ays						
Concentration		13	3	1	4	1	5	1	0	1	7	18	5	
LNLK-18	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)				14.0	/	14.0	14.0	14.0	M.0	14.0	14.0	14.0	14.0	
DO (mg/L)				10.0		10. Z	9.9	10.0	10:0	10.0	10.0	10.0	10.6	
рН				7.5	1	7.5	7.6	7.5	7.5	7.5	76	7.8	-	
Cond. (µS/cm)				3	33		38	33			10	37		
Initials				3	22	3	,52	35		B	21		-s-	

Carte de la companya de la companya de la companya de la companya de la companya de la companya de la companya							Da	ays						
Concentration		1.	3		4	15	5	1	b	1-	1	1	8	
TNTK-18	init:	new	old	new	old	new	old	new	old	пем	old	new	old	new
Temperature (°C)		14.0	1	14.6	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14-0	14.0	TICYV
DO (mg/L)		10.0	/	10.0	9.9	10.2	9.9		9.9	10.0	10.0	10.0	0.9	
pH	,,,,,	7.5	1	7.5	7.6	7.5	3<	75	7.5			7-8		
Cond. (µS/cm)		33	2/	33		2	38	57	36	2.5	176			
Initials		20	L		8-		3-	8			380		52	

							D	ays						
Concentration	19.000	17	2	1	4		15	1	0	1	7	i	8	
W4K-20	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	1	14.0	14.0	14.0	14.0	14.0	14.0		140	14.0		new
DO (mg/L)		10.0	1	100	9.7	10. Z	10.0	10.0	9.5	14.0			14.0	
рН		7.5	1	7.5	7.5	-	-	-	-	10.0	(0.0	10.0	9.0	
Cond. (µS/cm)		337	/			7.5	7.5	7.5	7.5	2.5	76	7.8	7.7	
Initials				7	33		38	3	36	2,	40	3	37	
Illiudis		6.40	レ	09	Ti-	3	C-	3	80	0	SL.	0	5C-	

Andrew Co.							Da	ays						
Concentration		(7	>	1,	4	15		1	6	1	T	1	8	
ERIMI-CO	init.	new	old	new	old	new	old	new	old	new	old	new	Total Control	new
Temperature (°C)						14.0	1			14.0	-		old	new
DO (mg/L)							/	14.0	14.0	14.10	14-0	14-0		
			-			10.2		10.0	9.8	(0.0	10.0	10.0	9.9	
рН						7.5	/	7.3	7.5	7.5	76	7.8	7.1	
Cond. (µS/cm)						33	5	23	6	2-	D	2	37	
Initials							رد	8,			-		50~	

DO meter:	10-	3	pH meter:	4-3		Loud-3
	Control				Conductivity meter:	Nicoro/4x/E
Hardness*	/				Analysts:	.,0
Alkalinity*	/					
* mg/L as CaCO3					Reviewed by: _	35
5-11-11-00		3.			Date reviewed:	2019/11/129
Sample Description	n:		- 1			*
Comments:					11	

Client: Sample ID: Work Order #:	Tec	K C V/A NIA	ical_		H	atel	Star	t Date 8 Date 8 Test Sp	Time:	Ha Jo	4 10 15ide	12019 12019 5h,	ie	
				W-0- 545-H			Da	ıys						
Concentration		1	٩	2	~	2			-2	7	23	2	4	
アンフィーノイ	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14,0	14.0	1	14-6									
DO (mg/L)		10,0	1021	1	10.0									
рH		77	7.7	1	3.5									
Cond. (µS/cm)		33	39	37	39									
Initials		Ćà	18	S	g _									
		1 (100)												
							Da	ays						
Concentration		1	9		20	7	.(2	2	2	23	2.	1	
LNLK-15	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14,0	14.0	1	14.0									
DO (mg/L)		10.0	joil	/	9.9									
pH		77	7.8	1	7,9									
Cond. (µS/cm)		33	٩	/ 33	9									
Initials		Cin	R	1 6	0-									
							Da	ays						*
Concentration		10	1	2	o	7	_(2	1	23	2.	1	
LNLK-16	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	1400	/	14-0									
DO (mg/L)		10.0	low	1	9.9									
рН		7.7	7.7	1	7.9									
Cond. (µS/cm)			39	/ 3	39									
Initials		Cm		1	30-									
				,										
							Da	ays						
Concentration		1	9	1 2	0	7	-(22	3	23	2 4	4	
NUK-17	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14,0	14.0	1	14.0									
DO (mg/L)		1000	ial	1	10.0		7							
рН		7.7	77	1	7.8									
Cond. (µS/cm)		33		/ 3	39									
Initials		Ċn			300									
DO meter:	<u></u>	0-3		_ pH	meter	ph	1-3		Cond	luctivity	meter:	0/00	ud.	-3
	Co	ntrøl							-	Analys	sts:		1	
Hardness*	/								1		\$100			
Alkalinity*	/				L							8		
* mg/L as CaCO3										Date re	viewed:	20	19/12	19
Sample Description	:													
Comments:														

Embryo-Alevin Toxicity Test Daily Mortality

Embergo Start Date & Time: _ Stop Date & Time: _ Client: Sample ID: Test Species: Redside shiner Work Order #:

Concentration	Rep			Total Dead										
		1	2	3	4	5	6	7	8	9	10	II	12	Eggs/Embryos/
LNLK-14	1	0	0	267										153
1 -15	2	,	1	214							/			163
-16	3			281						/				38 8
17	4			125					/					81
18	1			155				/						11 2
19	2			232			/							189 1
1 .20	3			167		/								60
FOREINF - DE	4	7	1	52	/									8 3
LNLK- 148	1				O	0	0	Ø	Ö	0	0	0	0	
1 19 C	2				1	1		1	i	1			1	
140	3							1		1				
146	4													
158											1			
15 C	2													
150	3													
ISE	4													
16-R	1													
17-0	2													
17-0	3					-								
18-8	4													
19-6	1													
19-0	2													
19-1	3							1			1			
19-6	4						-1-				1			
20-8														
J 200	2										11,			
ERIMF-06-6	3				4	1	1	V	V	1	V	1	1	
	4													
	1													
	2													
	3			- 1										
	4													
Tech Initials		8	Cmp	CHO	BRL	4	396	CMO	Un	ion	10-	1 2		

Comments:							
Reviewed by:	SS	Date reviewed:	2019111129				
Version 1.1 Issued October 6,	2015	Date reviewed: 201911129					

Nautilus Environmental Company Inc.

Embryo-Alevin Toxicity Test Daily Mortality

Embryo gr

Client: Sample ID: Work Order #:	Der Coal	Start Date & Time:			
	414	Test Species: R			

Concentration	Rep	Day of Test - No. of Mortalities												Total Dead
		13	14	15	16	12	18	19	20	21	22	23	24	Eggs/Embryos/ Alevins
LMLK-14 B	1	0	0	0										
C	2		1											
D	3				1									
E	4													
4NLK-15 B	1											-3-		-
c	2			I	-								-	-
D	3	1		1										-
É	4	1	1	0		-						-	-	
LNUK 16 B	1	1	12	79										
WLK 17 8	2		0	0									-	
C	3	1	T	Ī							-	-	-	-
LNLK 18B	4				-								-	
LNLK 19B	1	1												
c	2			1	-								_	
D	3	1							-			-	-	
E	4	1			_								>	
LNLK-20 R	1		1		-							_		
C	2	1	1								-			
ERIM+06 B	3	1			_									
	4	V	1											
	1			-				-						-
	2												-	
	3													
	4										-			
	1													
	2								-			+		
	3									-				
	4				-									
	1				-	-								
	2							-				-		
	3	-				+			-				-	
	4						-							
Tech Initials	-	Qn.	00	281										

Tooli iliidais	Die Die Blir Bbn			
Comments:				
Reviewed by:	28	Date reviewed:	2019/11/29	_
Version 1.1 Issued October 6	. 2015	Date reviewed:	Nautilus Environmental Comp	any Inc

Nautilus Environmental Company Inc.

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck	Start Date & Time:
Sample ID: N/A	Stop Date: 3
Work Order #: IJA	Test Species: Reds

Start Date & Time: May 215/2019
Stop Date: Test Species: Redside shiner

ID					Day o	f Test -	No. of	hatch					
S	10 to	2	3	4	5	6	7	8	9	10	11	12	Comments
ERIMF-06B	4(9)								_	42	0	0	
										·			
											_		
													7
	-												
											-		
								-	-				
ж.													
ech Initials		_		-	-				-	KJL	1	~	

Comments: @ very pale, underdeveloped

Embryo-Alevin-Fry Test Daily Hatch

BR

		121
Client: Teck		Start Date & Time: Man 21/2019
Sample ID: N/A		Stop Date: Jw. 10/2019
Work Order #: ₽A	-	Test Species: Redside shiner
· · · · · · · · · · · · · · · · · · ·		

ID					Day o	f Test -	No. of	hatch					
	13	14	15	16	13	18	19	20	21	22	23	24	Comments
LNLK-MB	0	44	21	_								_	
C	- 1 -	47	3	_								-	
G	-1-	47		0 -					1				
É		-	4	-			-						
LN45B		44	7	-	_							_	
C	V	33	17	-	-				-			_	
0	23	25	~										
· E	6	11	1	-								_	
		~	8										
LNUK 16 B	1	38	11	-								_	
C	-1	27		-								_	
NUK 18 B	V	8	3	-									
NLK 19 B	2	46	_									-	
C	0	45	3	-								_	4
Q.	0	34	3	-	-							_	
12	5	31	3	_									,
LNLK 10 B	ò		3	_								_	
C	1	9	1	-									
RIMT-OF	V	0	3	_									
7		1.											
				1									-
		1						-					
					-								
						-			-			-	
				-						-			-
					-								
													· · · · · · · · · · · · · · · · · · ·
					-							-	
P L. L. W	20	20	00.1			-							
Tech Initials	30	80-	BPL/										-

30	80-	BPL/											
		CMB											
_									- 31	_			
	30	30 60	300 BR BR1	300 BR 804	30 BR 801	30 BD BC/	30 BR 801	30 BD 60-1	30 BD BC/	30 BD BC/	30 80 80/ CMP	30 BD BC/	30 BD BC/

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck
Sample ID: N/A
Work Order #: N/A

Start Date & Time: May 21/2019
Stop Date: June 10/2019
Test Species: Redside shiner

· ID				Day	of Test	- No. o	f Morta	lities (h	atch)				
	13	14	15	16	17	18	19	20	21	22	23	24	Comments
LN44-14B	0	9	2	0	ρ	٥	0	Ð.					*
C					1		I						1
D		1.1		1									
E				1								1	/
LINLIK IS B											-	1	
C												1	
D												1	
É												/	
INLKIE B			1			2					/	1	
LNLKAS						0					1		
c			1			1					/		
WLK18B											1		
LNLKI9 B						1					/ .		
C						0	Acel			1			
D						1		1		1			
E						401		844		1			
LNLK-20B						0.		0		1			
C	1.	1	1,			+		0		1		,	
ERIMF-06B	1	1	J	. 1	1	4	T	0		/			
				-									
			100						/				,
				1								31	
									1				
						-							
													,
									-				
Tech Initials	B8-	BOL	300	BSL	50.	30-	CMP		_				

Comments:	Otocinician errol		

sample ID: Vork Order #:	MA									Redside			
ERIMF-6							Days						
Concentration	D	1		2		3			4	5		6	
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.0	14.0	13.5	140	136	14.0	13.5	13.5	13.5	142	13.5	14.0	14-
DO (mg/L)	10.2	10.3	10.0	4.9	9.9	10.1	loi	100	9.1	(2.1	100	10.7	10-2
pH	7.7	7.5	7.5	7-5	7.5	35	75	75	7.5	75	74		76
Cond. (µS/cm)	332	3-	35	-3	30	33		33		33:			2
Initials	350	3	55		1	CN		Civ		WL.		K)	
ERIMF-7							Days						
Concentration	0	1	- 11	2		2		1	4	5		6	
	init.	new	old	new	old	new	old	пем	old	new	old	new	old
Temperature (°C)	13.0	14.0	14.0	14.0	13%	14.0	13.5	13.5	13.5	140	13.5	140	
DO (mg/L)	10.2	10.3	10.1	9,9	9.9,	1-01	1000	10.0	99	(21	10.0	10.3	10.1
рН	7.7	7.5	7.6	26	75	7.5	76	7.5	76	75	7.5	7.4	73
Cond. (µS/cm)	332		345		331	33		33		33		3	
Initials	384	B			r	CM		Civ			1652	K71	-
	1.54	17	0			Co	1	1 00		who	100	6/	
ERIMF-8							Days						
Concentration	0	1		2			3	-		5		1	_
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13-0	140	14.0	140	13%	140	13.5	13.5	35	14.0	13.5	14.3	14.0
DO (mg/L)	10.1	10.3	10.0	9.9	9.8	1001	99	(0.0	10.0	10.1	10.0	10.3	10.1
pH	7.7	7.5		375	3	75	7.5	75	7.5	76	7.5	24	7.5
Cond. (µS/cm)	332		38		78	33		33		33	1		2
Initials	38-		r.		7	Ċi		Cin		UM	_	(4)	
muais	1.09	27	1,0				W.	LUN		1 - ()	1 3500		
ERIMF-9							Days						
Concentration	0	1			2	3		4		5	5	6	0
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.0	14.0	14.0			1400	13.5	3.5	13.5	0,77	13.5	14.5	14.
DO (mg/L)	19.1	1013	10.0	9,9	9.7	10-1	10.0	1000	10.0	101	10.0	[.G]	10.7
pH	7.7	7.5	7.5	25	26		7.5	7.5	7.5	75	7.5	74	7-1
Cond. (µS/cm)	332	3	38	3	38	33	6	33	9	33	14	33	2
Initials	BR	6	300		~	CA	3,	div	1	Um	rer	K	1
Thermometer:	T-9		meter:					- Ma_:			luctivity	meter:	ALD
Hardness* Alkalinity*	/	-							-			446	
* mg/L as CaCO3	/		_						J	Date re	wed by:		
										Date le	vieweu.	2011	mi
Sample Description													

ample ID:	NA												
Vork Order #:			_				Sto			June			
vork Order #:	NID		_			0.1		Test Sp	ecies:	Redsid	e shinei	<u> </u>	
ERIMF-10							Days		-				
Concentration	0	1		(2	-	3	1 4		1 4	5		6
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.0	14.0	13.5	14P.	13%	14.0	13.5	13.5	13.5	14.0	13.5	14.0	14.0
DO (mg/L)	10.2	10.3	10.0	9:85	9.8	10.1	9.9	10.0	10.1	10-1	10.1	(0:3	107
рН	7.3	7.5	7.5	25	75	7.5	7.5	75	75	25	7.5	24	7.5
Cond. (µS/cm)	332	3	38	3	38	33		33	-	330			72
Initials	B52	8	5-		-	CM		Cu			res-		ار
ERIMF-11							Days						
Concentration	0			- 7	2		3	4	1	1 5	5	(,
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.0	14.0	13.5	14/0	136	140	13.5	13.5	13.5	14.0	13:5	14.0	14.0
DO (mg/L)	10.2	10.3		9,7	7.8	10.1	10.0	10,0	104	1.01	10.1	10.5	(0, 2
pH	7-8	2.5	7.6	75	75	7.5	75	7.5	75	75	7.4	74	7.5
Cond. (µS/cm)	332	3	38	3	35	33		33		37		33	
Initials	82-	5	35-		/	Ca		CM		UL.			L
											124		
ERIMF-17							Days						
Concentration	0			7	2	- 3		2	4	5		(9
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	,30	14.0	14.0	140	13,5	14.0	13.5	135	13.5	14.0	13.5	14.0	140
DO (mg/L)	10.2	10.3	(0)	9.9	9.9	104	9.9	60	10.1	10.1	10.0	(0-3	503
pH	7.5	73	76	25	25	7.5	7.6	7.5	75	75	7.5	74	25
Cond. (µS/cm)	332	32	38	3	38	33	6	339		33			2
Initials	B8-	8	2	1	7	CIV	91	Can		ule			, _
						131			•	1	., ,		
ERFMF-13							Days						
Concentration	0	1		i	2	-	3	4		5		6	
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.5	14.0	14.0	14,0	13.5	140	13.5	135	13.5	140		14.5	14.0
DO (mg/L)	10. ;		10.1	9,9	9.5	10.1	10.0	100	10.0	121	10.0	10.3	
рН	7.6	7.5	7.5	25	75	7.5	7.6	75	76	15	7.5		25
Cond. (µS/cm)	332	5	35	37	8	33		330		334		35	
Initials	Bow	36	2	N		Civ	13	Cin			BS	14)	
hermometer:	T-9		meter:	D 0-	3			рH-3		Cond	uctivity	meter:	
Hardness*	/	itrol								Analys	ts:	BPL/	
Alkalinity*	/									Devi		YYL/	KJL
mg/L as CaCO3	3							-				22	1111-5
										Date rev	lewed:	2019	111129

nple ID: rk Order #:	NA						Stop	Date &	ijime:	1 0-	- 15/2	011	
ork Order #:	NIA							Test Sp					
								rest op	coles.	11003701	, Grinitor		
ERITHF-14							Days			_		-	
Concentration	0	- 1		2	-	3		-	-	5		interaction.	0
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.5	14.0	13.3	140	135	14.0	135	13.5	13.5	14.0	12.5	-	14.0
DO (mg/L)	10.1	10.3	10.0	9.9	9.8,	Del	9.9	1000	100	121	10.0	10.3	10.1
pH	7.8	7.5	26	75	200	75	76	75	75	7.5	7.5	74	75
Cond. (µS/cm)	332	33	5	330	f	33	b	33	9	33	ú		2
Initials	300	30		A	_	Čo	Pa	CIN	1	Mu	1856	K	1
ERIMF-15							Days						
Concentration	0	1		7	_	3	3	1	1	5		(0
Johnsonaanon	init.	new	old	new	old	new	old	new	old	new	old	new	old
Tomporature (°C)	13. D	14.0	14.0	140	13/5	140	13.5	13.5	13.5	14.0	13.5	140	14.0
Temperature (°C)	10.5	10.3	10.0	9,9	9,8	10.1	10.0	10.0	10.1	10.1	10.0	103	6.
DO (mg/L)	7.5	7.3	76	20	745	7.5	75	7.5	76	75	7.5	7,4	75
pH	332			-	38	33		33		33	_	7	32
Cond. (µS/cm)		37				Car		Ca			188L		>-
Initials	35	350		0		Car	18		4	lum	169.0	U	,0
ERIMF-16							Days						
Concentration	0			3	2	72	3		1		5	(٥
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	13.0	14.0	14.0	140	138	14.0	13.5	13.5	13.5	140	13.5	14.0	14.0
DO (mg/L)	10.1	10.3		9,9	918	10.1	10.0	(0.0)	99	10.1	10.0	(0.3	10.1
pH	7.5	_	7.5	_	7,5	7.5	7.6	75	7.5	7.5	7.5	74	115
Cond. (µS/cm)	332		38		338		34	33	5	31	4	3	37
Initials	Bou	_	55°		N		20	Ci		Mi	1800	_	14
miraio	100		74				, u				0.110		
Consentration	-	1				1	Days			T			
Concentration	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	IIIC	1104	Ulu	THE W	Jiu	11011	Jiu	11011	Jiu		- Tu		1
DO (mg/L)													
pH													
Cond. (µS/cm)					1								
								-	-				
Initials				_ h	0.7								
Thermometer:	7-9	_ DC) meter		0-3 0 mm	_ pl	H mete	r:_ρH	-3	Con	ductivit		
	Co	ontrol								Analy	sts:	BPL	-/AL
Hardness*		/					1					YYL	/ KJL
Alkalinity*	1/										ewed by		-
* mg/L as CaCO3	1									Date re	eviewed	: 201	CIIIIZ

Nautilus Environmental Company Inc.

Concentration	N/I		eal		-	Swy		p Date &	& Time:	7	الد 13	1200	7
Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	216	4							-				
Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm)													
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.							Test Sp	pecies:	Oncort			-89
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	1				_	200			Keds	icle St	men	_
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	-					Days			_			
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	DESPOSE OF	-	-	0.000								
DO (mg/L) pH Cond. (µS/cm)		new	old	new	old	new	old	new	old	new	old	new	old
pH Cond. (μS/cm)													
Cond. (µS/cm)													
								7					
Initials	/												
		K	ンレ										
							Days						
Concentration		1	+	1	8	(1		C		1	1	2
-WIMP 7	init.	new	old	new	old	new	old	15-characo	old	STATE		100000	1
Temperature (°C)		140	14.0	140	140			new		new	old	new	old
DO (mg/L)		10.1	62.2	119/2	98	10.0	140	14-0	13.5	14-0	14-0	14.0	140
pH		7-3	7-5	7,6	-		-	10.0	9,9	10.0	9.8	10.2	99
Cond. (µS/cm)	-			-	32	2.6	75	75	7.5	7.5	7.5		7.5
			12	,	33		33	7	32		33	33	_
Initials	-25.0	1	ル	1	+	-		8	2.0	B	30	Cm	9
Annual Property							Days						
Concentration		7	7		*	9			10		11		12
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14.0	14.0	140	140	140	140	14.0	14-0	140	14.0	14,0	140
DO (mg/L)		10.1	10.2	10,0	98	10.0	4.9	10.0	10-0	16.0	9.9	10.2	10.0
pH		73	チし	7.6	75	7.6	25	34	7.6	75	76	35	7.6
Cond. (µS/cm)		33		-	333	37			32		33	33	
Initials			36		3					-			
		-			1.5	A		- (30-	3	6-	CMS	
						_	-					- 1	
Concentration	-	-	+		5		Days						
CRIME A	init.			all management		100000	AND DESCRIPTION OF	Section 1995	0	1	1		12
	mit.	new 14.a	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		[0.1	14.0		14,0	14.0	142		140	14-0	14-0		13.5
DO (mg/L)			10.1	10.0	198	10.0	(20)	16.0	10.0	10.0	9.9	10.2	10.0
pH		73	15		728.8	zb	75	7.5	2.6	75	7.5	75	7,5
Cond. (µS/cm)			12	3	33	33	3	3	32		33	339	
Initials	800	Es	~		~	W	4				Scr		
	Con	DO		00-			meter:	pH-	3	Condu	uctivity	meter:	cond
Hardness*	/	u Oi			-	-				Analys	is:		/AWS
Alkalinity*	1												/ KJi
mg/L as CaCO3	1								_	Review		35	
										ate rev	iewed:	9010	111129

Concentration EYLMF-10 in Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	nit.			8 new 14,0 10,0 7,6	old 14,2 9 &	new jy,?	Days	Date & Fest Sp	ecies:	Oncorty Reds	inchus i	nykies hiner	
Concentration FYLM F-(0) in Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration		new 14.0 [0.1 7-3	14.0 100 7.5	new 14,0 10,0 7,6	old 14,2 9 &	new	Days			Reds	iele s	hine	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration	nit.	14.0	14.0 100 7.5	new 14,0 10,0 7,6	old 14,2 9 &	new	1	· ·	е Т				
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration	init.	14.0	14.0 100 7.5	new 14,0 10,0 7,6	old 14,2 9 &	new	1		e T			,	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration	nit.	14.0	14.0 100 7.5	new 14,0 10,0 7,6	old 14,2 9 &	new		· ·	0 1		11	-	-
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration	nit.	14.0	14.0 100 7.5	14,0	14,2		ALCOHOL: UNK				-		2
DO (mg/L) pH Cond. (µS/cm) Initials Concentration		12.1	7.5	7.6	98	NO	old	new	old	new	old	new	old
pH Cond. (µS/cm) Initials Concentration		7-3	7.5	7.6		1.1	14,0	14-0	13.5	14-0	4.0	14,0	140
pH Cond. (µS/cm) Initials Concentration		33	2		-/	100	10.1	10.0	9.9	10.0	16-1	2.01	0,0
Cond. (µS/cm) Initials Concentration		33		3	25	シャ	15	7.5	26	75	75	7.5	75
Initials Concentration					33	3	33	37	32	3	33	338	3
Concentration				-	7		m		ود	0	2	CM	9
									,				
	_						Days						
		7		9	8	0		1	0	1	1	1	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	11116	14.0	(40	14,0	14,0	14,0	140		14.0	14-0	14.0	140	13.5
		19.0	10.6	100	918	10,0		14-0			9.8	5.01	io.l
DO (mg/L)		73	75	7.6	26	76	10-1	16-0	10.1	7.5	75		7.5
pH				1.			76	7.5	7.6		33	335	
Cond. (µS/cm)		33		-	333	А							
Initials		(H)			1	Е	-	5	2	C	5-	CM	χ
													_
	_	7		-		-	Days		2				
Concentration	-	7	200	STATE OF THE PARTY OF	3	Name of Street	The second second	1	ALTO CALCADO	1		A STORE LAND	2
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14.0	140	140	140	17.0		4.0	14.0	140	14-0	140	14.0
DO (mg/L)		lal	10.1	10,0	98	100	100	10.0	10.5	10.0	9.9	10.2	10.0
pH		7.3	7-5	7.5	375	74	76	72	36	7.5	7.5		7.5
Cond. (µS/cm)		33	2		333	33	3	3	32	3	53	33	
Initials		P1	_	9	-	2		3	2-	8	36	Cin	?
							Days						
		-	-		×		M	-					
Concentration					2		-1		0	- 2	11		12
-11 -17	init.	new	old	new	old	new	old	new	old	new	old	new	old
	init.	100000	120.00	new	The State of the S	Inches of	T .	new	and the same of	new	old	14.0	Total Control
ERMF-B Temperature (°C)	init.	new	old	new	old	new	old 14.0	new	old 14-0	new 14-c	old	14.0	old 14.0
Temperature (°C) DO (mg/L)	init.	new ly.o	old [५.১	190 10,0	old 140 9.5	new /Y/2	old 14.0	new 14-8	0ld 14-0	new 14-0 18-0	old 14.0	14.0	01d 14.0
Temperature (°C) DO (mg/L) pH	init.	new 14.0	old 14.0 10.0 7.5	140 10,0 7.b	old 140 9.9 345	new 14/2 10/2	old 14.0	new 14.8 10.0 7-5	old 14-0 10-3 2-6	new 14-0 10-0	old 14.0 9.4	14.0	old 14.0 10.0 7.5
Temperature (°C) DO (mg/L)	init.	new 14.0	old [५.১	140 10,0 7.b	old 140 9.5	new 14/2 10/2	old 14.0	new 14-8 10.0 7-5	0ld 14-0	new 14-0 10-0 7-5	old 14.0	14.0	old 14.0 10.0 7.5

Client:	Te	k c	100			Hetel	- 62	t Date 8	sr-	И	24	1200	,
Sample ID:	NII		0001	_		-	Otal		/				-
Nork Order #:	NIA					-		Date &					
Work Order #.	10/14							rest Sp	becles:	Reds:		shine	
	-		-				Dave			WEST:	PC .	3/1/10/	
Concentration			L		i	9	Days	i					2
ERIMF-14	init.	new	old		ald	Sales Care	California	Section Product	The same	1	1	-	The state of the s
Temperature (°C)	nate	140		new f4.0	old	new 14p	old	new 14-c	old	new 14-0	old	new 14.0	14.0
DO (mg/L)		10-1	10.1	100	98.	10.0	121	10.0	10.1	10.0	10.1	10.7	10.0
pH		7.3	25	26	25	20	75	7.5	7-6	7.5	7.6	75	7.6
Cond. (µS/cm)		33		33			33	_	37			339	
Initials		V)		- 7		7	77				33	Ch	
midais		2			4	3-		1	300	- 6	~	u	u
							Davis						
Concentration		7		8	>	9	Days	1	2	1	1		12
Frimf-15	init.	new	old	new	old	new	old	new	old	new	old	mout	old
Temperature (°C)	111111	14-0	14.0	740	14,0	14-0	147	14-0			14-0	new	13.5
DO (mg/L)		(0.1	[0.1	120	9.8	100	101	10.0	9.9			100	1 2 4 1
pH		7.7	75	3.6	30	306	75	7.5	-	(0.0	10.0	7.5	10-1
Cond. (µS/cm)			32		333		33		32	7.5		33	7.5
Initials		40			2						33		
initialo		1			17			1.	30 L	95	500	Cin	
							Dave						
Concentration		1 -	L	3			Days	1	0		١.	12	
ERIMF-16	init.	NAME OF TAXABLE PARTY.	+		ACRES SAN	Suppose and	days with	Leannage Co.	0	SECURIOS.	11	(F-GH-30)	1
Temperature (°C)	IIIIC.	new 14.0	0ld 14-0	new	old	new	old	new	old	new	old	new	old
				190	140	140	14,0	14-0	140	14.0	13.5	14.0	13.5
DO (mg/L)		10-1	10.2	70,0	9:8	10,0	10.0	10.0	9.9	10.0	9.9	10.2	10.0
pH		7-3	1.5		76	7,5	7.5	7.5	7-6	7.5	7.6	75	7.6
Cond. (µS/cm)				- '	3 33	3	53		32		33	33	
Initials		100	_		2	A	-	(3)	X_	8	100 m	CM	9.
							-						
Concentration		-	7				Days		_				
Concentration	Inite	Mary Branch	-	25,510		August etc.	1200000		10000			-	
Tomporeture (90)	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)													
DO (mg/L)									-				
pH													
Cond. (µS/cm)		4	1										
Initials		1	_										
hermometer:	5-7		meter:	D 0-	-3	рН	meter:	ρН	-3	Cond			20, 4-3
Handa	Cor	ntrol								Analys	ts:	BPL,	/AUD/
Hardness*												YYL	/ KJL
Alkalinity*	/										ved by:	22	
mg/L as CaCO3	-								I	Date rev	iewed:	201(1)	11129
ample Description													
Comments:													

Concentration Concen	shines
Work Order #: Days Concentration FRINT - 07 Init. new old new	12 w old new
Days Concentration FRIME-07 init. new old ne	w old new
Concentration ERIMF-07 init. new old	w old new
Concentration ERIMF-07 init. new old	w old new
Temperature (°C) init. new old	w old new
Temperature (°C) 14-0 14-0 14-0 14-0	
DO (mart)	
DO (m = /1)	0 14.0
DO (mg/L)	
pH 75 2.5 2.5 2.5	
Cond. (μS/cm)	338
Initials Bar Bac	31-
7	2.
Days	
Concentration 7 8 9 10 11	12
	Control Office Control Office Control
Temperature (°C)	
DO (mell)	
mu	2 9.9
Cond (15(1-1))	3 7.5
1.11.1	338
Initials 1454 m m BR- BR	30
Days	
Concentration 7 8 a 10 11	12
ERTHT-09 init new old new old new old new old new old new	w old new
Temperature (°C)	0 /
DO (mg/L) / 10.7	2 /
pH / 7.5/ 7.5	5/
Cond. (µS/cm)	338
Initials	B8 -
Days	
Concentration 7 8 a 10 (1	12
TRIMT (0 init new old new old new old new old new old new old new	v old new
Temperature (°C) 14.0 14.0 14.0 14.0	
DO (mail)	
pH 25 7.5 7.6 7.5	
Cond (10)	
latticle 17	338
initials BRL BRL	30-
DO meter: DO-3 pH meter: +1-3 Conductivity meter: +3	1-3
DO meter: pH meter: pH - 3 Conductivity meter: co	174 2
Control Analysts: RP	OI LAVALLA
Hardness* Analysts: SP	DL/AWD/CHP
All Control of the second of t	L/KJL
teviewed by:	
Date reviewed: 20	019112119
Sample Description:	*
Comments:	

lient:	7	eck C	sal		F	Ewyn -	Start			Man	> 24	1200	1	
ample ID:		/A					Stop	Date &	Time:	Ju	ni 13	120	19	
Vork Order #:	ы	14						Test Sp	ecies:	Red	coide	2h	Luce	>
			3	i4		15	Da	ys	16	17		18		
Concentration		ac ?	5		9		10	-		1	_	'	5	
ERIMIT 75	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.6	14.0											
DO (mg/L)		10.6	9.9											
рН		745	25											
Cond. (µS/cm)			36											
Initials			2C											
		(3	14		15	Da	ays (6	(-	7		8	
Concentration		38 B		7			٥		"	1	2	1	3	-
ERIMF-16	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			14.0											-
DO (mg/L)		10.0	9.9	10.0	9.9									- 30
pH		7.5	2.4	7.5	7.5	/								
Cond. (µS/cm)		-	36		40									
Initials			p		QL.		/							
mado		-		- 7				1						
							D:	ays						
Concentration							ay 5							
Concentiation	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	Olu	HEW	Olu	Hew	olu	Hew	Olu	HEW	Old	Hew	Old	HOW	Old	Heli
DO (mg/L)														
pH														
			-					1						
Cond. (µS/cm)		-			_		-	-						
Initials										-			_	
							-				_			
		1					D	ays						
Concentration	05-7.1	a Corporati		a resident		19 /1-(74)	1000	DESCRIPTION OF THE PERSON OF T		NE TO		200-110	100	The same
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		-			-					-			-	-
DO (mg/L)		-		-	-			-						
pH						-								
Cond. (µS/cm)		1								-				
Initials	-													
DO meter:	_1)	0 -	3	_ pl	ł meter	:_p	H -3		Con	ductivity				
	Co	ontrol								Analys	sts:	BPL	/ KJL	/ CMP
Hardness*	1	/							1					
Alkalinity*	1/				1						wed by:			1 - 7
* mg/L as CaCO3	2									Date re	viewed:	2	olalli	129
Sample Description														
Sample Description		_												
Comments:														

Client:			^	0		800	عطستنجا		B. Time			10	019	
Sample ID:	NI	TECK	Cock	7		. 0	Sto	rt Date &	Time:	- 2	ians -	3/2	0,9	
Work Order #:	NI						Oto	Test Sp	pecies:	Rec	2 5100	e Chi	ner	
		ľ	3	1.	1	15	Da	ays	6	1	_	11	8	
Concentration	No. of Concession, Name of Street, or other Designation, Name of Street, Name	Ben	The second second		1	L	0	1			12	-	3	
ERIMF-11	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН														
Cond. (µS/cm)														
Initials														
		1:	2	14	(15			6	1		1	8	
Concentration		00 2						ays		_	_		13	
ERIMF-12	THE RESIDENCE OF	ARTERIOR STATE	201770	2000	100000		1000	The State	E-manufacture (- Contract	Name of the	- PORTUGE	170000000	PRODUCTION OF THE PARTY OF THE
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	-	14-0	13.5		14.0	O Pi	14.0	14.0	14.0	/	14.0			
DO (mg/L)		10.0	1.01	10.0	10.1	10.0	10.0	10.0	ial	/	10.0			
pH		7.5	7.5	7.7	7.5	7.5	7.5	7.7	7.6	/	7.8			
Cond. (µS/cm)			66		40	33	37	33	,9	/				
Initials	BPC BPC				اد	86	30	Cav	v?	/ 30	7-			
		-	2	1.									_	
	entration 13			1	7	15		ays	di	(7		(8	
Concentration	Name and Address of	California de la constanta de	Section Section	The state of the s	<u>></u>	-	0				12	1	3	
ERIMF-123	old	new	old	new	old	new,	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	/	14.0							
DO (mg/L)		10.0	10.0		10.0	/	10.0							
рН		7.5	7.6	7.5	7.5	/	7.5							
Cond. (µS/cm)		33		3	40	/								
Initials		Sp	~	12	X-	/ 2	39L	/						
		1.	2	10	+	15	De	we I		1	1	- (Q	
Concentration		(3)	-	-	+	15			(b	13			8	
Concentration	old	980 8		0		Tarrah like	9	Jacon	11	-	12	,	3	
ERTHF-14	old	new 8	old	new	old	new	old	new	old	new	old			new
Temperature (°C)	old	new 14.0	old 14.0	new IY-0	old 14-0	new 14-o	old 14.0	new i4.o	old i4.o	-	old	,	3	
Temperature (°C) DO (mg/L)	old	980 8 new 14.0	old 14.0 9.5	new 14.0	old 14-0 18.2	new 14.0	old 14.0	new 14.0	old 14.0	-	old 14.¢	,	3	new
Temperature (°C) DO (mg/L) pH	old	900 8 new 14.0 10.0	old 14.0 9.5 7.5	new 14.0 (0.0	old 14-0 18.0	new 14.0 10.0 → .5	old 14.0 10.0 7.7	new 14.0 10.0	old 14.0 9.9	new	old 14.4 9.4 7.7	,	3	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	old	980 8 new 14.0 10.0 7.5	old 14.0 9.5 74	new 14.0 (0.0 7.5	old 14-0 18.0 7.9	new 14.0 10.0 7.5 33	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6	new	old 14.4 9.4 A.7	,	3	
Temperature (°C) DO (mg/L) pH	old	900 8 new 14.0 10.0	old 14.0 9.5 74	new 14.0 (0.0 7.5	old 14-0 18.0	new 14.0 10.0 → .5	old 14.0 10.0 7.7	new 14.0 10.0	old 14.0 9.9 7.6	new	old 14.4 9.4 7.7	,	3	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials		980 8 new 14.0 10.0 7.5	old 14.0 9.5 74	new 14.0 (0.0 7.7	old 14-0 18.0 7.5 40	new 14.0 10.0 7.5 33	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6	new	old 14.4 9.6 4.7	,	old	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	D	980 8 new 14.0 10.0 7.5 93 90	old 14.0 9.5 74	new 14.0 (0.0 7.7	old 14-0 18.0 7.5 40	new 14.0 10.0 7.5 373	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6	new	old 14.4 01.4 01.4 A.7 A.7 meter:	new	old	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	D	980 8 new 14.0 10.0 7.5 33	old 14.0 9.5 74	new 14.0 (0.0 7.7	old 14-0 18.0 7.5 40	new 14.0 10.0 7.5 373	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6	new	old 14.4 01.4 01.4 A.7 A.7 meter:	new BPL	3 old J-3	D/CM
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials DO meter:	D	980 8 new 14.0 10.0 7.5 93 90	old 14.0 9.5 74	new 14.0 (0.0 7.7	old 14-0 18.0 7.5 40	new 14.0 10.0 7.5 373	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6	new series and series are series and series are series and series and series and series are series and series and series are series and series and series are series and series and series are series and series and series are series and series and series are series and series are series and series are series and series are series and series are series and series are series and series are series and series are series and series are series and series are series and series are series are series are series and series are series are series are series are series	old 14.4 9.4 A.7 A.7 meter:	new BPL,	3 old A WI	D / CM
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials DO meter: Hardness*	D	980 8 new 14.0 10.0 7.5 93 90	old 14.0 9.5 74	new 14.0 (0.0 7.7	old 14-0 18.0 7.5 40	new 14.0 10.0 7.5 373	old 14.0 10.0 7.7	new 14.0 10.0 7.7	old 14.0 9.9 7.6 9	new uctivity Analys Review	old 14.4 9.4 A.7 A.7 meter:	new BPL	3 old	D/CM

lient:		eck (Coal		11	80		Date 8	/	M	ay 2	3/200	9/9	
ample ID:	W							Date 8						
ork Order #:	N	IA						Test Sp	ecies:	_ Ke	olsic	12 sh	inc	
		13	>	14		15		ys	(6	1.	>	18		
Concentration		Ber -3	5	- 01		10		10		- 13	_		3_	_
ERIMF-07	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0/	14.0									
DO (mg/L)		10.0	10.0	/	10-0			-			/			
рН		7.5	ナイ		3.5									
Cond. (µS/cm)		33		087				/						
Initials		35	20	5	8-	1	/							
			,											2
		12	7	1.	4	1	5 Da	ays	16	1.	7	Ĺ	8	
Concentration		58~ S	5	- 0	1		10		11		~	1	3	-
ERIMF-08	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	1	14.0									
DO (mg/L)		10.0	10.0	/	10.0									
pH		7.5	7.5		75									
Cond. (µS/cm)		_	36	/	, -									
Initials			70	1	5-									
initials		1 0		1/ 6	5					-				
		13		1-	1	17	D	ays	16	1	7		8	
Concentration		800 S		_	Q.	,2		ays	1	-	15		2	
ERIME-09	old	new	old	new	old	now	old	new	old	new	old	new	old	new
Temperature (°C)	Olu	liew/	13.5	Hew	Olu	new	Old	Hew	Old	HEW	Old	HCW	Old	Hew
		1	10.0										-	
DO (mg/L)		1/	7.5					-			-			
pH		1/	1 4.2								******			
Cond. (µS/cm)		1												
Initials		36	4			1					-			-
		()	5	1.	4	15	5 D	ays	16	,	17		18	
Concentration		135 -1	3-	10		1	0	-	1		12	-	3	-
ERIMI-10	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14-0		14.0	14.0	1	14.0							
DO (mg/L)		10.0		10-0	10.0	1	10.0							
pH		2.5	7.6	-	7.5	1	7.5							-
Cond. (µS/cm)			36	_	40	18:3								
Initials			2		300		SPL .							
00 meter:	D	0-3				:р			Cone	ductivity	meter		√9-3	
	Co	Control							7	Analys	sts:	BPLI	ALD	1 CM
Hardness*		Contact										YYL	/ KJ	L
Alkalinity*	1								1	Revie	wed by	: 5		
mg/L as CaCO3	2								٠,		_	20		29
Sample Description	:													
Comments:														

Client:	Teck	(0	ما		Ha	tch	Star	t Date 8	STime:	May	24/	2019		
Sample ID:	NIA						Stop	Date 8	Time:	Jan	2 13/	299		
Work Order #:	NIA						*	Test Sp	ecies:	Redside	e sh	iner		
		-				-	Ds	iys		_		_		
Concentration		7000	7		š	0			0		1(12	
ER 1204 7-11	init	new	old	new	old	William William	LORDINGS:	VC9-20-6	Non-Asset	new	old	LIPS HOUSE	old	POW
Temperature (°C)	W.H.H.C.	HICM	Ulu	new	olu	new	old	new	old	it-o	14.0	new	14.0	new
DO (mg/L)									1			14.0	9.9	
pH							-		/	10.0	9.7	-	7.5	
Cond. (µS/cm)		/							1	75	7.5	-		-
Initials	-				-			0	/	-	33	33		
iniuais			_					100	96	6	300	39	-	
						-	De	nve	-	_	_			
Concentration		-	+	1	8	0		lys	0		11		12	
ERIMF-12	init	new	Des Sales Victoria	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)					- Oid	new.	Old	- 1	7	140		14.0	14.0	THE PERSON
DO (mg/L)	1							/	/	10.0		10.7	10.1	
рН								/	/	7-5		7.5	7.5	
Cond. (µS/cm)								-	_/_		33		38	
Initials								/	6.				20	
	1. Age our							1 .,	1					
							Da	ays						
Concentration		7	+		8	0			9	-	1)		12	
ERIMA-3	init	new	old	new	old	new	old	new	old	new	old	new.	old	new
Temperature (°C)								- 1	/	14-0	140	14.0	14.0	
DO (mg/L)								1	1	10.01	9.8	10.2	10.1	
рН								1	/	25	7.5	7.5	7.5	
Cond. (µS/cm)								/			35		38	
Initials								8,	X	-	350		32-	
	/										^			-
								iys						
Concentration	0.00	-		8	5		9		0		11	,	7	
ERIMI- 17	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)								1	/	140	14.0	14.0	14.0	
DO (mg/L)								/		10.0	9.9	10.2	10.0	
pH		•							/	7.5	7.5	4.5	7.5	
Cond. (µS/cm)		_						/		3	33		38	
Initials	-		-					1 8	K		80	13	2-	
DO meter:	DO) -3		рН	meter:	ρH	-3		Cond	uctivity	meter:	2000	- 3	
	Cor	ntrol								Analys	ts:	BPL/	ALD,	CMP
Hardness*													/ KJL	
Alkalinity*										Review	ved by:			
mg/L as CaCO3	1								t	ate rev			qIIII	29
Sample Description	:-				4									.,.
Comments:														

Client:	Teck	(00	al		Hay	- Con	Sta	rt Date	& Time:	M	ly :	24/	2019	
Sample ID:	NI	4				-	Sto	p Date	& Time:	To	me 13	(201	9	
Work Order #:	~	A						Test S	& Time: pecies:	Reds	ide s	hiner		
							D	ays						,
Concentration	150000000	and distriction of the last	7	-	8		٦	1	0		11		51	
ERTHY-15	init.	new	old	new	old	new	old	new,	old	new	old	new	old	new
Temperature (°C)						1		/	/	14-0	14.0	14.0	14.0	
DO (mg/L)							T	/	/	10.0	9.9	102	10.0	
pH								/	1	7.5	7.6	7.5	7.5	
Cond. (µS/cm)			/					1		2	33		38	
Initials		-						1 5	3-		50	3		
								1			~	,	3-	
						- 4.0	D	ays						
Concentration			7		8		9		(0		1)	1	2	1
ERJM7-16	init	new	old	new	old	new	old	new	old	пем	old	new		new
Temperature (°C)						11011	Old	- IICW	Old	14.0	Olu /	14.0	17.0	new
DO (mg/L)									/	10.0	/			
pH					-				/	-	/	10.7	_	
Cond. (µS/cm)						-		/	X	7.5	/	7.5	7.5	
Initials								/		52	150		38	
					-			1		\$5	3-	3	8-	
									-					
Concentration				T			D	ays	-					
o mocha a don	init.	Spiriting.	46 PK 1 1 1	Section 5	55 500	STATE AND IN	I SURPRISE STATE	NEWS	Excessive and	A TATAL STREET	Liver market Street Co.	ACRES IN	The same of the	A SECTION
Temperature (°C)	BUL	new	old	new	old	new	old	new	old	new	old	new	old	new
DO (mg/L)		-												- 4
PH Cond (vC()														1
Cond. (µS/cm)		1							(₹					
Initials														
	_													
							Da	ays						
Concentration	Part of Street	2000000	The State of the S											
- 1700 - 1700 1700	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН		*												
Cond. (µS/cm)												0.00		
Initials												-		
*														
DO meter:	_ 00) -3		На	meter:	OH	-3		Condi	uctivity	motor	CON	1 -3	
						P			Condo	Cuvity	meter.	2.0		
	Con	trol								Analyst		D OI	ALA	1141
Hardness*	/		7							Analysi		Dru/	ALD,	unp
Alkalinity*	/									Povious	od b	414/	KJL	
mg/L as CaCO3	1									ate revi				
									U	ale lev	ewed:			
Sample Description:	-3													
Comments:													-	

Tesk (oal	Start Date & Time:	May 24 /2019
N/A	Stop Date & Time:	June 13/2019
NIA	Test Species:	Redside Shiner
	N/A	N/A Start Date & Time: N/A Stop Date & Time:

							Da	ays						
Concentration		1-	3	1.	4	1	5	1	6	12	7	1	5	
FO- 9 MIZAS	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	13.5	140	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
DO (mg/L)		100	9.9	10.0	9-9	10.0	9.9	10.0	9.9	10.0	9.9	10.1	1000	
рН		7.5	7.5	75	7.6	78	7.9	7.7	77	7.8	7.9	79	7.9	
Cond. (µS/cm)		3	36	3	fD O	3	37	33	39	37	375	33	56	
Initials	(1)	B	~		ور	135	20	Cr	NE	8	92	CM	9.	

							Da	ays						
Concentration		1	3		Fi	15		L	ما	17	7	1	8	
ERIMIT-08	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	140	140	14.0	14.0	14.0	14.0	0.41	14.0	
DO (mg/L)		10. 0	10.0	10.0	10.0	(0.0	10.0	10.0	9,9	10.0	9.9	10.1	loil	
рН		2.5	7.5	7.5	76	78	7.8	7.7	76	7.9	7.8	79	7.9	
Cond. (µS/cm)		3	336		40	3	37	33		2	28	33	6	1
Initials		0	30-		BL	8	50	C	ne	B	0-	CN	l	

							D	ays						
Concentration		12		i	4	15		1	So.	1	7		18	
ERIMI-09	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	140	14.0	
DO (mg/L)		10.0	10.0	[0.0	10.0	10.0	10.0	ioio	9.9	10.0	10.0	101	10,0	
pH		7.5	7.5	7.5	3.6	7.8	7.8	7.7		7.9	7.8	7.9	7.8	-
Cond. (µS/cm)		33 6		3.	40		37	3	39	3	38	33	م	
Initials		3	Dr.	31	SL		280		WE		6	Ĉįv	e.	

							Da	ays						
Concentration		13	7	1	4	1.	5	1	So	1.	7	1	8	1000
ERIMF-10	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	140	14.0	- 16
DO (mg/L)		(0.0	9.9	10.0	10.0	10.0	10.0	10.0	9.9	10.0	10.0	101	10.0	
рН		73	75	7.5	2.6	7.8	79	77	76	7.7	7.9	79	7.8	
Cond. (µS/cm)		3	336		40	3	37	3		3	38	33	q	
Initials		B	ود		SC-		350	1	MP	94	20	Cin	9.	

Initials		BPL	30-	BRU	CMP	BQ~	Cine	
DO meter:	00-3		pH meter:	pH-3	Cond	ductivity meter:	con 3 -3	
	Control					Analysts:	BPL/ALD/	CHP
Hardness*	/						YYL/ KJL	
Alkalinity*						Reviewed by:		
* mg/L as CaCO3						Date reviewed:	2019111120	1
Sample Descriptio	n:							
Comments:								

	Haten So-
TP LIC COOL	Start Date & Time: Man 24 /2018
N/k	Stop Date & Time: June 13/2019
NIA	Test Species: Radide shiner
	Tech Cool N/A N/A

							Da	ays						
Concentration		638 ×	13		14	(5	1	•	I	7	1	8	
ERIMF-11	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14-0	13-5	14-0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	140	14.0	
DO (mg/L)		10-0	9.9	10.0	10.0	10.0	9,9	10.0	9.9	10.0	9.9	10.1	9.9	
рН		7.5	7.5	7.5	7.1	7.8	7.8	7,7	76	7.9	2.8	79	7.8	
Cond. (µS/cm)		32	0	3.	90		37	3	39	3		33	t	
Initials		13	80		BPC	3	5-		inf	G	0-	Ch	Λ	

							Da	ays						
Concentration		13		j	4		15	1	6	(7	1	8	
ERIMF-12	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14-0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14,0	14.0	
DO (mg/L)		10.0	10.0	10.0	10.0	100	(0.0	10.0	9.9	10.0	9.9	1.01	10.0	
рН		7.5	7.5	7.5	76	78	7.8	7.7	76	7.9	7.8	79	7.8	
Cond. (µS/cm)		37	66	31	40	3	37	33		3	35	331		
Initials		3	ge .	30	-	3	SV	Ċin			2	Con	0	

							D	ays						
Concentration		1	3	i	4	1	5	1	6	13		1	8	
ERIMF-13	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	14.0	G. VI	14.0	140	14.0	14.0	14.0	14.0	
DO (mg/L)		10.0	9.9	10.0	9.9	10.0	(0.0)	10.0	9.9	10.0	9.9	10-1	100	
рН		7.5	7.5	7.5	76	78	79	77	76	7.1	7.8	7.9	79	
Cond. (µS/cm)		33	36	3	40	3	37	33	-		38	33	Ċ	
Initials		130	22	3	56		550		W	0	2	CM		

							Da	ays						
Concentration		,2		1	4	1	5	1	6	1	7	1	X	
ERIMI-14	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	مردا	140	14.0	140	14.0	14.0	140	14.0	
DO (mg/L)		10.0	9.9	10.0	9.9	(0.0)	10.1	10.0	1000	10.0	10.0	101	100	
рН		7.5	7.5	7.5	7.6	7.8	7.8	7.7	76	7.9	7.9	7.9	79	
Cond. (µS/cm)		3	36	3	40	3	57	33		-	38	33	(,	
Initials		3	G-	(3	GL	31		C	uf		2-		P	

DO meter:	D0-3	pH meter:_	pH-3	Conductivity meter:	cond-3
	Control			Analysts:	BPL/ALD/CAP
Hardness*					YYL/ KJL
Alkalinity*	1			Reviewed by:	SS
* mg/L as CaCO3	1			Date reviewed:	2019111129
Sample Description	:				
Comments:					

Embryo-Alevin-Fry Toxicity Test

Water Quality Measurements 35 Start Date & Time: Stop Date & Time: Test Species: Rederide Sha

							Da	ays						
Concentration		1	3	1	4	1.	5	1)	0	1	>	1	8	
ERIMF-15	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		140	14.0	14.0	14.0	14.0	140	14.0	14.0	14.0	14.0	14.0	14,0	
DO (mg/L)		10.0	9.9	10.0	9.9	10.0	10.0	iao	ioi	10.0	10.1	lod	10,0	
рН		7.5	7.5	2.5	76	28	7.9	7.7	7,7	7.7	7.9	79	7.8	
Cond. (µS/cm)		3	36	3	40	2	33	3	39	3	38	3	36	
Initials			5-		SL		2-	Ci	nl	B	86	0	20	

							D	ays						
Concentration		13	5	1-	1	1	5	1	6	13			18	
GRIMF-16	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	14.0	140	14,0	140	14.0	14.0	14,0	140	
DO (mg/L)		(0.0	10.0	(0.0)	9.9	10.0	10.0	10.0	1001	10.0	10.1	1.01	10.1	
рН		7.5	7.5	7.5	2.6	7.8	7.8	7.7	77	7.9	7.8	7.9	7.9	
Cond. (µS/cm)		3:	36	3-	10	3	37	33	9	3	38	53	(s	
Initials		B	Sr.	13	s-	B	gv.	Ċi	wf	G	2-	(2)	R	

							Da	ays			-			
Concentration	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН														
Cond. (µS/cm)														
Initials														

							Da	ays						
Concentration	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН														
Cond. (µS/cm)														
Initials														

DO meter:	00-3	pH meter: pH - 3	Conductivity meter:	cond-3
	Control		Analysts:	BPL/ALD/CMD
Hardness*	/			YYL/KJL
Alkalinity*	/		Reviewed by:	SS
* mg/L as CaCO3			Date reviewed:	2019111129

Comments:

Client:

Sample ID:

Work Order #:

NA

Client:		Teck	con	. 0		Haten	Stor	t Date 8	35-	Ma	24	1		
Sample ID:		14			_	-		p Date 8						_
Work Order #:		IA	_			-								
Tronk order in								Test Sp	ecies.	120	Side	-411	1	
							Da	ays						
Concentration		j	9	1	20	2	-1	2	2	2	3	2	4	
ERIMF-07	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0									
DO (mg/L)		10.0	9.8	10.2	9,9				-					
pH		79	78	7.9	8,0				-					
Cond. (µS/cm)		33	3	33	7		-							
Initials		CA	nf	Car	l	/								
Concentration		1	9	1 2	0	7	Da	ays	2		3		24	
ERIMF-08	old	Owner, married	Total Control of the	NEW YORKS		SO OTHER	100000	2	Section Sectio	Delic Volville	-	100000	T-	1000000
	010	new 14-0	0ld	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)				14.0	14.0				-					
DO (mg/L)		10.0	10.1	5.01	1000					1				
рН		39	7.8	79	3.0									
Cond. (µS/cm)		33		3	5+									
Initials		Ćò	-{	Car	W.		/							
							D	21/0						_
Concentration		1	9	1 2		1 2		ays	2		23	2	-1	
erint-09	old	new	The Real Property lies	A STATE OF THE PARTY OF THE PAR	Total Control	100000	NO PERSONS	The second	-	0-5254		100 A 100 A	4	DOMESTIC.
Temperature (°C)	olu	14.0	Old 14.0	new [H-o	old 40	new	old	new	old	пеж	old	new	old	new
			_	5.6										
DO (mg/L)		10,0	9,9		10.1					400				
pH		79	38	7.9	79	-								
Cond. (µS/cm)				33										
Initials			me	Civ	4		/							-
							Da	ays						-
Concentration		1	1	7	0	2		2	-2	2	- 3	2	+	
ECIMT-19	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		140	14.0	140	140									
DO (mg/L)			9.9	10.7	10.0									
pH		79	7.9	79	79						-			
Cond. (µS/cm)		33	8	33					/					
Initials		C	me		nl			/						
DO meter:	00) -3		рН	meter	p +	1-3		Cond	uctivity	meter:	(0.12	-3	
	Co	ntrol							1	Analys	te.	BPL	A wD/	CMP
Hardness*	,	/								raidiys		YYI	/ KJL	UTII
Alkalinity*	1									Review	ved by:			
* mg/L as CaCO3	1								,				nalli	20
													, contin	6-1
Sample Description:														
Comments:														

Hetch Man 24/2019 Teck (oa) Start Date & Time: Client: Jue 13/2019 Sample ID: Stop Date & Time: NIA Test Species: Redaide shine Work Order #: NIA Days 21 22 Concentration ERIMF-11 new old new old new old new old new old new old new init 14.0 14.0 140 14.0 Temperature (°C) 1.01 10.2 10.0 10.0 DO (mg/L) 79 78 79 800 pH 337 Cond. (µS/cm) Initials Cine comp Days Concentration 22 ERIMIT-12 init. new old new old new old new old new old new old new 14.0 14.0 14.0 140 Temperature (°C) DO (mg/L) 100 10,2 5.01 10.0 79 78 79 Hq 338 Cond. (µS/cm) 337 Cinf Initials Carl Days Concentration ERIM =- 13 init. new old new old old new old new old new old new 14.0 Temperature (°C) 14,0 14.0 140 3,6 9.8 DO (mg/L) 10.2 10.0 pH 78 78 338 Cond. (µS/cm) 337 Initials Cine CM Days 24 Concentration 20 22 23 ERIMF-14 init. new old new old new old new old new old new 14.0 14.0 14.0 140 Temperature (°C) 6,0] DO (mg/L) 9.9 10.7 iou 79 pH 79 39 338 Cond. (µS/cm) 337 Initials Cim H-3 00-3 Conductivity meter: (0-1 - 3 DO meter: pH meter: BPL/ ALD/ CMP Control Analysts: Hardness* YYL/KJL Alkalinity* Reviewed by: SS * mg/L as CaCO3 Date reviewed: 2019/11/29 Sample Description: Comments:

Client:		Tack	Con	- 2		H	ik n	t Date	S Times		7	4 /2		
Sample ID:	NI	A	Coo			-	Sto	n Date	& Time:	300	413	1201	000	-
Work Order #:		iA				-	Oto	Test S	pecies:	04.4		'Ar		
						-			poo.00.	- KGOM	3.			
							Da	ays						
Concentration		1	(9	2	0		21	2	2	2	3)	4	
ERIMF-15	init	new	old	new	old	ACCUPATION.	old	ALC: UNKNOWN	old	No. of Concession, Name of Street, or other Designation, Name of Street, or other Designation, Name of Street,	The second	St. St. St. St. St. St. St. St. St. St.	of Other Designation	new
Temperature (°C)		140	140	1410	142	-	-	The state of the s	Old	TIL TE	Ulu	Sell Cw	Old	TIC W
DO (mg/L)		10.0	1.01	10.2	10.1			-	-				-	
pH		79	78	79	8,0								-	
Cond. (µS/cm)			38		37	-		-				-		
Initials		Ch		Civ			7	-			_	-		-
	9			- Ola	<u>u</u>									
							D.	100	_					
Concentration		1	9	1 7	,0			ays	`		7			1
ERIMF-16	init.	new	el marine de	A GROWN OF THE	Manakasa	And the later of the	1	7	A STATE OF THE PARTY OF THE PAR	Sec. 15.25	3	7	The second second	
Temperature (°C)	HUL	140	14.0	new 14.0	old 140	new	old	new	old	new	old	new	old	new
DO (mg/L)		10.0	9.8		-	-								
				10:2	10.1									
pH		79	78	79	8.0					200				
Cond. (µS/cm) Initials			3.8	33					/					
initials			ME	Ca	18			/						
							-	_			-			
•							Da	iys						
Concentration		,	-											
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)									3					
Initials														
							Da	1/0						
Concentration							Da	ys						
	init.	new	old	new	old	now	old	DOWN.	212	STATE OF THE PARTY	BEN PER	Tarana Sa	label control	Chartegovers
Temperature (°C)				ino tr	Old	I I C W	UIU	Hew	Old	new	old	new	old	new
DO (mg/L)										-				
pH														
Cond. (µS/cm)							-	_						
Initials														
V		_							-					
DO meter:	00	-3		рН	meter:	OH	- 3		Condi	ctivity	meter	100	4 - 3	
1	•					-				. a triey				,
Hardness*	Con	UOI.								Analyst	s:	BPLT	AWD/	CHP
Alkalinity*	-			-								YYL)	KJL	
mg/L as CaCO3										Review			5	
gr L as Jacos									D	ate revi	iewed:	20	allli	29
Sample Description:					j.									
winding pegolihuoli:	-		_											-
Comments:														
March 1997						-								

Embryo-Alevin Toxicity Test Daily Mortality

Conce	ntration	Rep				Day	of Te	st - No	o. of N	lortal	ities				Total Dead Eggs/Embryos/		
,	300		1	2	3	4	5	6	7	8	9	lo	11	12	Eggs/Emb Alevin		
	ERING (_1	0	0	0						,				-	-	
	MF-7	2	1	1	1									6	36 66	241	
	MF-8	3							- 11-						23 123	200	
ERT	MF-9	4								-					4	95	
ERI	MF-10	1					1								86	.81	
ERI	MF-11	2													39 1	28	
ER	IMF-12	3													59	72	
ER	LMF- 13	4													23 1	34	
	MF-14	1	1	13											77	186	
ER	3MF-15	2								-					60	186	
ERS	ime-16	3	V	_	1										48	152	
		4															
ERT	MT-07 B					0	0	0	0	0	0	0	0	5			
1	07 C	2				1	1	1	1	1		0		9			
	08 B											1					
	09-P											0					
	10-8											0		2			
	10-0											0		v			
	11-6											Ð					
	12-6											9					
	12-C											1					
	13-8									1		0	1				
	14-13	_															
	14-0																
	15-B																
	15-0	_					1										
	V 16-8					7	4	V	1		1	4	1	41			
		4															
		1															
		2			-						-						
		3													-		
ech Ir	itiala	4		-				- 11		. /							
Comm		_	Bic	B	BRU	BEL	- W	Įψ.		~			132				

Embryo-Alevin Toxicity Test Daily Mortality

Client: Sample ID:	Texis Coal.	Start Date & Time: Many 24 /2019 Stop Date & Time: June 13 /2019	
Work Order #:	NIA	Test Species: Redside shiner	

Concentration	Rep		*		Day	of Te	st - N	o. of I	Mortal	ities				Total Dead
		13	14	15	16	17	18	19	20	21	22	23	24	Eggs/Embryos/ Alevins
ERIMT-07-B	1	0	0										_	
e		1	_										_	
ERIMF-08-B	3	0	0										_	
ERIMF-09-B		3530						NAME OF					-	
ERTHF- 10-B		0	0	O	_									
C	2			ව	-									-
FRIMF-11 - B	3	4	+											-
ERIMF-12-B			1	0	Ó	_	7.5			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			_	
	1			0	0	_								
ERTHF-13-B	2	Ho		0-					-		- TOTAL			
ERIMF-14 - B	3 8	220		0-										
	4	0	1	0	O	_	_		-					
ERIMF-15-B		1												
- C		_						-					-	
ERBHIT-16-B	3	1	0	0				-					-	
	4													
	1													
	2				177									
	3													
	4													
	1													
	2												104	
	3													
	4				1									
	1													
	2													
	3												TAR	
	4		T-11											
	1													
	2													
	3													
	4													
Tech Initials		392	BR	BSV	Coul	_	_	-					-	

	3										TUE	Link it
	4		T. III									
	1											
	2		-									- 401 1.1.
	3											
	4											
Tech Initials		392	BB-	BSV	CM							
Comments:							<u></u>					in Lyan
Reviewed by: Version 1.1 Issued October 6, 2015						Dat	e revi	ewed:		9019	112110)
version 1.1 Issued Octo	ber 6, 20	15								Na	utilus Env	ironmental Company Inc.

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #: NA

Start Date & Time: Many 24/2019
Stop Date: Jones 12019
Test Species: Redside shiner

ID					Day o	f Test -	No. of h	natch					
	1	2	3	4	5	6	7	8	9	10	11	12	Comments
ERIMF-075	_								-	4	9	7	
ं ०३०	_							_	-	~	-	-	
ERELU-08B	_				-		70	0	Ö	6	2	2	
ERIMI-095								-	-	-	-	1	
ER ZH 3-10-B	_								-	430		316	
c	_						7		-	10	.4	13	
ERIMP B	_	-							-	25			
GREAT-13 &	-							_	+	8	3	3	
0	-							_		-	3	-	
EREMI-13-B	_						-			2	4	-	
ERIMF. 14-B			-							7	0	19	
C	-				1.00			_		4	4	5	
ERIMF- 15 B		-						_		-	-		
15 C	-	-							-	6	4	-	,
ERTHI. 16-18	_	-							+	-	5	7	
										-			
*													
						, A.							
		-											
					1								
			1										
Tech Initials	-				-	-	- 185.	1	1	- Bec	30-	Cmi	

Comments:	@ vary gale underdividuoed.	

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #: N/A

Start Date & Time: Many 24 (2019
Stop Date: June 13/2019
Test Species: Redside shiner

ID					Day o	f Test	No. of	hatch					
	13	١٦	15	150	17	18	19	20	21	.22	23	24	Comments
ERIUH-07-13	a	1	-									_	
07 C	0 -											_	
EROUT-OSB	1	1											
ERIMA-09-B	3-												
CRIMS-10-B	27	1	1	_									
C	4	1	3										
ERIMF-11-B	_												
ERIHT-12-B	7	7	0	i	_					-			
C	0	0	0	D	1	_							
ER EMA-13-R		1.	3.									_	
ERIMI-14-B		5	2										
C		1	0-1	W	0	11	200					_	
ERIMF-15-B	293	=48-										_	
С		100											
ERTHE-16-B	25	35/2	1-								-		
													*
j+													
-													1
					+								
								,					
					,								
											,		
							-						
Tech Initials	BRL	50	BOU	CMP	BOU								

Comments:

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck
Sample ID:	N/A
Work Order #:	NIA

Start Date & Time: Hay 24/2009
Stop Date: Two 13/2009
Test Species: Redside shiner

İD				Day	of Test	- No. o	f Morta	lities (h	natch)				
	{	. 2	3	ې	5	6	7	8	9	!0	11	12	Comments
ERZNA- OF B	_	-				-	1	1	1	0	0	TH	,
c	7					-				1		6	
ERZHIF-08B						-						2	
ERZUA-09 B	,					->						1	
ERTHUT-10 B								1			1	18/16	
C						->	-	0	10		0		
EFERTH B	-						- 1	1	1			1 1	
ERBMINE 3	-											CV 3	
c	_												
ERIMY 13 B	-											1	
ERIMI14B	_						-					4/1	
C												14	
ERZOLF 15 B							-				1.		
C												ce	
ERIMF-16-B).		1	4	\$	
						*							
						,		(a) 1 (ii. 5					
					-								
			04										
+													
										1			
*											10		
								N					
			4										
	1												
Tech Initials	-			-			5	2	~	BOL	BOL	spular	2

2019/12/19

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Tighe: Many 24 /2019
Stop Date: June 13/2019
Test Species: Redside shiner

. ID				Day	of Test	- No. o	f Morta	lities (h	atch)				
	13	14	15	16	17	18	19	20	21	2-2	23	24	Comments
ERIMF-07 B	0	0	D	0	0	0	Ÿ	0					,
С				1		1							1
ERIM F-US-B				1.		1				1			1
ERSHIF-09-B													7
ERJUA-10-B	1												/
_ č	1				+	1						1	
EREUF 11-B	1				1							1	
ERIMFAZ-B	1				10		1					/	
c					0							1.	
ERINT 13 B	T				1	i	1					/	
ERZUFIAR						1					/		
٥											1		
ERZMI-15 B		- -		1	+						/		
C				1	1					-	/		
ERZMF-16-R	1		1	1	i	1	1	I			1		
							,			1			
										1			
										1			
										7			
											-		
			÷				-						
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Tech Initials	20	anu	00.4		0.0								
con initials	DIV	500	ゆる	CM2	86	286	39	501					

Comments: B State tal 3, cran of second 3, sin filed 3 colone 2

Stop Date & Time: Test Species: Redside shiner Concentration Concentratio	Client:	Te	us Co	20	E	mbry	20	Sta	rt Date 8	چرے R Time:	Mau	24/2	019	
Test Species: Redside shiner	Sample ID:							Sto	p Date 8	& Time:	Tone	14/2	019	
Concentration	Vork Order #:													
Concentration								Davs				_		-
ST(D - 62 Init. new old new ol	Concentration	0	i		7)		3	1 4		1 5		10	
Temperature (°C) 13.0 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 13.5 14.0 10.0 10.1 10.1 10.1 10.1 10.1 10.1	STC D-02		new	old	new	old	Contract to	1000mo-1	new	old	new	old	245,025,00	2000
DO (mg/L) DO (mg/L)									-					
PH 7.8 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5									-	1.	_		_	_
Cond. (µS/cm) 352 338 338 336 339 339 339 332 333 332 333 332 333 332 333 332 333					_	-								
Days Days														
Days												-		
Concentration STPD- C3 init. new old n		1.5.	1.0					4		<i>y</i>	1000	56	P	/2 0
STPD- C init. new old														
Temperature (°C) 13.0 14.0 14.0 14.0 13.5 13.5 14.0 13.5 14.0 14.0 14.0 14.0 15.5 15.5 15.5 14.0 15.5 14.0 14.0 14.0 15.5 15.5 15.5 14.0 15.5 14.0 14.0 16.3 16.1 16.2 16.3 16.1 16.2 16.3 16.1 16.3 16.3		The second secon	1	No.	- 4			1	L		5			The second of
DO (mg/L) pH 7-5 7.6 7.6 7.6 7.6 7.6 7.6 7.6 7.									-		_	old		-
PH 7-5 7.6 7.6 7.6 7.5 7.6 7.5 7.6 7.7 7.7 7.7 7.7 7.7 7.7 7.7 7.7 7.7							1.	-	15.5		140	13.5		14.0
Cond. (µS/cm) 332 338 336 339 334 332 Initials 36° 67° 7° 7° 100 100 100 100 100 Days 100 100 100 100 100 100 DO (mg/L) 100 100 100 100 100 100 100 DH 7.8 7.5 7						-				-		_		10.1
Days Concentration O Z 3 4 5 6 5 6 5 6 7 7 7 7 7 7 7 7 7								76			7.5	7.5	74	75
Concentration Concentration	CONTRACTOR OF THE PARTY OF THE											_	3	32
Concentration O	Initials	300	0	350		~	Civ	R	Cir	8	in	1050	(3)	-
Concentration O 7 3 4 5 6 ST(7) O 4 init. new old new o			-					-		_	_			
ST(7) CY init. new old	Concentration	0	1		2			Days			-		1 4	
Temperature (°C) 13.0 14.0 14.0 14.0 13.6 14.0 13.5 13.6 14.0 13.7 14.0 14.0 15.6 15.6 13.6 14.0 13.7 14.0 14.0 15.0 10.1 10.1 10.1 10.1 10.1 10.1 10	Secretary and and and	THE RESERVE AND ADDRESS OF THE PARTY NAMED IN	-	1	-	200	SPORT I	1	COLUMN T	-	The second second	52 x 55 x 5	-	-
DO (mg/L) 10.2 10.3 10.1 9.9 9.8 10.1 10.1 10.0 10.1 10.1 10.1 10.1 10						-	_							
pH 7.8 7.5 7.5 7.7 7.6 7.5 7.6 7.5 7.7 7.6 7.5 7.6 7.5 7.7 7.6 7.6 7.6 7.5 7.7 7.6 7.6 7.6 7.7 7.6 7.6 7.7 7.6 7								1	1					
Cond. (µS/cm) 337 338 336 339 334 332 Initials 55 35					1						1		_	
Initials FR BY W CM W/BC KN Days Concentration D Z 3 4 5 6					40						-			-
Concentration 0 7 3 4 5 6														
Concentration 6 2 3 4 5 6	inidals	878	(4	28		~	L	W.	(h	N	1 11	185-	K	n
Concentration 6 2 3 4 5 6								Days						
STED-05 init, new old	Concentration	0	1		1			3	4		5		6	
old liew old liew old liew old liew old liew old liew old	STPD-05	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C) 13.0 14.0 14.0 14.0 13.5 13.5 13.5 14.0 17.5 14.0 14.0 14.0	Temperature (°C)	13.0	14.0	14.0		126	140							
DO (mg/l) 107 / 107 109 65 67 101 100 101 101 107 11	DO (mg/L)	10.2	18.3		9,9,									
	pH	7.5	10.3	7.5	75	75	75	7.5	75	73	7.5	7		7-5
pn 7 - s 7 - h h h h h h h 7 - n n h	Cond. (µS/cm)	332	7.5	338	3	38	3							
222 174 221	Initials	35	13	SU	1	+								
Temperature (°C) 13.0 14.0 14.0 14.0 12.5 14.0 13.5 13.5 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0	Concentration STPD-05 Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	new 14.0	old 14.0 10.0 7.5 338	new 14,2 9,5 7,5	old 125 5.7 75	new 14.0 io.l 7.5	Days 3 old 13.5 10-0 7-5	new (3.5 to,o 13.5 33	old 13.5 10.1 7.3	5 new 140 10.1 7.K	old 13.5 10.1	6 new 14.3 10.1 74	14
pn 7・つ ミーナ・フーヤ・ カフーカン わら 木く 木く コく コく コく コマーノ・(Cond. (µS/cm)	332	7.5											
Cond. (µS/cm) 332 7.5 335 336 339 334 332	Initials	BSV	13	SU	1	-	C	ul	Con	3	un	1550	6	シー
Temperature (°C) 13.0 14.0 14.0 14.0 13.5 13.5 140 13.5 14.0 14.0 14.0 14.0 14.0 14.0 14.0 14.0	Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	13.0 10.2 7.4 332 BSV	14.0 14.0 7.0 7.0 8	10.0 7.5 338 Su	14,2 9,5 7,5	126 5.7 75 36	140 10.1 75 3:	13.5 10.0 7.5 36 up	13.5 10.0 7.5 33 Ch	13.5	140 10.1 7.5 33	13.5 10.1 75 4	14.0 10.3 7.9 33	10 75
Cond. (µS/cm) 332 7.5 335 336 339 334 332		Cor	ntrol								Analys	sts:	BRUIA	ارتب
Cond. (µS/cm) 332 7.5 336 336 339 334 332 Initials GSV ISSV A CMP	Hardness*		/			T.					-			1
Cond. (µS/cm) 332 7.5 336 336 339 334 332 Initials GSV ISSV A CMP	Alkalinity*		/								Review	wed by:	22	
Cond. (µS/cm) 337 7.5 338 336 339 334 332 Initials GF BF F CMP C	mg/L as CaCO3	1												1111120
Cond. (µS/cm) 337 7.5" 238 336 339 334 332 Initials GS	Sample Description	:									Date le	vieweu.	_20(0	11112

Client:		ومد و	المحا		E	mpraje	Sta	rt Date	& Tirrie	: Mo	25	120	9	
Sample ID:		NIA					Sto	p Date	& Time	300	14	12019		
Work Order #:		NIA						Test S	pecies:	Re	الم وردو	2017		
											270,70		1000	
Concentration	0	1		-				ays						
		Contractor and the		2	100000000	Name of the last	3	L	-	5)	6	,	
STPD-66	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	13.0			140	13%	140	13.5	13.5	13.5	14.0	13.5	14.0	14.0	
DO (mg/L)	10.2	_			9.8	10.1	9.9	10.0	iou	1.01	10.0	10.3	101	
рН	7.8					75	75	7.5	74	125	75	7.4	76	
Cond. (µS/cm)	332	_	338	1	338	33	6	33	٩	33	4	3	32	
Initials	BRC		BSC		~	Ci	ne	Civ	l	Ww.	1086	(c	1	E
				-										
Concentration	0	1		7		3	D	ays	1	5			_	
579707	init.	new	old	new	old	2002000	-	AND DESCRIPTION OF THE PERSON NAMED IN	-	A Commission of the	100,000	and the second	0	Taken out
Temperature (°C)	13.0			14,0	136	14.0	13.5	13,5	old	new	old	new	old	new
DO (mg/L)	10.2			19,5	9,9			1	13.5	C.47	135	14.0	14.0	
pH	7.8	75		75	-	10.1	100	10.0	102	101	10.0	103	121	
Cond. (µS/cm)					34	7.5	7.5	7.5	7.5	75	75	74	75	
Initials	352		575		3.5	33	6	33		33		3	32	
illiudis	050	13	300	-	2	Ċi	N	Ci	N	Muz	- BR-	(0)	-	
			_											
Concentration	D	1				3	Da	ays	_			-		
ERW37-07	init.	new	alal	IN SCHOOL		1		-	-	5		6	7	
Temperature (°C)	13.0	14.0	old 3,5	new 14,0	0ld	14.0	old	new	old	new	old	new	old	new
DO (mg/L)	10.7	10,3	10.1	917	9.8	,	13.5	13.5	13.5	0.71	13.5	14.0	14.0	
pH	7-8	7.5		7	75	joil	10.0		10.1	10.1	10-1	(2-3	1.01	
Cond. (µS/cm)			7-6	7.5	38	7.5	7.5	75	76	25	75	74	7-5	
Initials	332		535			331		33		33			32	
IIILIAIS	178-	10	130		8	Ca	N.	Cin	1	un,	1B8-	(2)	-	
							De	iys						
Concentration							De	ly S						
	init.	new	old	new	old	new	old	now	old	Frank.	-14	SCHOOL STREET		STREET,
Temperature (°C)					Old	1104	Olu	new	olu	new	old	new	old	new
DO (mg/L)														
рН											-			
Cond. (µS/cm)							-							
Initials														
	1					,	1 -							
O meter:	12)- >	<u> </u>	pHı	meter:	ptl	-3		Condi	uctivity	meter:	600	erd	3
. [Con	trol				1				BA	AWD	S/CAJ	p/44	2/10
Hardness*	/	901						-		Analyst	s:	. 000		-
Alkalinity*	/													
mg/L as CaCO3	/									Review			S	
									D	ate rev	ewed:	2010	2111112	1
ample Description:														
				R										-
omments:														

Concentration TPD-02 Temperature (°C) DO (mg/L) pH		IA					Sto	p Date 8	Time:	Jone	14/20	29	
Temperature (°C) DO (mg/L)		10						Test Sp	ecies:	Oncort	yrıchus	mykiss	BRL
Temperature (°C) DO (mg/L)												esh.	
Temperature (°C) DO (mg/L)							Days						
Temperature (°C) DO (mg/L)		7			8		9	1	0	1	1		15
DO (mg/L)	init.	new	old	new	old	new	old	new	old	new	old	new	old
		140	14.0	140	140	14,2	14,0	4.0	14-0	14-0	14.0	140	14.0
Ha		10-1	10.2	10,0	100	10,0	191	10.0	10.1	10.0	9.9	10.2	9.9
		77	7.5	7.6	75	7.6	7-5	2.5	7.6	7.5	3.6	7.5	7.5
Cond. (µS/cm)		53		3	333	3	33	3	32	3	33	33	3
Initials		E	1		A	Δ.	_	G	x-	3	20	CN	
							Days						
Concentration		7	-	- (3	1	9		G	1	1	1	2
STPD-03	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		14.0	14.0	140	140	140	142	14.0	14-6	14.0	140	140	14.0
DO (mg/L)		10.1	10.0	19,0	10,0	10,0	101	10.0	10.1	10.0	1001	10.2	10.0
pH		73	7.5	7.6	75	2.6	7.5	7.4	26	75	25	7.5	7.5
Cond. (µS/cm)		33			333	3	33	37	32		33	33	
Initials		B	-		1	2		Bo	~	36	2	Ċw	
							Days						
Concentration		7	7	8			9	(0		((1	2
STPD-04	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		140	14.0	140	142	140	140	14.0	14.0	14-0	140	140	13.5
DO (mg/L)		10-1	10.1	100	99	100	ioo	10.6	16.1	0.05	10.5	5.01	ioil
pH		7.3	75	76	7.5	7.6	75	7.5	7.5	7.	7.5	7.5	75
Cond. (µS/cm)		33	2	14	333	37	3	3:	37		33	33	
Initials		K	1	4	-	A		- 2	50-		00	CM	3.
							Days						
Concentration		7		8	-	0	1	1	0		11	1	2
STPD-05	init.	new	old	new	old	new	old	new	old	new	old	new	old
			C.Y	14,0		14,2	142	14-0	0-45	14.0	14.0	1400	13.5
Temperature (°C)		101	102	98	9,8	100	10.0	10-1	10.1	10.0	10.0	10.2	1.01
Temperature (°C) DO (mg/L)		7.1	7.5	26	75		7.5		2.5	2.5	7.5		7.5
			-0										
DO (mg/L)		23	V		333	3	53	3	5.5	3	33	33	8

Concentration CT FD-0 6 Temperature (°C)		NIA					Sto	p Date	& Time:	Tarin	2 (4/2	Lac	
STFD-06 Temperature (°C)		214						Test S	pecies:	Oncor	hynchus	mykiss	
STFD-06 Temperature (°C)									2 437.61	Red	cicle	Show	2
STFD-06 Temperature (°C)							Days					4(.50	
Temperature (°C)			7		8		7	1	0) [1	2
	init.	new	old	new	old	new	old	new	old	new	old	new	olo
		14.0	14-0	140	140	142	140		14-0	14-0	N.0	140	14.0
DO (mg/L)		10-1	10-1	100	99	10.0	(20	10.0	10.1	10.0	10.0	10.2	10,0
pH		7.3	7.5	36	20	76	7.4	7.5	7-6	7.5	7.6	-	75
Cond. (µS/cm)		3	32		33		33		32		33	33	
Initials		14	2	A	_	~			ru			-	
				,				100			38-	CM	W
							Dave						_
Concentration		-	-		8	29	Days	1	0				
3780-07	init.	new	old	new	old	new	old			Section 1997	11)
Temperature (°C)		14.0	14-5	140	140	14P	148	new	old	new	old	new	old
DO (mg/L)		101	10.2	10,0	9.8			14-0	14.0		14.0	140	140
pH		73	76	7.6	26	10.0		10.0	10.1	16.0	10.0	10.2	10:0
Cond. (µS/cm)			2		333		7.5	7.5	26	7.5	7.5	7.5	75
Initials		16				7	33	37		11	33	33	
muus		(-)			5	~	-	13	0	(38-	Cr	R
		_											
Concentration		7		0			Days		. 9.29				
ERWSF-01	init.	(Approximate)		Ç	400	N/ Supins	Dames and Assessment		(0)	- 1	(1	2
3, 40) 1 0 /	HIII.	new	old	new 14P	old 140	new	old	new	old	new	old	new	old
		1 -1 -											11
Temperature (°C)		14.0	14.5			140	14.0	14-0	14-0	14.0	14.0	140	1400
Temperature (°C) DO (mg/L)		1.0	iov	10,0	98	100	(0.1	10-0	14-0	14.0	10.1	1400	1400
Temperature (°C) DO (mg/L) pH		10.1	10 V 7-5	7.6	98	76	75	10.0	26			7.5	10.0
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)		10·1 1-7 33	10 V 7-5 V	7.6	98	100	75	10-0	26	7.5	1.01	10.2	10.0
Temperature (°C) DO (mg/L) pH		10·1 1-7 33	10 V 7-5	7.6	98	76	75	10-0 7.5 33	26	7.5	7.6	7.5	10.0 7.6
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)		10·1 1-7 33	10 V 7-5 V	7.6	98 73	10.0 7-6 33	75	10-0 7.5 33	26	7.5	7.6	10.2 75 33	10.0 7.6
DO (mg/L) pH Cond. (µS/cm) Initials		10·1 1-7 33	10 V 7-5 V	7.6	98 73	10.0 7-6 33	75	10.0 7.5 33	26	7.5	7.6	10.2 75 33	10.0 7.6
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)		10·1 7·3 33 k.	10 V 715 V	7.6	98 73	10.0 7-6 33	75	10.0 7.5 33	26	7.5	7.6	10.2 75 33	10.0 7.6
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration	init.	10·1 1-7 33	10 V 7-5 V	7.6	98 73	10.0 7-6 33	75	10.0 7.5 33	26	7.5	7.6	10.2 75 33	100 7.6 8
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C)	init.	10·1 7·3 33 k.	10 V 715 V	10:0 7:6 3	98 73	100 3-6 33	Days	10-0 7-5 80	26	7.5 3:	10.1 7.6 63	10.2 75 335 CM	10.0 7.6
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	init.	10·1 7·3 33 k.	10 V 715 V	10:0 7:6 3	98 73	100 3-6 33	Days	10-0 7-5 80	26	7.5 3:	10.1 7.6 63	10.2 75 335 CM	100 7.6 8
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH	init.	10·1 7·3 33 k.	10 V 715 V	10:0 7:6 3	98 73	100 3-6 33	Days	10-0 7-5 80	26	7.5 3:	10.1 7.6 63	10.2 75 335 CM	100 7.6 8
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	init.	10·1 7·3 33 k.	10 V 715 V	10:0 7:6 3	98 73	100 3-6 33	Days	10-0 7-5 80	26	7.5 3:	10.1 7.6 63	10.2 75 335 CM	100 7.6 8

ample ID:	1	eck C	Car.				Sto	n Date 8	Time:	30~	14/	4/201	-1	
/ork Order #:	i	IA					310	Test Sr	vacies.	Red	11	-1.	0.	_
								10010	,00,00	700	ice.	suine	5	
							Da	ays						
Concentration		1,	3	10		13	5	(5	,	177	2	15	X	
517507	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	140	14.0	14.0	14-0	14.0/				1		
DO (mg/L)		[0.0]	9.9	10.0	10.0	10.0	16-0	10.6	1.01					
pН		2.5	7.5	3.5	75	78	7.9	7.4	78			/		
Cond. (µS/cm)		23	p	3.	40	3	37	33			/			
Initials		B	2		PL	B	P	CM	8	/				
										-				
							D	ays						
Concentration		13	,	- 1	4	t.	5	11	9	(2	(.8	
STOD-03	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14-0	14.0	14.0	14.0	14.0	14.0	14.0				/	
DO (mg/L)		10.0	9.9	10.0	10.0	10.0	10.1	10,0	9.9			/		TO
рН		7.5	7.6	22	7.5	7.8	7.8	7.7	7.7		/	/		
Cond. (µS/cm)		3:	36	3	40	3	37	/ 33			/			
Initials			PU	6	g_	3	5	CM		/				180
							D	ays				-		
Concentration		1	3		4	1	5	_	6	1	2	1	8	
STPD-04	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	14.0	14.0	14.0	14.0	14.0	140	1	14.0			11
DO (mg/L)		10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.9	1	10-0		1	
pH		7.5	7.5	7.5	3.5	7.8	7.8	7.7	77		79,		/	9
Cond. (µS/cm)		37	6	30	10	3	37	33		1	1	11		
Initials		130	3	6	8-		6-	CM		1/5	386	1		
									-					
							D	ays						
Concentration		13	>	1.	4	15	5	1	6	1	7	1	8	
5790-05	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	140	14.0	14.0	14.0	14,0	14.0	/	14.0			
DO (mg/L)		10.0	9.9	10.0	10.0	10.0	10.1	1000	1.01	/	9.9		-	
pH		7.5	7.5	7.5	7.5	7.8	7.9	7.7	7.8	/	7.9			
Cond. (µS/cm)		3	36	3	10		7	33	9	/				
Initials		66	~	0	S-	3	(0	Civ	18	1 2	2			
	1	2				7	1 2							
O meter:	11	1-3		рН	meter:	of	1-3		Cond	uctivity	meter:	Cou	d 3	3
		,				1				0	OI /A	W//	210/V	41
	Co	atrol					2			uctivity Analys	ts:	010	7/1	1-1
Hardness*	/													-
Alkalinity*	/										ved by:		22	
mg/L as CaCO3										Date rev	iewed:	201	911112	9

Client:		Tech	Coa	Q	1	-mbi	Star	rt Date 8	Time:	M	cus.	4/20	19	
Sample ID:	/\	VA					Sto	p Date 8	Time:	27	رسو ا	0/201	9	
Work Order #:		MIA						p Date & Test Sp	ecies:	Ked	side	Strine	6	*
								ays						
Concentration		1	3	1-	1	1 <	5	U	6	1.	7	1	8	
370006	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14.0	14.0	14.0	14.0'	14.0				/	
DO (mg/L)		10.1	10.0	(0.0)	10.0	[0.0]	10.0	10.0	10.1					
рН		7.5	2.6	7.5	2.5	79	7.9	77	7.3		/			
Cond. (µS/cm)		3	36	31	10		37	33			/			
Initials		8	300	-	3L		s-	CM		/				
								Civi						
							Da	ays	-					
Concentration		1	3	1.	1	- 1	5	13	6	1	7	1	8	
STRDOZ	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	14.0	14.0	14.0	14.0	14.0/	14.0	1.011	0.0	1.011	Oid	11011
DO (mg/L)		10.0	10.0	10.0			10.1	10.0	1.01				/	
рН		7.5	2.6		10	7.8	7.8	7/7	77					
Cond. (µS/cm)			36		40	38		/ 33						
Initials			300		(~		sa.	Ch		/				
					1		-		- (1					
							Da	ays						
Concentration			3	I	4	1	5	11	b	1	7	1	8	
ERUST-01	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	2000	14.0	13.5	14-0	14.0	14.0	140	14.0	140	/	14.0	11CW	Old	11011
DO (mg/L)		10.0	10.1	1000	10.0	0.01	10.1	10.0	10.1	1	9.9			
рН		2.5	7.	7.5	7.0	7-8	7.9	7.7	7.6	1	7.9			
Cond. (µS/cm)			360		40	32		33		1	1 2 2			
Initials			Qu		g-		>6 L	Cr		10	500		-	
						1-	-	_ \(\text{\tin}\text{\tint{\text{\tetx{\text{\tetx{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\texi}\text{\text{\texi}\text{\text{\texi}\text{\text{\text{\text{\texi}\text{\text{\texi}\text{\texi}\text{\text{\text{\text{\tet{\text{\text{\text{\text{\texi}\text{\texi}\texit{\text{\t						
2							Da	ays						
Concentration	10000	del es		E100801		10000000								
T (20)	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)												1		1
DO (mg/L)														
pH		0												
Cond. (µS/cm)														
Initials														
DO meter:	Do	0-3		рН	meter:	pH	-3		Cond	uctivity	meter:	YKU	ed.	-3
	Cor	ntrol								Analys	ts:	y cour	1440	1KJ
Hardness*	/									, many s		-		
Alkalinity*	/						-			Review	ved by:	-	35	
* mg/L as CaCO3	/								1		-	20		20
Sample Description:													. (111)	6-1
oampie Description:														
Comments:														

Client: Sample ID: Vork Order #:	N	A A				tch	Stop		Time: ecies:	F	14 24 Ne 14 Iside 9	1200 (luher	19	
							Da	ays						
Concentration	I DISCLOSED	7	A STATE OF THE PARTY NAMED IN	8	Annual Property lies	9		1	0	1	1	1	2	
20-61815	init	new	old	new	old	new	old	new!	old	new	old	new	old	new
Temperature (°C)			/		1		/		/		1	/	/	
DO (mg/L)			/		/		/		1		/		/	
pH	-	1	/		/		/		/		/		V	
Cond. (µS/cm)		/			1.		/	/	,	/		1		
Initials		/		/		/		1		1		1		
	,							0						
Concentration			\$		8		Da	ays	0		10			
Sted-03	20014	State of the latest to	Total Control of the last	a particular	Acres de la constante de la co	-	The same of the sa	No. linear	The second second	(LCACONIA)	11	-	2	ACRES NO
	init.	new	old	new	old	new	old	new	old	new	old	new		new
Temperature (°C)			/		/		_/	14.0	/	14-0	14.0	14-0	140	
DO (mg/L)			/		/		/	10.0		10.0	9.9	10.0	10.0	
pH			/		1		/	7.5	/	7.5	7.5	75	7.5	
Cond. (µS/cm)		/		/		/		3	32	3	33	7	338	1
Initials		(/				3	94	6	50		38-	
				-	_			500						
Concentration		7			~			ays						
STP D- 04	init	WHITE COLUMN	AND DESCRIPTION OF THE PERSON.	TWO STAGES	8	NI PERMINE	CALADO-STOCKE	SHIP CONTRACTOR	0	1000000	11	Aces	12	2453.50
	HUC	new	old	new	old	new	old	new	old	new	old	пем	old	new
Temperature (°C)			1		/		/		/		/		/	
DO (mg/L)			/		/		/		/		/		/	
pH		-			/		/			/		1		
Cond. (µS/cm)		/		1				/	'	/		/		
Initials						1	_	1		,		1		
							Da	iys						-
Concentration		7	-		8		q		(0)		. (1	2	1
20-02	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			/		/		1		1		1		/	1.01.
DO (mg/L)			/								/		/	
pH			/		1		/				/	1		
Cond. (µS/cm)		/		/		1				1		/		
Initials		/		1		/		1		/		1		
OO meter:	Do)-3		рН	meter:	PH	-3		Condu	uctivity BPL/	meter:	(OL)	id	-3 1ksi
Handman*	Con	trol	-	-						Analys	ts:	- M		
Hardness*	/													
Alkalinity*	/										red by:		SS	
mg/L as CaCO3									D	ate rev	iewed:	201	allilz	9
ample Description														

Client:	Te	CK	Con		H	at c'	Star	t Date	& Time:	Ч	aug 2	4/20	9	
Sample ID:		- (/				_	Sto	p Date	& Time:	3	ore, "	4/201	٩	
Work Order #:	- 12	12						Test Sp	pecies:	Re	Side	56	q q unes	
								ays						
Concentration	-		7	3	4	,	4	- (0		11	1	2	
STED-06	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			1		1		/		/		/		/	
DO (mg/L)		-	/		/		/		/		/		/	
рН	-		/				/		X		/		V	
Cond. (µS/cm)	-						/	/		/		/		
Initials		/			/	1				/		1		
												/		
							Da	ays						
Concentration			7	5	Š		9	T .	10		11	1	2	
2260-63	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			1		1		1	140	1	14.0	14.0	14.0	14.0	Hew
DO (mg/L)		1	/		/		/	10.0	/	10.0	_	[0.7	10.7	
рН			/		/		/	7.5	/	7.5	7.6	7.5		
Cond. (µS/cm)			/		/		/		52				7.5	
Initials		1	/	/	/	/			ec ec		33		33	
		6		/		1			VC	C	, P	2	350	
							D		_					
Concentration			7		8			ays	[0				_	
ERWSF-01	init.	1000	Carrier and Carrie	DOSES!		in the sales	9	THE PARTY.		- (1		12	
Temperature (°C)	HILL	new	old	new	old	new	old	new	old	new	old	new	old	new
			/		/		/		/		/		/	
DO (mg/L)			/		/		/		/				/	
pH			/		/			,	/	/				
Cond. (µS/cm)		/				/		/		/		/		
Initials		-		/		-		/		/		/		
							Da	iys						
Concentration														
	init.	new	old	new	old	new	old	new	old	new	old	new	old	now
Temperature (°C)											JIU	11011	Jiu	new
DO (mg/L)														-
pH														
Cond. (µS/cm)						3								
Initials														
O meter:	DC)-3		рН	meter:	pH	-3		Cond	uctivity	meter:	Cou	W:	3
	Con	itrol								Analyst	S.	יייןנוי	1/17	1/1
Hardness*														
Alkalinity*	/									Review	ed by:	0	2	
mg/L as CaCO3			*							ate rev			911112	9
ample Description:													11116	
														-
omments:														

T	RCK C		-					35					
11/		-ONL				Star	t Date 8	Time:	M	au ?	24 1-	2019	
100	A							Time:	5	مس ا	1/201	7	
. 2	A						Test Sp	ecies:	Reds	ide sl	niva		
_						Da	ve						
-11	13	5	1-	+	1<			,	(-	7	1	8	
old	new	old	new	old	new	old	new	old	new	old	new	old	new
	14.0	/	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	
	10.0		10.0	10.0	10.0	to.0	10.0	10.1	100	10.0	101	10.0	
	7.5		7.6	7.6	78	7.8	7.7	76	3.9	7.5	7.9	78	
	336	1	3.	40	33	C)	33	9	53	5	33	36	
	36	-	6	,a	25	3	CM	ę	30	L	Ch	16	
	_					D-							
	12	5	1-	4	15			6	1	7	1	8	-
old	new	old	new	Contract of the last	- DAOVE	and the second	A STATE OF THE PARTY.	The second second	Charles Co.	ACC. 2000	Towns of the	Page 100	new
	14-0	14.0					14.0	-			14.0		
	10.0				100						1 .		
	3.5	2.5			7.5			_		73			
	37	56											
	Bru												-
							_						
Description of	13	STATE STATE OF	THE RESERVE AND ADDRESS.	WOLD THE		and the second second	1	100000000000000000000000000000000000000	(3	7	1	Land Street, S	No. of Contract of
old	new	old	new	old	new		new		new	old	new		new
		/			14.0		-	-	14.0	14.0	1 .	_	
		/							10.0	9.9	-		
		/						-		-			-
_			2	40	8	37			53	8			
	8	5 C	C	18C	5	25	Ca	nl	6	5	CM	9	
						Da	avs	-					
	13	5		14	1		T	6	1.	7		18	
old	new	old	new	old	new	old	new	old	new	old	new	old	new
	140	/	140	14.0	14.0	14.0	14.0	140	14.0	4.0	14.0	14,0	
	10.0	/	10.0	10.0	10.0	10.0		9.9	10.0	9.5	10.1	10.0	
	7.5	1	7.5	7.6	78	74		7.7	79	79	79	7.8	
					3	37	+						
	C	~	B	34	67	Ci_	Ce	np	(K-	CN	18	
DC)-3		рН	meter:	pt	-3		Cond	luctivity	meter	Coc	ld	3
Cor	ptrol				-1				Analys	ts: Bol	-/AW	s /carp	144
/								1					
/						2-		1	Review	wed by		22	
	old	old new 14-0 10-0 7-5 37 6 9 10-0 10-0 10-0 10-0 10-0 10-0 10-0 10	14.0 / 10.0 / 3.5 / 336 / 366 / 366 / 366 / 366 / 366 / 366 / 375 3.5 / 376 / 376 / 376 / 376 / 376 / 376 / 376 / 377 / 378 /	old new old new 14.0 10.0 13.0 14.0	old new old new old 14.0	old new old new old new 14.0 14.0	13	Old new Old new Old new Old new Old new Old New Old	13	13	13	13	13

Sample Description:

Comments:

Client: Sample ID:	N	A	Cose			teh	Stop	t Date 8 Date 8	Time:			4/201	9	
Vork Order #:	N	A		_				Test Sp	ecies:	Keds	ide S	tuher		
		-		-	7									
Concentration		1	3	1.	4	15		ys (s		1:	<u>~</u>	(8	
57PD-06	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	Old	new		14.0	/	14.0	14.0	14,0	14.0	14.0	14.0	14.0	140	new
DO (mg/L)			/	10.0	1	11.00 11.00 10.00 11.00	14.8	10.0	9.9	10.0	9.9	10.1	10.0	
pH			/	7.5	/	7.4	7.9	77	78	7.9	7.8	79	7.8	
Cond. (µS/cm)				30	1	:42		33		33	-	33		
Initials		/			&C	G		CM		6		CM		
midulo				•,	30	- 1		Civ	· V	+71		<u> </u>	d	
							De	iys	-					
Concentration		17	2		1-1	15		-	6	()	7		8	
5700-07	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			10/	140	14,0	14.0	14-0	14.0	140	14.0	14-0	14.0	14.0	HEW
DO (mg/L)		10.0	99/	10.0	10.0	10.0	9.9	10.0	9,9	10.0	9.9	10-1	10.0	
pH		7.5	2.5	7.5	76	7.8	7.9	77	78	7.9	7.9	79	79	
Cond. (µS/cm)		-	36		10	33		33		37		33		-
Initials			70		gi	36		CM		G		CM		
inidas			1			47.6		U	LY	0	10	L U	. 4	
							D:	ays				-		
Concentration		17	2	1	7	1-	5	1 (6	1	7	(8	
ERWST-01	old	new	old	new	old	new	old	new	old	new	old	new	old	new
- 1-00			1			14.0	14.0	140	14.0	14-0	14.0	14.0	1410	HOW
Temperature (°C)		14.0		14.0			17.0							
Temperature (°C)		14.0	-	14.0			4.9		-			-	loul	
DO (mg/L)		[0.0	1	10.0	9-9	10.0	4.9	1000	10.1	10.0	10.0	10.1	10:1	
DO (mg/L) pH		7.5		7.5	9-9	10.0	7.9	10.0	10.1	10.0	10.0	10.1	79	
DO (mg/L) pH Cond. (μS/cm)		7.5		7.5	9-9 76 40	10.0 7.8	7.9	10.0	10.1	7.9	10.0 7.8 38	10.1	7.9	
DO (mg/L) pH		7.5		7.5	9-9	10.0 7.8	7.9	10.0	10.1	7.9	10.0	10.1	7.9	
DO (mg/L) pH Cond. (μS/cm)		7.5		7.5	9-9 76 40	10.0 7.8	7.9	10.0 77 33 Cr	10.1	7.9	10.0 7.8 38	10.1	7.9	
DO (mg/L) pH Cond. (μS/cm) Initials		7.5		7.5	9-9 76 40	10.0 7.8	7.9	10.0	10.1	7.9	10.0 7.8 38	10.1	7.9	
DO (mg/L) pH Cond. (μS/cm)	old	10.0 7.5 331 61-	- [7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration	old	7.5		7.5	9-9 76 40	10.0 7.8	7.9	10.0 77 33 Cr	10.1	7.9	10.0 7.8 38	10.1	7.9	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C)	old	10.0 7.5 331 61-	- [7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	old	10.0 7.5 331 61-	-[7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH	old	10.0 7.5 331 61-	-[7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	old	10.0 7.5 331 61-	-[7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH	old	10.0 7.5 331 61-	-[7.5	76	10.0 78	7.9 ,37 ,70 Da	10.0 7.7 33 Cr	10.1 7.8 39 we	7.5	10.0 7.8 38	10.1 7.9 33 Cm	79	new
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old	10.0 7.5 331 61-	-[10.0 7.5 3 61	9-9 7-6 40	10·0 7·8 7 6	7.9 37 01d	10.0 7.7 33 Cr	10.1 7.8 39 we	10.0 7.7 3 6	10.0 7.8 38 80	10.1 7.9 33 Cm	A9 b	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old	10.0 7.5 331 61-	-[10.0 7.5 3 61	9-9 7-6 40	10.0 78	7.9 37 01d	10.0 7.7 33 Cr	10.1 7.8 39 we	10.0 7.7 3 6	10.0 7.8 38 80	10.1 7.9 33 Cm	A9 b	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	DO	10.0 7.5 331 60	-[10.0 7.5 3 61	9-9 7-6 40	10·0 7·8 7 6	7.9 37 01d	10.0 7.7 33 Cr	10.1 7.8 39 we	new	10.0 7.8 78 70 old	10.1 7.9 33 Cm	A9 b	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials DO meter:	DO	10.0 7.5 331 61-	-[10.0 7.5 3 61	9-9 7-6 40	10·0 7·8 7 6	7.9 37 01d	10.0 7.7 33 Cr	10.1 7.8 39 we	10.0 7.7 3 6	10.0 7.8 78 70 old	10.1 7.9 33 Cm	A9 b	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	DO	10.0 7.5 331 60	-[10.0 7.5 3 61	9-9 7-6 40	10·0 7·8 7 6	7.9 37 01d	10.0 7.7 33 Cr	10.1 7.8 39 we	new	old	10.1 7.9 33 Cm	old old	

Comments:

Concentration STROCT Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials		NA				_	20	Date &		00	V14	1200	- 4	
Concentration CTVOTT Temperature (°C) DO (mg/L) pH Cond. (µS/cm)									pecies:		a.J	-1	1 .	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.					-	,	1631.0	Decies.	A GC	Sice	50	unch	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init						Da	ays						
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init	(_~	1	حا	7	15	2	2	2	3	2	4	
DO (mg/L) pH Cond. (µS/cm)		new	old	new	old	new	old	new	old	new	old	new	old	new
pH Cond. (μS/cm)		14.0	140	14.0	14.0	14.0	140					-		
Cond. (µS/cm)		10.0	9.9	5.01	10.1	101	5.01		3			*		
		79	7.9	7.9	73	7.9	78		1					
		33		33	7		34							
		CM			ne		ng							
		1	7	7	20		21 D	ays 2	22	-	23	2	4	
Concentration		٢	3	1	4		12	(to	1	+-		5	35
ST90-03	init.	new	old	new		new	old	new	old	пем	old	new	old	new
Temperature (°C)		14.0	14.0	140	14.0	140	140							
DO (mg/L)		1000	9,8	10.2	10.0	ial	(0.2						-	
pH		79	78	79	7.8	79	8.0							
Cond. (µS/cm)		338	3	33	37	33	_						-	
Initials		Cons Cons					ng							
			9	2	0	7	2\ Da	ays	22	r	23	2	4	
Concentration	NAME OF TAXABLE PARTY.	4	3	-	in		15	1	6	1	7	1	8	E
2260-04	init.	new	old	new		new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	14.0	140	140	140							
DO (mg/L)		100	loil	10.2	1000	10-1	10.2					400		
pH		79	78	79	79	-	(2)							
				1	1	7.9	80				-			
Cond. (µS/cm)		338		33	7		34		1.					
Cond. (µS/cm) Initials			3		7	3		/						
		335 Ch	8	33 CN	7	3	34 Ml	/						
Initials		335 Cu	3	33 CN	7	3	34 ml	,	-2	2		7	24	
Initials	Ind.	335 Cu	3	33 CN	7	3	34 Ml Da	1	-2	-	>	1	5	130
Initials Concentration	init.	335 Chu 1 -13	old	33 CN new	7 V	new	Da Old	,	-2	_		new	-	ੈਤ new
Concentration	init.	335 Cu 1 -13 new	old 14 •	733 CN new 14.0	old IH-	new 140	Da Old	1	-2	-	>	1	5	SECTION AND
Concentration	init	335 Chu 1 -13 new 140	old [4 0]0.0	733 CM new 14.0	7 01d 140	new 140	34 M2 Da Old 140 10.2	1	-2	-	>	1	5	SECTIONS
Concentration STPN-05 Temperature (°C) DO (mg/L) pH	init.	335 Chu 11-73 new 14-0 10-0	01d [40 [0.0 7.8	new 14.0 10.7 7.9	7 01d 140 101 73	new 1400 101 3,9	01d 140 10.2	1	-2	-	>	1	5	SECTIONS
Concentration STM-05 Temperature (°C) DO (mg/L)	init	335 Chu 1 -13 new 140	old 14 0 10.0 7.8	733 CM new 14.0	7 01d 140 101 73	new 140	01d 140 10.2 8.0	1	-2	-	>	1	5	SECTIONS

Client:	-	Teck Coal Hatch. Start Date & Til										V /	3 - 6	
Sample ID:		V/	1			-		p Date	1	- 7	any	14/2		
Work Order #:		NIA				-	310	Test S		-	Ja'I			
	-			-		-		Test 5	pecies.	Ne	dside	50	lines	-
							D	ays						
Concentration	enime (Out of	1	9	1	20	-	2(1 2	2		23	2	4	
5780-06	init	-		new	old	new	-old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	140	140	14.0	140							-
DO (mg/L)		10,0	ioi	10.7	(0.0	1.01	10.2					-		
рН		79	179	729	78	7.9	300							
Cond. (µS/cm)		33	8	3	37	33	4							
Initials		C	me		ne		ul		-					
7														
Concentration			3	2	0	1	2.i	ays		12	1		24	_
STP0-07	init.	new	old	new	10.000	- CHESTON	Total Control	No serve	22	1000000		C C C C C C C C C C C C C C C C C C C	Transmission of	0.0000000000000000000000000000000000000
Temperature (°C)	The state of the s	14.0	140	14.0		new	old	new	old	new	old	new	old	new
DO (mg/L)		-			14.0	1400	14,0							U.
pH		79	1001	10.2	101	101	10.7							
			73	7.9	7.8	79	8.0							
Cond. (µS/cm)		33		3	37	33				-				
Initials		0	Ml	do	nl	C	ul							
			_				D.	6/12						
Concentration		1	9	1 3	C	2		ays	- 7	1	- ^			
ERWSF-01	init	new	A PARTIE OF THE	Contraction of the last	I was a second	-	Taxable Comment	CHE LOS AND	- 2	- CONTRACTOR	23	2	4	48700-7000
Temperature (°C)	-Eu oc	14.0	140	new 14.0	old	new	old	new	old	new	old	new	old	new
DO (mg/L)			1		14.0	(4.0	140							
pH		10.0	10.1	10.2	1000	lovi	1000	W.						
Cond. (µS/cm)		7,9	78	79	7.8	79	79				-			
Initials		33		33		331				2				
iniuais		Ċiv	V.	Ċr	M	Ci	ne	_	1					1
							Da	ays						
Concentration	Morres		- CONTRACTOR		2 -22									
+	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)													-	
pH														
Cond. (µS/cm)														
Initials														
	M	1												
DO meter:	10	2		рН	meter:	pt	1-3		Condi	uctivity	meter:	60	ud.	3
1	Control									BA	(Au)	Korel	446/	KJI
Hardness*	/	/								Analys	ts:			
Alkalinity*										= 0.0			-	
mg/L as CaCO3	/						_	-		Review			2	
									D	ate rev	iewed:	20	19111)	9
Sample Description:	t				4									
Variable in														
Comments:									11					

Embryo-Alevin Toxicity Test Daily Mortality

Client: Teck Coal Start Date & Time: Man 24 (209
Sample ID: N/A Stop Date & Time: Tour 14 (2019)
Work Order #: N/A Test Species: Redside shiner

Concen	tration	Rep				Day	of Te	st - No	o. of N	Iortali	ties				Total	Dead
			1	2	3	4	5	6	7	8	9	10	11	12	Eggs/E	
STPD.	OZ	1	0	0										1 8	3:034	14 103
STPD.		2													33	141
STPD		3									/				148	161
STPD	-05	4								/	-				148	162
STPD		1							/		1 1				66	33
STPD		2	1												56	38
	-	3					/							8	86	42
ERWS	F-01	4	O	D		/		9				1			P	· ·
		1														
		2								1						
		3														
		4														
STPD	-02 B	1			0	Ġ	0	0	б	0	0	0	0	0		
i	02 C	2					1	1	I			1				
	CZ D	3					1									
	OZE	4				1	-							9		
-	03 B	1				40										
	04 B	2				0				3 -				10	9	
	04 c	3				50										
	Q PO	4				40										
	05.B	1				40										
	05-c	2				40	1									
	05-0	3				30										
	06-B	4				30										
	060	1				10										
	57-B	2				30										
V	07-0					0									4	
		4				1								1		
ERUS	7-01 R	1							1					2		
	C	2					U		V	J	V	1	4	Ø		
		3			-			1				V			/	
		4														
Tech Init	ials		BOL	8	202	BEL	in	K)~	834	00.	1	PA.	39-	001		

2	3			4	V	O.	1		7	3	1	0	۵			
Tech Initials	4	BOL	6	882	BSL	lan	200	431	00.4	1	PA.	BOL	001			
Comments:		nuiable	2	ut die					191				108			_
Reviewed by: Version 1.1 Issued Octob		SS 15					Date	e revi	ewed:		2019			ironmen	tal Compa	ny Inc.

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Teck Coal	Start Date & Time: How 24/2019
Sample ID:	NIA.	Stop Date & Time: 10-14/2019
Work Order #:	NIA	Test Species: Redside shiner

Concentration	Rep			ř	Day	of Te	st - N	o. of	Morta	lities			_ 20	Total Dead
		13	14	15	16	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins
STPB-02B	1 (800	0	0	0									
C	2	0	1	0	0									
D	3	0		0-	_									-
É	4	0		0	0	_								
S E0 - 0972	1	1		0	0			_	-					
P30840-6975	2			0	0	P.K		_						
CP	3			0							-	-		
DE	4			0	0	1								-
STPD-05-B	1			0	1	-								
c	2		1			9-	- 9	_						
D	3					11-								
STPD-06-13	4											-		
C	1													
STPD-07 B	2					-					-	-		
Č	3	1				1	-							
E BIOSFOLB	4	37				1	_	_		-		-		
- c	1	1	4	-					-					
	2													
	3													
	4													
	1													
	2				7									9
	3													
	4													
	1													
	2													LI-
	3									01				La road
	4													
	1				- TE-S-									
	2													
	3													
	4													
Tech Initials		BS-	BSU	BR	Cine	BQ-	-			-				

	4			4			1	Daniel Committee				A Commonweal	
	3												
	4	11											- Annual Control
	1												
	2												Li-
	3								1				100
	4												
	1												
	2	6											
	3												
	4												
Tech Initials		B9~	BSV	BRU	Cine	P30-			-	-			
Comments:							_						

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NIA	

Start Date & Time: May 24/2019
Stop Date: June 14/2019
Test Species: Redside shiner

ID					Day o	f Test	No. of	hatch					
	1	2	3	4	5	6	7	8	9	10	11	12	Comments
STPD-02B	_	_							-	-	~	-	
c	_							-	-	-	-	-	
D	-						-	-		-	_	-	
E									-	-	-	~	
STPD-03B	_								_	9	3	%0	
5780-04 B										-	-	-	
C										-	-	_	
. D										-	-	-	
STPD-05-B	_								-	-	-	-	
2								-		-	-	-	
Þ									+.	-	-	-	
5788-06-B									-	1	-	-	
C										-	-		
8-FD-09-B										24	0	0	
· C									-	-	-	_	
EWAST-01B	-		-					-	-	-	_	-	1.
C C C							-	-		-	-	-	
		,							1				
		1			1	1							
			-						-				
							-	1	1	1			
-			-	-	-		-		1	-			
		1	-	-	-	-		-		-			
	-	-	-	-	-	-	-	-				-	
		-	-	1		-	-		+	-	-		
	-	-	-		-	-	+	-	-	-	-	-	
		-	1	-	-		-	-	1		,	-	
		-		-	-	+	1	-	-	-		-	
				-	-	-	1 7	-		-		-	
		1		-	-	-	-	-			-	-	
								-		4	-	-	
									-				
Tech Initials	-	-	-	-	-	-			+	80	BPL	- BB-	

Comments:

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck
Sample ID:	N/A
Work Order #:	NIA

Start Date & Time: Hay 24/2019
Stop Date: Tou 14/2019
Test Species: Redside shiner

ID					Day o	f Test	No. of	hatch					
	13	14	15	10	17	18	19	20	21	22	23	24	Comments
STP11-02 B	8	35	6	2	_								
c	15	20	io	2	-							-	
D	0	23	23						-				
6		41	5	1	_	-						-	
STP1-03 B	3	8	2	2	-						-	-	
STRIDOUB		21	11.	12						-		-	
C	Ð	1	43	-								-	
D	6	23	43	6									
STPD-05-B	0	5	35	3	3								
C	6	24	9	0	4-		-				-	-	
D	0	34	9	0	1	-				-			^
5TRD-06-B	0	14	27	3	-					-	-	_	
C	0	0	2	13	-					-		-	
STPD-07-13	8	7	1	1	-	-		-			-	-	4
C	0	1	0	1	-							-	
のから													•
ERWSF-01B	31	6	1	i	-		-					-	
C	13	12-	_	-		-	_			-		-	
						-							
								,		-			
						1							
			1			4							
1 1 2 2 2 2 2 2 2	,	,		1 1									
Tech Initials	300	agu	55	conf	GQ								

Comments:

Client:	Teck	
Sample ID:	N/A	
Work Order #:	MA	

Start Date & Tighe: Now 24 12019
Stop Date: True 14 (2019
Test Species: Redside shiner

· ID				Day	of Test	- No. o	f Morta	lities (l	natch)				
	1	2	3	4	5	6	7	8	9	10	(1	12	Comments
STRD-02 B									_	-	-	-	,
C			-								_	-	
0											_		
(V								_	-	_	-		
3-50-C1 876									-	0	0	0	
STPN-04-B									_	_			
C										-	-	-	
. D										_	_	-	
STPD-05-B								-	-		-	-	
											-	: -	
D											_		
3TD17-06 B			-							=	-	-	
C		٠.								_	-		
578D-07-B												_	
C										0	0	9	
ERWSTONS										-	_	~	
CKM31.023								-		-	-	-	
					_	-			-	-	-		
				+							1, 14		
									jā.				
			,		. To								14.00
-	,												
													•
										1	,		
Tech Initials				-								20	
										BOL	38L	661	

SS

Client: Teck
Sample ID: N/A
Work Order #: N/A

Start Date & Time: Non 24/2019
Stop Date: June 14/2019
Test Species: Redside shiner

ID	Day of Test - No. of Mortalities (hatch)												
	١	2	3	4	5	6	7	8	9	10	11	12	Comments
ST8 17-07 B									1	6	0	0	Comments
2								/				1	
D								/					
E							/						
STRD-03 B												-	
8 40-6872													
С					/			_					
D													
STR D-65-B				/									
C													
D			/										7
37 D-06 B	_	-/											
C	_	/											
STPDOZ-R	-											1	
		_										1	
Trust-a B											1		
C.										4	J	7	
	_												
		_											
						_							
							-						
	1					-							
													~
-											-		
			-										
ech Initials	~												
ecii illiuais										300	BAL	1394	

-

Comments:

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NIA	

Start Date & Time: Han 2x 12019
Stop Date: June 14 /2019
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (h	atch)	No. of Mortalities (hatch)							
	13	14	15	16	17	18	19	20	21	22	23	24	Comments				
STPD-02-B	-	6	0	0	Ö	6	0	O	0				/				
C	-		0	1				1		,			/				
7	^		i	1						5.		. /					
E	-		0						1			1					
STP D-03-13	0		1		1												
STRD-04-13	-		1		1							1					
C	-		0									1					
D	-				1												
5787-05-3	_						1				- 7						
C	-										1						
5787-06-3	-		-														
C	-																
STRD-07-B	0					DE											
С	0																
ERWST-a-B	-						1	1									
-c	-	1	1	2	-	-	_	٦.	4	1							
						4											
				r					1								
			-														
					,		,										
	•																
Tech Initials	SEL	BSL	B80	nie	354	58L	650	63_	38L								

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Sample ID: Vork Order #:		201 (0		Emi		Stor	t Date 8	Timos			la .	
		NIA	ONL						/		uz 29	12012	1
		NA						Date 8		-Oncort	ne 19	1200	9
	-	N/14						rest op	ecies.		lyrichus Louvol		
Short don Carl							Days	-		1/0		¢ 311.	
Short day fert Concentration	0		1		2	,	3		-1		5	(0
EWRSFLOZ	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-5	14.0	14.0	14.0	14.0	14,5	140	140	142	14.0	140	14.0	14.0
DO (mg/L)	/	10,3	101	1100	[0.1	10.0	98	10.0	13	0.01	a. 9	10.0	10.0
pH		7.4	7.4	7.3	7.5	76	775	7.6	74	7.6	7.5	75	7.6
Cond. (µS/cm)	,	33	12	33	2	3	333	3	>3	3	32		33
Initials	JRE	V	>-	(2)			18	1	du		sec		Ru
												207	1 400
extended all feet							Days						
Concentration	0	1	NAME OF TAXABLE PARTY.		2	-	3		4	1	5		P
EMRSE-02	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-5	14.0	140	14.0	14.0	140	140	140	14,0	14.0	13.5	14.0	14.0
DO (mg/L)	/	103	10.2	10.4	10-2	10,0	98	10.0	10.0	10.0	9.9	(0.0)	100
pH	/	74	14	7.3	75	76	ردر	76	7.4	76	7.5	7.5	7.6
Cond. (µS/cm)	/	3	77		2		333	-	333	3:	37		33
Initials	SPE	AL KIN				A 10				B	?L	6	3
	Т												
	_						Days						
Concentration	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)				11011	010	11041	Old	HOW	Old	HOW	Olu	HOW	Old
DO (mg/L)													CTIN'T
pH													Pitt
Cond. (µS/cm)										-			GL P
Initials													Carri
				**									
				- 0.1	1		Days			1::			
Concentration	Init	part	cld	marri	eld		cla		clid		ald.		-1.1
Temperature (°C)	init.	new	old	new	old	new	old	new	old	new	old	new	old
1,500					-								
DO (mall)	-							-	_				
DO (mg/L)													
pH													

Olit-	Ko	rk 1	oal			oryo			GR	NA	. 20	lic		
Client:	10		eal	11				t Date &		Inco	429	114		
Sample ID:		NIA.					Stop	p Date &	& Time:	コント	219/	12009		
Work Order #:		NIV					1	Test Sp	ecies:	Tleds	ide Si	nhers		
Short bry Fert.							Da	ays						- 11/2
Concentration			+	4	8	9	i	10)	1,	\	1	12	
EWRSF-02	init.	new	old	new	old	new	-old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	14.0	14.0	14.0	14.0	14.0		14.0	14.0	14.0		
DO (mg/L)		10.2	100	10.0	9:9	10-0	10.0	10.0	10:1	10.0	10.1	10.0	10.0	
рН		7.5	75	7.5	7.5	7.60	7.5	7.8	7.8	77	77	7.9		
Cond. (µS/cm)		CE YO			36		40		37	33				
Initials			M	B			10 10		8				38	
muuo			i d	170		15	7/1	15	60	CN	LY.	1 3	SL	
Extended Dry Fox.							Da	ays					,	
Concentration		-	-	8		9			0	1	-	17	2	
EWRSF-02	init	BOARD BARRIES	N. Salarana	new	old	new	old	new	old	new	-	STATE OF THE PARTY	OF EASTERN PARKETS	05000000
Temperature (°C)		14.0	140	14.0	14.0	14.0	14.0	14.0	-	14.0	140	7	old	new
DO (mg/L)		10.2	10.0	10.0	9.9	10.0	10.0		14.0	1		14.0	14-0	
pH		7.5	75	7.5	7.6			10.1	10.1	10.0	101	100	10.0	
Cond. (µS/cm)		33	0			3.6		7.8	7.9	7.7	77	7.9	-	
Initials			46		36		10		37	33			38	
illidais		u	N	10	SEC	6	PL	3	2	Cr	Vf	6	31-	
							Da	ıys		-				
Concentration			March 11					,						
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			100000				0.0		Old	TIC W	- OIU	TIC VY	Old	ELIG VV
DO (mg/L)														
рН			1000		(n=====)							-		
Cond. (µS/cm)	W													-
Initials			-							_				
			-								-			
							Da	ys						
Concentration	ri al		The work	CONTRACTOR OF THE PARTY OF THE	(Alexandra)	No. of Street Land				No.			Market Constitution	
_	init.	new	old	new	old	new	old	new	old	new	old	пеж	old	new
Temperature (°C)														
DO (mg/L)												115		
pH														
Cond. (µS/cm)														
Initials														
DO meter:	Di	0-3	ď	рН	meter:	g H	-3		Condu	uctivity	meter:	(01)	ol - 7	5
A PARTY NAMED IN THE PARTY NAMED	Con	trol								Analyst	s: c	inp.	300	
Hardness*	/													
Alkalinity*	/									Review				
mg/L as CaCO3			1001										0/02/2	7
Sample Description:) () () () () () () () () () (×									40
Comments:									3					п

Client:	Tec	KI	pal		Citt	10	Sta	rt Date 8	R Time:	Ma	1291	2010	P	
Sample ID:	1	ماد				-: [[]	Sto	p Date &	& Time:		ام ا	-		
Work Order #:	1	No			Mag II	-		Test Sp				Shir	el	-1-1
Short Dry FeA.							D	ays	-					
Concentration		1	3	12	\	1	5	16	2	17	F	1	8	
Concentration EWRSF-02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	O I W	14.0	140	14.0	14.0	140	14.0	14.0	14.0	14.0	14.0	HCW	Olu	11044
DO (mg/L)		101	Oto	10.0	10.1	10.2	9,9	10.1	9,9	10.0				
pH		7.9	7.8	79	7.8	7.9	78	7.9	78	7.9	7.9		-	
		33		33	77.63550	7.1	7			1	21			
Cond. (µS/cm)	-			27	0	33	.0	33		P	26			
Initials		CM	Y	Ch	u	L	W	Cm	W	648	,,,,		180	
Extended Dry Fest.					Aug of		D	ays						
Concentration		1	3	1	4	1	5		6	1	+	1	8	
EWRSF-02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14,0	14,0	14.0	140	14.0	140	NH.0	14.0	1000	Jid	1	U,U	HOW
DO (mg/L)		lail	9.9	10.0	99	10.2	9.9	191	100					
pH		79	79	79	78	79	79	74	79	1		1	-	
Cond. (µS/cm)		33		33		33		37					-	
Initials		CM		Ca		c'm		CN.	1		1		1	
inidato		Livi		_ U		Clar	4	I CI	H				-	
					45//		D	ays						
Concentration								1						
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)					-			11011	0.00			11011		
DO (mg/L)														-0
рН														
Cond. (µS/cm)						1	_			1	L			
Initials		1												
mado		_												
							D	ays						
Concentration														Carried Co
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)									1					
DO (mg/L)														
рН														
Cond. (µS/cm)			-								1			
Initials													1111	
DO meter:)o - 3		pH	meter		H- =	3	Cond	ductivity	meter:	_000	nol - 3	
2.75	Co	ntrol	No.							Analys	sts:	COND	B 40	
Hardness*		/												
Alkalinity*	/													100
* mg/L as CaCO3										Date re	viewed	20	20/02	127
Sample Description:														
Sample Description:														-100 1-0
Comments:														

Sample ID:		NIV	Coa				Stor	t Date 8	Time	T	- 1G	1290	i	
Work Order #:		n1					Otol	Test Sp	ecies:	0,0	levala	Shir		
		1-1				•			001001	production of the same of the		27/10		
short dry					1 4		Da	iys						
Concentration		7	+	8			1		0		((1	7	
ERWSX-OZ	old	new	old	new	old	new	old	new	old	new	old	new	old	ne
Temperature (°C)												14-0	/	
DO (mg/L)			1								-	(0.0		
pH												7.9		
Cond. (µS/cm)		and the second		- Tree				100				37	38	
Initials			_			Helia.							oc_	
extended dry							Da	ays				201		0.
Concentration			7		8	7		1	0		11	13		
ECW87-02	old	new	old	new	old	new	old	new	old	new	old	new	old	ne
Temperature (°C)			1									14.0	1	
DO (mg/L)				pri D								10.0		170
рН												7.9		- 7
Cond. (µS/cm)								355				2,2	18	Se.
Initials			_	THE								B		
					in all		Da	ays						
Concentration													DIES IN	12.5
	old	new	old	new	old	new	old	new	old	new	old	new	old	ne
Temperature (°C)						-						10	. 21111	
DO (mg/L)													Life	1
рН														
Cond. (µS/cm)													1110	1
Initials													-	
							Da	ays						
													odnu-	
Concentration	Mary Comments of the	100111	old	new	old	new	old	new	old	new	old	new	old	ne
Concentration	old	new												
Temperature (°C)	old	new												
	old	new												
Temperature (°C)	old	new												
Temperature (°C) DO (mg/L)	old	new												

Client:	Tea		oul		tto	nteh	Star	t Date &	1	H		29/20		**
Sample ID:) (V		17.			Sto	p Date &			une 1	9 (2	-019	
Work Order #:	h	2/10				-		Test Sp	pecies:	12	edsta	ee SI	م،کس	_
Short Dry					live D			ays					20	
Concentration		1	3	14		15		16	2	1-	1		18	
ERWISF-02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	140	14.0	140	140	14.0	140	140	14-0	14.0	140	- mai
DO (mg/L)		10.1	99	1000	9,9	10.7	1,01	Tool	9.9	10,0	10.0	10.1	10.7	
рН		79	79	79	78	79	78	79	78	7.9	7.8	-	79	
Cond. (µS/cm)		33	36	33		33	57	33		3	36		37	
Initials		Cr		ĊN			nl	Cm			a c		ne	
							•							
Extended Dry							D	ays						44
Concentration		13	5	14		15		16		1	7	(8	
ERMSF-02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	140	14.0	140	140	14.0	140	14.0	14-0	(4-0	140	140	
DO (mg/L)		10,1	10.2	100	10.1	10.2	10.0	lou	9.8	10.0	9.9	hod	101	
рН		79	7.8	79	78	79	79	79	78	7.9		79	7.8	
Cond. (µS/cm)		33		339		33		33			36	33		
Initials			MR	Ċr		Cr	28		M		a	da	N.	
							Di	ays						
Concentration														
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)										11000	014	11011	0.0	11011
DO (mg/L)													Linear	
рН														
Cond. (µS/cm)														
Initials														
							D	ays	1111					
Concentration													The You	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	- Old	11011	U.U.	HOW	Olu	HOW	olu	HOW	Old	TICAN	Olu	TICAN	Olu	HOW
DO (mg/L)											7			
pH														
Cond. (µS/cm)														
Initials							-		_					
DO meter:	1	00-3		рН	meter:	- 8	4-3		Cond	luctivity	meter:		ond-	-3
5-4	Co	nt/ol							1	Analys	ts:	car	1 30	د
Hardness*											-	01-01	, ,,,	
Alkalinity*	/									Review	ved by:		SS	
* mg/L as CaCO3										Date rev				27-
Sample Description:	:													2011
Comments:														

Client:	Tee	K C	our		-	atch	Star	t Date &	Time:	. Un	u 2ª	1201	η,	
ample ID:	1	11/1			all part			Date &				9 (20		
Vork Order #:	y	2/2		Last I		-		Test Sp	ecies:	Rei	lsidu	chen	d	
Short Day					H.VI		Da	ays						
Concentration		1	9	20	,	2	1							page 1
ERWSF02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		140	14.0	140	14.0	14.0	140						Jemi	/
DO (mg/L)		100	10.1	10.7	10.0	10,0	loil						/	
рН		79	7.9	79	71	7.9	78						/	
Cond. (µS/cm)		33	36	33	33	33	34					/		24
Initials		Cr	ne	Ch	N	C	mi							
Extended Dy							Di	ays			-/			
Concentration		1	9	7	.0	2		,,,		/	/		3 2 3 3 1 1	-
ERWSF-02	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		140	14.0	14,0	14.0	14-0	140							
DO (mg/L)		100	101	5.01	10.1	1000	1000		1				Library	- 13
рН		74	8.0	79	79	79	7.9		/				j.de	
Cond. (µS/cm)		33		33		33		1	V		1			
Initials			me	CN			N	1			-			
						_	D	ays						
Concentration	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	O.G.	11011	- Old	HOW	Old	HOW	Old	HOW	Vid	new	Old	11011	Old	new
DO (mg/L)													-	Le
рН														
Cond. (µS/cm)													and the	and a
Initials														
	I												-	
Concentration				1	17/14	T	D	ays						
Concentration	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)										1 7				
рН														
Cond. (µS/cm)														
Initials													DIA.	
DO meter:		0-3		_ pl	l meter	:	H-3	n lle	Cond	luctivity	meter	Col	nd -	3
- 3/15	Co	ntrol								Analys	sts:	cm	9	
Hardness*														
Alkalinity*														
* mg/L as CaCO3										Date re	viewed	_ 20	2010	2127
Sample Description	:													
Commonter														
Comments:														

Embryo-Alevin Toxicity Test Daily Mortality

Embryo

Client:	Tecle Comp.	Start Date & Time:
Sample ID:	NIA	Stop Date & Time: Sure 19 12019
Work Order #:	NIA	Test Species: Redside shiner

Concentration	Rep			Total Dead											
EWRST-02		1	2	3,	4	5	6	7	8	م	10	16	رد	Eggs/En Alev	
shortday food EWEST-02 Ionshiped	1	0	0	0								-		7:59	17: 29
EWEST-02	2	0	0	0										P 31	1119
10ng Feet	3														0.4
31,	4				-										
EWRST-UZ B	11				0	0	0	0	0	0	0	0	0		
shortfex 02 C	2				0	0	0	0	0	0	2501	0	0		
	3										-				
EWRST-02B	4				0	0	0	47	0	D	0	0	0		
and the same of th	1							1			-				-
	2														
	3														
	4														
	1														
	2														
	3														
	4														
	1														
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	3														
	4												-		
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	2						-								
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	4														
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	2														
	3									-					
	4							-		-					
	1														
	2									-	-		_		
	3														-4
	4										-				
Tech Initials		b	1000		nov.		12.01					4 6			
ecii illiciais		KJL	RIC	500	Bec	360	2000	BRL	BRU	BBV	BBL	UMY	BPL		

		1-1860 100 100 1000 1000	
Comments:			
_			
Reviewed by:	SS	Date reviewed:	2020102127
/ersion 1.1 Issued October 6,	2015		Nautilus Environmental Company Inc.

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Teck Coal	Start Date & Time: Ham 29 (2019
Sample ID:	114	Stop Date & Time: Jone (9/2017
Work Order #:	NIV	Test Species: Redside shiner

Concentration	Rep			Total Dead										
		13	14	15	16	17	18	19	20	24	22	72	24	Eggs/Embryos Alevins
EWRSF-02BI	1	0	100	10	_									
-07 C	2	0	0	0										
	3													
EWRSF-02 B2	4	0	0											
	1													
	2			5000										
	3													
	4													
	1												-	
	2													
	3													
	4													
	1													
	2													
	3		-											
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	2		-											·
	3		-											
	4		-							-				
	1												_	
	2												-	-
	3													
	4													
	1						-							
	2	-												
	3													
	4													520
Nacada Nacada Nacada	1													*
	2									1				
	3							-						
	4													
Tech Initials		08-	B81	BRU						-				

	4														100	
	1															
	2									-						
	3															
	4								-			1				
Tech Initials		00	BRV	BRU								1				
Comments:	(1) (1)	لسعلم	ped but	+ diza												
Reviewed by: Version 1.1 Issued Octo	ber 6, 20	SS	3		.Dark	e fre	Dat	e revi	iewed:		20	2010	2127	vironma	ntal Comp	any Inc
	3, 20								40			No		VIIOIIIIG	ikai Ooni	any mo.

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck
Sample ID:	N/A
Work Order #:	

Start Date & Time: Han 29 (2019
Stop Date: June 19 (2019
Test Species: Redside shiner

ID													
	. 1	2	3	4	5	b	7	8	2	10	1	12	Comments
EWRST-UZB	1 -	-	-	-	1	-	-	1	^	-1	-	6	
102C		-	^	-	-	-	_	-	-	-	-	0	
EWRSJ-02-B			_	_	~	_		_	~	_	-	3	
										7			
		-											
											- 4		
										-			
									-	,			
	-	-											4
				-									
		- :					-						
		-											
	-	-											
		-											
	-				-						n - 200 - 3		
)#:								
Tech Initials	Ku	KAL	AND	ML	BOL	BRL	BPC	280	BPL	BOV	Cine	BR	200 Europe

58 2020/02/127

Comments:

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck
Sample ID:	N/A
Work Order #:	NIA

22			
Start Date & Time:	Hous	29	12019
Stop Date:	Jen		(2019
Test Species: /	Redside s	hiner	

ID					Day o	f Test -	No. of	hatch					
X 845 -30	13	14	15	16	17	18	19	20	21	.22	23	24	Comments
FWINDE-DEE	23	10	7	_								_	
020	-	7	-										
EW164-028	225	2	1 -				,						
							64						
							-						
	-												
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	+	-	-					-					
	+	-	-										
		_							-				
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	-	_											
	1	1				(*)							
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										-			
		1											
Tech Initials	881	80	BR	>				7					

SS

2020102177

Comments:

Client:	Teck
Sample ID:	N/A
Work Order #:	NIV

Start Date & Tiphe: July 29/2019
Stop Date: July 12019
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (h	atch)				
	1	- 2	3	4	5	6	7	8	97	10	11	12	Comments
ERWSF-02-BI	-	1	1	_		- ~	_	-	^	`	-	-	,
OZC	-	-	-	-	-	-	-	_	-	1	-	-	
ERWSTOL BZ	~		7	1	v	U	1	_	_	-	-	-	V-
•													
			*										
		•											
			-		54								
									,				
							-						
	,		31										
-		-									1		
ch Initials	~							_	866	39v (inh	BR	

85. .

2020/02/27

Client:	Tec	ck
Sample ID:	N/A	1
Work Order #:	N	IN

gcc

Start Date & Time: How 29 (2019
Stop Date: Jone 19 (2015
Test Species: Redside shiner

ID				Day	of Tes	t - No. o	f Morta	lities (h	atch)		0 1 1		
	13	14	15	16	17	18	19	70	21	22	23	24	Comments
ERWSF-02BI		0	0	0	0	eside	P	0	P				*
02C		0	0	0	v	SE SE						_	
ERWSF-02BZ	0	.0	0	ò	361	OF T	1	1					
													(4) N
											-		
			+5										
							·						
ech Initials	B8~	BOV	BRL	300	350	IMP	Bru	ing	Che				

SS. 2020102127

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements

DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	0 init. 14.5 9.8 7.5 328	new 14-5	0ld 140 10-1 7-5	new 14.0 10.0	old 14.0	new	Days	Test Sp		Oneorh		mykiss	
Concentration STFD - OS Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STRN ON Temperature (°C) DO (mg/L)	0 init. 14.5 9.8 3.5 328 Al-	new 14-5	140	new 14・0 10・0	old 14.0	new	Days	4		Red		thoner	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	init. 14.5 9.8 3.5 328 AC	14-5	140	new 14・0 10・0	old 14.0	new	3	The second second			3000		
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	init. 14.5 9.8 3.5 328 AC	14-5	140	new 14・0 10・0	old 14.0	new	3	The second second		5		,	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	init. 14.5 9.8 3.5 328 AC	14-5	140	new 14・0 10・0	old 14.0	new		The second second				6	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	14.5 9.8 3.5 328 BC	14-5	140	14.0 10.0 26	14.0		old	MOILE	old	All the second	old	And better	The Party of the P
DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	9.8 3.5 328 BR-	76	75	10.0 26	10.0	17.0	14.0	new 140	14.0	new 14.0	14.D	new	old 14.0
pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	7.5 328 BC-	76	7.5	26		500	9.8	10.2	9.9	10.0	9.8	10.0	10.0
Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L)	328 BC-	33	4		7.5		76	75	7.6	7.5	7.5	7.5	7.5
Concentration	0		_			75		338			36		
Concentration Temperature (°C) DO (mg/L)	0				2		33	Cm			30	34.	
Temperature (°C) DO (mg/L)	-			6)6		063	Sic	CM		100	10	88	_
Temperature (°C) DO (mg/L)	-				_		Dave						
Temperature (°C) DO (mg/L)	-	1		2		2	Days		4		-	,	
Temperature (°C) DO (mg/L)		THE PARTY	ald	ENVOICE:	Contract to	100000	La Constitution	SUCCESSOR.	-		-1-1	Salving State	0
DO (mg/L)	init.	new	old	new	old	new	old	new	old	new	old	new	old
	7.91	145	(4,2)	14.0	14.0	14-0	13.1	140	14.0	14.0	14.0	14.0	14.0
	9.9	(0.0	0.01	10.0	10.0	10.0	9.9	10-5	10.1	10.0	9.8	10.0	9-9
pH	7.5	76	75	4-6	7.5	75	7-5	75	7.5	7.5	7.6	7.7	7.5
	328	33			52		33	33		+	36	34	
Initials	いって	i	ini	45	ec.	7	3?~	0	gar.	5	a	131	1
	-						Days			1 -	_		,
Concentration	0	MODELA.	1	2	BEFFE	EAVE	3	WEST STATE OF	4			Entered State	0
260 10	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.8	175	(40	14.0	14.0	14.0	14-0	14.0	14,0	14.0	14.0	14.0	14.0
DO (mg/L)	10.0	100	121	10.0	10.0	[e- C	9.9	10.2	10.0	10.0	9.8	10.0	100
pH	7.5	7,6	75	7-6	7.5	75	7.5	7.5	7.5	7.5	3.6	7-5	7.5
Cond. (µS/cm)	327	33	74	3:	37	3	33	33	8	3	136	3,4	0
Initials	BC-	V	m	8	PL	13	SC	Cin	N		30-	61	L
12.750.77							Days						
Concentration	0	1			2	7	>		4	5			0
2401.11	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.5		140	14.0	14.0	140	14.0	14,0	14.0	14.0	14.0	6.41	14.0
DO (mg/L)	9.5	10:0	-	10.0	10.0	10.0		10.2	10.0	10-0	9.8	10.0	100
pH	7.5	7.6	75	7.60	7.5	7.5	76		7.5	7.5	7.5	7.5	7.5
Cond. (µS/cm)	325	37	54	3	32	7	333	3	38	3	36	3.	to
Initials	BRV	W	m	8	RL		B82		90		g-		- 3c
nermometer:	79	DO	meter:	0	0-3	<u>р</u>	l meter:	pH	-3	Cond	uctivity	meter:	COU
	Cor	ntrol								Analys	ts: 15	LLMA	יווער
Hardness*	/								1				
Alkalinity*	/									Review	ved by:	55	5
mg/L as CaCO3								-		Date rev		_	

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements

NI	71	000	2		mbry	Star	t Date 8	G Time:	200	~1/2	019	
	4	Coa							June			
NIA								ecies:	Oncorh			
								Ø	~ Re	deside	L Shi	-el
						Days			~		,	
Acres de la constitución de la c	i		2	The second second		3		1	5		6	>
init.	new		new	old	new	old	new	old	new	old	new	old
14.5	14.5			14.0	14-0	13.1		13.5			14-0	140
	10.0										10.0	9.9
75									77	2.1	3.7	7.5
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						Days	-					
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Nautilus Environmental Company Inc.

Version 1.2 Issued October 6, 2015

lient:	10 00	KAK C	oal		129	mag	Star	t Date 8	k Time:			1200	(
ample ID:	11/	A					Sto	Date 8	Time:	_ 50	心を	12019		
ork Order #:	10.	MIA						Test Sp	ecies:	en has	Zart	Just	ung in	whise
							Da	ays				511.		
Concentration	1	-	7	8		9		10	>	1	\	1	2	11
STPD-08	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14-0	14.0	140	14.0	14.0	14.0	0.41	140	140	140	14.0	1
DO (mg/L)	1	10.0	10.1	10.0	9.9	10.0	10.0	1001	6.01	10.0	101	10.2	10.0	
pH	1	7.8	7.9	7.7	78	7.8	7.9	7.9	28	7.9	79	79	7.8	
Cond. (µS/cm)		3:	37	33	9	3	38	33	6	33	3	33	7	1.
Initials		851	2	Civ	P	50	Ş~	CN	18	Cin	l	Ca	nl	
			-		_		D:	ays				_		
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STP D-09	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	1	14.0	140	140	14.0	14.0	14.0	14.0	140	140	14.0	140	140	
DO (mg/L)	1	10.0	10.0	10.0	9.9	10.0	19.0	1001	1000	10.0	10.2	5.01	10,0	
pH	1	7.8	7.8	77	77	98	3.9	79	79	79	73	79	78	1
Cond. (µS/cm)	1		37	33			38	33		33			37	1
Initials	/		S-	Ch			300	Cm		Ci		_	we	1
/	/			_ Oi	-1		-	Cim		<u>u</u>	М	1 4	VV	
							D	ays						
Concentration	1	7			8	-	7	_	0		11	- (7	
51017-10	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	1	14-o	14.0	14.0	14.0	14.0	14.0	1 6	140	140	14,0	140	14.0	1
DO (mg/L)		10.0	10.0	10.0	1000	10.0	9.9	10.1	10.0	100	9,9	10.2	9.9	
рН	1	7.8	7.9	77	7.8	7.8	7.9	7.9	7.8	79	7.8	7.9	7.8	1
Cond. (µS/cm)	-		37	33		-	38		36		38		37	1/
Initials			a	CA			SC.		48		inl		nr.	11
inidalo					, vv	1 12	•	1 (111		M		VIV	1
							D	ays						
Concentration		-	1		5		1		0		اد		10	
STP D-11	old	new	old		old	new	old		old		old	new		new
Temperature (°C)		14.0	14.0	140	14.0	14.0	14.0	140	1400	14.0	14.0	14.0	140	/
DO (mg/L)	1	10.0	10.0	10.0	10.1	10.0	9.9	1001	9.9	10,0	9.9	5.0	t.ol	
pH	1	7-8	7.9	77	78	7.8	7.9	7.9	78	79	7.9	79	7.8	
Cond. (µS/cm)		3	37	33	7	3	38	33	i	3	38	3	37	
Initials		S	9	Cn		6	36	Ch		C	inf	d	W{	
	6					4	-						,	1
DO meter:	LY	7-3		_ ph	meter	: pH	-3		Con	ductivit	y meter	: Có	id.	-3
		-veley.				1			7		n.	PL/AL	DD/CO	4/1/
Heat and a	Co	ntrol							-	Analy	sts:			
Hardness*		/	-						-				4.0	
Alkalinity*	/										wed by		22	Y
* mg/L as CaCO3										Date re	viewed	:2	019/12	118
Comple Description														
Sample Description	:	_	_	_					_					
Comments														
Comments:														

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new old	d new 14.0 14.0 3 7.8 33 50 60 60 14-0 0 14-0 0 10.0 8 7 8	old 14.0 9.9 7.9 8 Day	new 14,0 10.1 7.9 330 Cms	old 14.0 10.0 7.9	new 14.0 10.0 7.9 33	old 140 9,9 7,8	14.0 10.2 7.9	old 140 10.0 7-8	new
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		Day	ys						
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	-					B	0/1	18/AL	D/M
					Analys	ts:	7	V/1-	1000
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									10
					ate rev	riewed:	_ 20	19/12/	18
						Review	Reviewed by:	Reviewed by:	Analysts: BALLINGAU Reviewed by: SS

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						Da	ays						
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						Da	ays						
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old	1000000	A STATE OF THE PARTY OF	-	State of the last	-	100000			new	1	I Tomas In Co.	2000	new
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DC	7-2		nH	meter	pt	1-3		Conc	luctivity	motor	· Cau	1 -1	3
			_ pii	meter	-			- 00110	douvit	meter	DOI.	4. 1.	(410
Co	ntrol							1	Analys	sts:	BMY	4WD/	coy
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	old	13 13 15 15 15 15 15 15	13 old new old / 14.0 14.0 10.1 10.2 / 7.9 7.8 334 CMP Old new old / 14.0 14.0 / 10.1 10.0 7.9 7.8 334 CMP Old new old / 14.0 14.0 / 10.1 9.9 7.9 7.8 334 CMP Old new old / 14.0 14.0 / 10.1 9.9 7.9 7.8 334 CMP Old new old / 14.0 14.0 / 10.1 10.0 / 7.9 7.8 334 CMP	13 14 14 14 14 14 14 14	13	13	Stop Stop	Stop Date 8 Test Sp	Stop Date & Time: Test Species: Test Spe	Stop Date & Time: Stop	Stop Date & Time: Test Species:	Stop Date & Time: Test Species: Charactery Charac	Stop Date & Time: Stop Date & Time: Stop Date & Time: Test Species: Charles Spe

lient:	Ter	K Ce	-1		Fm	pho	Star	t Date &	Time.	5		151/2	019	
ample ID:	AIZ	4						Date &	1	Ti	Na	72010	1019	
ork Order #:	10/2	\.						Test Sp						Vie
on order m.	10/2	*						rest op	Coles.			le shr		year)
							Da	ys						
Concentration	1	1	3	11	1	1	5	1	6	1	7	1	8	
5TPD-12	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		140	14.0	14.9	140									
DO (mg/L)		1001	5.01	10.0	10.0			- 11						
pН	1	79	78	7/8	78									
Cond. (µS/cm)		33	4	137	ط									
Initials		CIN	Q	-	5~									
				BEL										
							Da	ays						
Concentration		1:		ı	4	1	5	11	0	13	-	1	8	
5780-13	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	(4=	14.3	14-0	140	140	140/	14.0				/	
DO (mg/L)		1001	loro	10.0	9.8	101	1000	10-9	hol			/		
pH		79	800	7.5	7.8	79	800	79	800		/			
Cond. (µS/cm)		33	4		536	332		/33	6		/			
Initials		C	us	6	38	Cm		/ Ch	2	/				
							(20		-				
	- 1						Da	ays						
Concentration		1	3	1.	4		5	1	d	1	7	1	8	
ERWSF-03	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0/	14.0	14.0	14/0									
DO (mg/L)		10.1	10.0	1200					_					
pH		39	7.9	78	7.9									
Cond. (µS/cm)		/33	4	1	36									
Initials	10	L C	ml	10	SPL									
				Ben		-								
							D	ays						
Concentration														
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН														
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	7		_				1							
DO meter:	())-/	3	pH	meter	· pt	1-3		Cond	ductivity	meter	600	id	3
				_		1				ductivity BP	/ AL	Near	MIL	/VT
	Co	ntrol								Analys	sts:	Ur	1110	1200
Hardness*			1											
Alkalinity*	/													
* mg/L as CaCO3										Date re	viewed	:_ 2	111010	2119
Sample Description														

Concentration Temperature (°C) DO (mg/L) pH	_	14						t Date 8	/		me 1			
Concentration うてとかっさ。 Temperature (°C) DO (mg/L)	N	14	_					Date 8	1		ue z			
ラTアウーoら Temperature (°C) DO (mg/L)								Test Sp	ecies:	Real	sicle	3hi	معد	
Temperature (°C) DO (mg/L)							Da	ys						
Temperature (°C) DO (mg/L)		7		8		0	1	10		(1	- 1	2	
DO (mg/L)	old	new	old	new	old	new	old	new	old	new	old	new	old	new
			/			14.0	1	14,0	140	140	14.0	140	14.0	1
pH			/		/	10.0	1	10.0	10.1	10,0	9,8	10.2	10.0	1
			1		/	7.8	/	7.9	7.3	7.9	7.8	79	7.8	1
Cond. (µS/cm)		1		/		33	-	33	6	33	8	3	37	
Initials		1		1		3	CL	d.	15	Co	ne	C	me	
							Dr	we.		_				
Concentration		7	-	8		C		lys	0		1	1	2	
5770-09	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)					/	14.0	1	14.0	14.0	140	14.0	140	14.0	1
DO (mg/L)			1		1	10.6	/	10.1	10.1	iozo	9,9	5.01	io.i	1
рН		1	/		1	7.5	/	79	78	79	78	79	800	1
Cond. (µS/cm)		/					38	33	į,	33	3	3	57	11
Initials		/					Sr.	Ca		Ćr		C	NE	1
		1									V 4			•
							D	ays					7.3	_
Concentration		-	7	-	3	9	1000000000		10	1	1	t	2	- Charleson
2160-10	old	new	old	new	old	new	old	new	old	new	old	new		nev
Temperature (°C)			/		/	1400	/	14.0	14.0	14.0	14,0	14.0	140	
DO (mg/L)			1	Y	1	10.0	/	lost	l.ai	100	9.9	10.2	10.0	1
pH					/	7-8	/	7.9	78	79	7.8	79	3.0	-
Cond. (µS/cm)		1				3	38	35		33		33		
Initials		1				6	38-	Ch	2	Cin	2	C	M	
							D	ays						
		:	7		8	9			10		11		12	
Concentration	ald	new	old	new	old	new	old	new	old	new	old	new	old	nev
Concentration STP D-11	old				1	14.0	/	14.0	14.0	140	O.HI	140	140	
	old		1			March 1997	1	1001	5.01	10,0	9.8	1:- 7	lia .	1
216 0-11	old		1		4	10.0	/	10.1			10	5.01	100	1
STF D-1/ Temperature (°C)	Old	- 7	1		1	12.0	/	79	73	79	78	7.9	8.0	1
ST@ D-\ Temperature (°C) DO (mg/L)	old		1		/	178	35		73		78	7.9	8.0	1

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements Hatch Client: Start Date & Time: June 1/2019 Sample ID: Stop Date & Time: Some #12019 Work Order #: Test Species: Red side showed Days 9 Concentration 8 17 5TPD-12 old new old old new new old new old new old new old new Temperature (°C) 140 140 140 100 9,9 DO (mg/L) 10.7 Isol 10.1 pH 79 8.0 Cond. (µS/cm) 338 337 Initials Conl Cons Hatchday 100 11 se Days Concentration 7 9 8 10 17 57PD-13 old new old new old old new new old new old new old new Temperature (°C) 14.0/ 140 DO (mg/L) 100 10.0 pH 79 338 Cond. (µS/cm) 338 Initials Cin CMP/992 Hatch day 12 Days Concentration (0 12 ERWSF-03 old new old old old new old old new new old new new new Temperature (°C) 14.0 14.01 14-0 14,0 14-0 H-0 14.0 DO (mg/L) 10.1 10.0 10.1 9.9 10.1 10.0 7.9 7.8 7.8 7-8 pH 7.8 338 Cond. (µS/cm) 337 Initials Conf/824 BRUCHP BR BOL Hatch Day

							Da	ays						
Concentration		1	7	5	3	91		1	0	11		,	2	
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)					/									
DO (mg/L)			1		/									
pH			1											
Cond. (µS/cm)			/	1										
Initials		1		1										

DO meter:	120-3	pH meter: pH-3	Conductivity meter: Coul 3
	Control		Analysts: BPI/AWD/Cup/ry
Hardness*			
Alkalinity*	1		Reviewed by: SS
* mg/L as CaCO3			Date reviewed: 20/01/12/19
Sample Description	on:		

Comments:

Version 1.1; Issued April 22, 2014

Temperature (°C)	elient: sample ID: Vork Order #:	N	ek C	001			lato	Star	t Date & p Date & Test Sp	& Time:	Ju	e\	2015	Ceine	
STR-OR								Da	ays ,						
Temperature (*C))			1,	1		15	16	,	17		19	3	1
DO (mg/L)		old/						_							new
Days		/	140				14.0		140	140			14.0		/
Cond. (µS/cm) 334 336 333 334 336 333 334 336 333 334 336 333 334 336 333 334 336		1						_	_					10.3	1
Initials		1					-		-				79	7.8	
Days Days		1							_		33	3			1
Concentration \$\frac{1}{5}\lbrace{(\mathcal{N}\)}{\mathcal{N}\}}\rightarrow old new old	Initials		CM	ů	8	<u>s-</u>	Cr	~	Co	4	CN	18	Cı	nl	
String															
Temperature (°C)		1	Company of the last		1,	1	1.	-	16	Name and Address of the Owner, where the Owner, which is the Own	1	1	15	3	
DO (mg/L) Do 15.2 10.2 10.2 10.2 10.3 10.2 10.3 10.5		old				old									new
Days Concentration 13		- 1			14-0		140	140	14.0	140	140	140	14.0	140	1
Cond. (µS/cm) 33¼ 33½ 33¾ 33½ 33¾ 33¼ 33¾ 33¼ 33¾ 33¼ 33¾ 33¾ 33¾ 33¾ 33¾ 33¾ 33¾ 33¾ 33¾ 33¾ 33¼	DO (mg/L)				-	9.9		_		lou	_			1.01	1
Initials	pH	1			78	7.9					79			79	1
Days	Cond. (µS/cm)	1	331	4			3	37	33	6	33	3	53	34	j.
Days Concentration 13	Initials	1	Cm	2	8	~	C	n	Co	ng	Cin	٤	CA	12	1
DO (mg/L)	5780-10	old	new	old	W. C. C. C.	1	new	old	new	old	new		new	old	new
PH	Temperature (°C)		14.0		14.0			140	140	140	140	14.0	14-0	140	
Cond. (µS/cm) 334 331 337 336 333 334	DO (mg/L)				10.0	9.9			100	101	10.2	5.0°		1001	1
Cond. (µS/cm) 334 331 336 333 334	pH				78	75					7.9	79	7.9	800	1
Days	Cond. (µS/cm)		331	+	3	31	3	37	33	i	33		35	4	1
Concentration 13	Initials		Cm	٩	G	sa			1 Ca	&	Civ	S			1
Concentration 13															1
S(P)-1 old new old	Concentration		12		1	u	12		4		1 1-	L	1	2	
Temperature (°C)		old	Table 19 Control	SECTION AND INCOME.	Control of the last		A SHARLES		The Contract of	2000	4000000		Carrier.	and the second liverage livera	-
DO (mg/L) 10.1 10.2 10.0 10.0 10.1 10.7 10.0 10.2 10.0		Ju								-					new
PH		1											_	_	1
Cond. (µS/cm) 334 331 337 336 333 337 336 337 336 337	The second secon	1/										-			1
Initials CM BY CM CM CM CM CM CM CM CM CM C		1													1
DO meter: pH = 3 Conductivity meter: Coul = 3 Control Analysts: BFL Aux carply Hardness* Alkalinity* Reviewed by: SS		-											_		1
Control Hardness* Alkalinity* Conductivity meter: Conductivity	minais	_	UN	1		51	U	4	U	11	U	M	UM	Λ'	
Hardness* Alkalinity* Reviewed by: SS	O meter:		0-3		рН	meter:	-pt	1-3		Cond	luctivity	meter:	Co	ud-	3
Hardness* Alkalinity* Reviewed by: SS		Cor	ntrol								Analys	sts:	BPLA	ansa	49/4
noticited by.		/	/								Bar C. v.	200			
	Alkalinity*	/									Review	wed by:		SS	

Comments:

DO (mg/L)	lient: ample ID: /ork Order #:	Jec N N	K C	oal		H	atch	Star	t Date & p Date & Test Sp	k Time:	Syn	e 5/de	12017	tune	25
STRD-12							.,							9	
Temperature (*C)		1	13		1	7	15		()	0	1+		18	3	,
DO (mg/L)	31-09rc	old			new	old			new						new
Days	Temperature (°C)	/	14:0		14.0	14.0	140		140	14.0		14.0	140	140	1
Cond. (µS/cm) 334 336 337 339 339 334 336 337 339	DO (mg/L)			99	10.0	9.8	101		10.6	101			10.0		11.5
Initials	рН	1		78	7.5	7-9	79	800							
Initials	Cond. (µS/cm)	1	33	34	3	36	33	57	33	6	33	3	3	54	
Concentration S(R)-3 Oid new old new	Initials		Car	ાર	1 3	38	Civ	e	Co	M	Civ	q	Cn	nr.	
Concentration 13								D	ave						-
Sth -3 old new old n	Concentration		13	3	1-	1	19			6	17	-	14	3	T.
Temperature (°C)		old	-	100000	new	old	Ghodine.	-	now	ACCUPATION AND ADDRESS.	1000000	100000	Till a control		new
DO (mg/L) 10-1 10-2 10-2 10-3 10-1 10-2 10-2 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-1 10-0 10-1 10-0 10-1 10-0 10-1 10-0		Jiu			-										liew
Days Concentration 13	The same of the sa	1						1				-		1	1
Cond. (µS/cm) 334 336 337 336 333 334 Initials		-1			-	9					-		-		1
Initials											77	147		2:1	1
Days															1
Concentration 13	Initials		I Cr	M	13	50	Cir	~{	C	int	CN	V	CA	VX	
Concentration 13								D	avs						
Concentration Control PH Cond. (pS/cm) Initials DO (mg/L) DO (mg	Concentration	1	13	5		4	į į			2	17	7	1	4	
Temperature (°C)	A Thomas Control of the Control of t	old	and the second	Contract of	Street, or other Designation of the last o		-		Extra delication	and the same of the last	A DOMESTICAL	ADMIC OF THE REAL PROPERTY.	Mary Sales	The same of	new
DO (mg/L)		7		_	-						_				lie,
pH		1	1.		-			,	-		_	-	1	1	1
Concentration Concentration Days Concentration							_							1	1
Initials Concentration Concentration Concentration Days Concentration Old new ol			_		_	-									1
Concentration Days	T 100 100 100 100 100 100 100 100 100 10		_				C	0							1
Concentration Old new old ne	initials		L	Ч	1	200	u	W(C	M	I Ci	N	Civ	14	
old new old ne	0							D	ays						
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Control Hardness* Alkalinity* Temperature (°C) Analysts: Analysts: Reviewed by: SS Date reviewed: 2019113	Concentration	old	new	old	new	old	new	old	new	old	now	old	now	old	new
DO (mg/L) pH Cond. (µS/cm) Initials DO meter: Control Hardness* Alkalinity* Alkalinity* Tomg/L as CaCO3 DO (mg/L) PH meter: PH Ph Ph Ph Ph Ph Ph Ph	Temperature (°C)			3,0		Jiu	II.OH	Jiu	11011	Jiu	HOW	Jiu	HOW	Jiu	liev
pH Cond. (µS/cm) Initials DO meter: Control Hardness* Alkalinity* mg/L as CaCO3 PH meter: pt/3 Conductivity meter: Coud. Analysts: PPL/Aw Reviewed by: SS Date reviewed: 2019113															
Cond. (µS/cm) Initials DO meter: Control Hardness* Alkalinity* mg/L as CaCO3 PH meter: pt/3 Conductivity meter: Coud. Analysts: PPL/AW Reviewed by: SS Date reviewed: 2019117															
Initials DO meter: Control Hardness* Alkalinity* mg/L as CaCO3 PH meter: ptl-3 Conductivity meter: Coud. Analysts: PPL/Aw Reviewed by: SS Date reviewed: 20/9/17			7												
DO meter: PH meter: PH S Conductivity meter: Could. Control Analysts: PH /Aw Hardness* Alkalinity* Reviewed by: SS mg/L as CaCO3													-		
Control Analysts: Conductivity meter: Conducti	iiiuais	_		F. 7.				_	1	_					
Hardness* Alkalinity* Reviewed by: S mg/L as CaCO3 Date reviewed: 20/9/1/3	OO meter:	1	0-	3	рН	l meter:	P	t1-3		Cond	ductivity	meter	: Co	end.	3
Hardness* Alkalinity* Reviewed by: S mg/L as CaCO3 Date reviewed: 20/9/1/3		Co	ntrof							1	Analys	sts:	BPI	/Aus	1/01
mg/L as CaCO3 Date reviewed: 20/9/17	Hardness*		/										- 10	11100	1 -0
mg/L as CaCO3 Date reviewed: 20\9\1\1	Alkalinity*	/								1	Revie	wed by		30	
Sample Description:	mg/L as CaCO3											-			2118
	Sample Description	:													
Comments:															

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements

elient: sample ID: Vork Order #:	10	ch C	oal		H	atch	Star	Date 8	Time: R Time: Decies:	100	2 300	2019		
							Da	vs						
Concentration	10	9	7	0	2	1		,						7
2767-08	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	1	14.0	1	. /							7.0.11	010	11011	0,0
DO (mg/L)	/	10.0	/	/										
pH	1	7.9		/				7 7 7						
Cond. (µS/cm)	3	36	1											7
Initials		-/JHW	/											
		7.51,100												
							Da	iys						
Concentration	10		2	0	2	(-						-
5780-09	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	1	14.0	1	1				- Tu		VIG	11011	Olu	11011	- Old
DO (mg/L)	1	10.1		/										
рН		3.0		/										
Cond. (µS/cm)	3:		/	1										
Initials		LAMA												
							Da	iys						
Concentration	19		7	0	2	1		.,,,						
5780-10	new	old	new	old	new	old	new	old	now	old	now	old	nour	old
Temperature (°C)	/	14.0	Hew	- Old	Hew	olu	new	olu	new	olu	new	ola	new	old
DO (mg/L)	1	10.2		/										-
pH		8.0		/										
Cond. (µS/cm)	20	36	1	1										
Initials		-134/2	- /											
IIIIIIII	3(0	-121/0								_				
							-							
Concentration	19		2	ð	2	1	Da	iys		_		_		
5710-11	nous	ald	(0.000)		ALC: CARRY	The state of the state of	and plants		AUTOCOM.		and a street		DESTRUCTED BY	NAME OF TAXABLE PARTY.
Temperature (°C)	new	old G.Pf	new	old	new	old	new	old	new	old	new	old	new	old
DO (mg/L)	10/1	10.2		/				-						
pH	7.9	8.0		/									-	
Cond. (µS/cm)	/ 33	10.0		/										000
			- 1							-				
Initials	340	15HW												
hermometer:	T-9		meter:	_Dc	7-3	рН	meter:	PH	-3	Cond	uctivity	meter:	Cou	6 19/11
	Cor	ntrol								Analys	ts:	BILA	Wya	19/M
Hardness*	1	/												, ,,,
Alkalinity*	1										ved by:		SS.	
44									1	Date rev	viewed:	20	019/12	118
mg/L as CaCO3														
mg/L as CaCO3 Sample Description:														1

Embryo-Alevin Freshwater Toxicity Test Initial and Final Water Quality Measurements

Client: Sample ID:	Cle	ck (pal		Ha	eta.	Star		& Time:		re !	119		
Nork Order #:	ا نم	Λ							1		ع عن ا le Shine			
							Da	ys						
Concentration	19		2	0	2	-1		,,,						_
5180-12	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0/	14-0		14.6			11011	0.0	11011	Oid	11011	Olu	11011	Old
DO (mg/L)	10/	10.2		16.0										
pH	7/9	3.0		12.7										
Cond. (µS/cm)	1 33		7	45										
Initials		THW		382										
	0,0,	311	SIL											
							Da	ıys						
Concentration	19		2	0	1 8	21	1	1,5						
5180-13	new.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.00	14.0	;	15,0	11044	Jiu	HOW	Olu	HEW	Olu	Hew	Viu	Hew	old
DO (mg/L)	ioA	10.2	1	10.2							1-			
pH	79	8.0	1	7.9						-				
Cond. (µS/cm)	-	36	12	46										-
Initials		/IMW		THIN										
,	13/10	/2(100	25											
			-74				De		91					
Concentration	19		7	o	7	. (Da	iys	T					
ERWSF-03	new	old	new	old	new	old	The state	alal		ald		-14	A 100 PM	
Temperature (°C)	14.01	14.0	liew/	14.0	new	Olu	new	old	new	old	new	old	new	old
DO (mg/L)	lol	10.3	/	100									-	
pH	7/9	8.0	/	17-8		-					-			
Cond. (µS/cm)			1 24	40		_					-			
Initials		1grw	11											
lilliais	NO	ISMU		PL		-		-				_		
			BR				-	0/2						_
Concentration							Da	ys	1		1			
oonochia adon	new	old	new	old	- mouse	-12	DESCRIPTION OF	Der o	article outcome	E213	Name and		ENVEN	
Temperature (°C)	Hew	oiu	Hew	Olu	new	old	пеж	old	new	old	new	old	new	old
DO (mg/L)								-	-					
pH									-					
Cond. (µS/cm)														
Initials						-		_						_
midulo														
hermometer:	7-9	DO	meter:	100	-3	рН	meter:	pH	-3	Cond	luctivity	meter:	coo	id.
	Cor	itrol							1	Analys	te.	RPI	/Als	1/
Hardness*	/	/							1	Allarys		1012	7000	1/4
Alkalinity*	/							_	1	Review	wed by:		33	
mg/L as CaCO3	-/										viewed:	2	019/12	110
Sample Description:									,	Jale re	vieweu:		2/11/2	113
Comments:														
												_		

Embryo-Alevin Toxicity Test Daily Mortality

		BR	-
Client:	leck coal	Start Date & Tingle: June / 2019	
Sample ID:	W/A	Stop Date & Time: Jane 20/2019	
Work Order #:	NIA	Test Species: Redside shiner	

Concentratio	n Rep				Day	of Te	st - N	o. of N	lortal	ities				Total Dead
		1	2	3	4	5	6	7	8	9	10	li	12	Eggs/Embryos/
STPD-08	1	0	0											139 WEX 2
1 09	2													139 MAX 2
10	3													114 80
1	4													245 37
12	1													72-73 64
1 13	2	1	V										(39 55 83
	3		Y											3 1 3 2 6 2
ERWSZ-0	5 4	6	0											141 63
STP17-08				20	1	υ	0	0	2	0	0	10	Ü	141 03
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STPD-18-				Ø	0	rO	Q	€ D2	2	0	30	10	0	
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STPD -12-				10					0			1		
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STPD-13-				改工马	2							_		
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Tech Initials	4	My	Ba	- BAC										-

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EWRS7-03-18	1			G	0	0	0					0	0-	-			
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Tech Initials		Mar.	0.0.	0.07	Ca.O	801	BOL	201	Cia D	Qn.	20-	GOL .	00:-		-		_
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	97		7		7									. 7	inla	io	_
	0	CPD-De	i in	Perti	lized	فدو	ecime	ent!	وع 33	50 E)	ا ده	Feet		37	inla	io	
	(E	(PD-02)	i in	Perti	lized o	eco	ecime	at i	9325	5,0 E) -> 8	1 w	Feet	da	3			
Comments:	(E	CPD-De	i in	Perti	lized o	eco	ecime	at i	9325	5,0 E) -> 8	1 w	Feet	da	3			
Comments: Reviewed by: Version 1.1 Issued Octobe	3	(PD-00) comical devict 2 had	i in	Perti	lized o	eco	ecime	L Nikel,	9325	2 cco	1 0r	Feet	7,20	3			

Embryo-Alevin Toxicity Test Daily Mortality

0	5 1	Day		st - N	o. of 1	Mortal 20		22	23	24	Total Dead Eggs/Embryos/ Alevins
0	5 1	100						22	23	24	Eggs/Embryos
0	0	0									
0	0	100									
0	0	0									
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	58~(59~CM.	sold so	59~CM 85~	sa-cm ea-	58~CM 88~	59-CM 80-	59-CM 88-	59~CM 80~	sq and sq	59~CM 88~

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: ISL 1/2019
Stop Date: ISL 20/2019
Test Species: Redside shiner

ID					Day o	f Test -	No. of	hatch					
	i	2	3	4	5	6	7	8	9	10	11	12	Comments
5787-08	0	-	-	-	-	_	~	-					
1 01	1	-	~	-	-		_	-					
(0		-	^		-	~	5	-					
(1		-	-	_	-	~	_	-					
12		-	2	_	-	1	-	-					
V 13	4	7	-	-	-	-	-	-					
ERWSZ-03	Yux	4	1	_	-	_	-	-					
57PD-08-A									80	i8	7	6	
0									25	6	7	9	
D	_								× 200	4	W 12		
STP17-09-B		-							275	60	7 28	2	
2	-	_							0.	5	38	4	
D	-								0	4	36	-	
STPD-10-B									0 KL	3	1	26	-
-C	-							-	0	1	18	13	
- D	-	-						· .	0	_	-	10	
5TPD-11-B	-/						-	_	0.	-	-	6	
- C									60x	3	4	13	
- 0	-	_							6	-	-	15	
- E		~							_0	_	6	4	
一下	-	-							0	_	-	6	
578D-12-B									0	-	12	5	
C	-	-		-					0	-	-	-	
STPN-13-13	_								0	-	-	CR 214	
-c	-	_							0	-	-	-	
ERWST-03-B		-		فر					2	30	13	4	
-0	=	_							3	6	21	13	
D	_				-				-23	13	3		
Tech Initials	m	89 -	BOL	- BRL	Env	300	05-	CMP	BRL	野山	380	CMP	

Comments:	Ø	hatch	such a	dein't a	price	Cal	Someral			
	*	2/6	hatch		ocaque					
	Ħ	2/4	11	11 .	11	361	4			
	2	3/25	11	11	31	11	11			
	1	1/6	11	٠,٤	et	10	16			

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck	
Sample ID:	N/A	
Work Order #:	MIA	

Start Date & Time: Stop Date: Test Species: Redside shiner

ID					Day	of Test	No. of	hatch					
	13.	14	15	16	17	18	19	20	21	22	27	2+	Comments
18008-B	1	3-											
C	-	-					-						
78009-B	3	1											
8-01-07	6	- 0	0	1	_								
C	12	3	1	-									
180 II - B	36 23 29	6	-									-	
DE	32	7											4
TP0-12-B	32 36 28 3	2	1	1	-					-			
C 8 8-077	21	-										-	
CRWSF-03-B	-	0	0										
D	17	=											
												1	
ech Initials	CMP	65-	CM	Crup	-	-					-		

2019/12/18

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck		
Sample ID:	N/A		
Work Order #:	1	A	

Start Date & Time: Tone 1/2019
Stop Date: Tone 20/2019
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (l	natch)				
	1	2	3	4	5	6	7	8	9	10	11	12	Comments
STPD-08	0	-	-	_	-	_	-	/					
1 09	ĺ	-	-	-	0	_	/	-					
(0		-	_	-	2	_	_	-					
1 1		-	-	/	-	~	~	-					
12		-/	1	_	-	~		-					
1 13	Y	-	_	1		-	-	-					
35													
£052-03	0	-	-	-	_		-	-					
57PD-05-B									-	0	0	9	
C	_							-	-	0			
0		1	n-00229		******				-	0			
57PD-09 - B							-	_	-	1			
C				-					^	0			
D	_								-	0		1.	
JED-10-B	_									0			
C	-						_	_	-	0			
D			-						_	0			
STPD-11 - B	-								-	0			
C	~								_	0		1	
D F	_								-	0		1	
U										0			
Ŧ									-	0			
TPD-12-8	_									Ð		1	
C	-							7	-	0			
ST8 1-13-B	-						-			0	1	1	
C								_	_	0			
RWSF-65-66	3 _								-	0			7
								_	-	0		1	
									~	O		7	
Fech Initials	IALL	BAL	45		2.5	0.0	89-	Ď 0	880	392	Br	- B&C	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: July 2019
Stop Date: Two 2019
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (h	atch)				
	13	14	1.5			18	19	2/6	21	22	23	24	Comments
STPNEOS B	Ø	0001	0	Q	0	O.	O	10					,
C		0						1					-
D								-				-	
STP15-09-13								1		-			-
c													
1>								1				_	
STPD-10-B								1					
C									-				
O								1					
STED-U-B							1	1				-	
C						1					-		-
D								1-				-	
E								-					
F								1					
STPD-12-B								-					
							1	1		-			
STP13-13-B								-					
								-					
ERWSF-03 B	-							-					
		1	1		+			1					
D	1	1	-	7	7	7	1	1				_	
+													•
14													
- 3													
	*												
											1		
								-					
													1
Tech Initials	Boc	260	COUP	35-	ang	Cim	BRU	200	_	-	_		

SS

2019/12/19

Embryo-Alevin-Fry Freshwater Toxicity Test Water Quality Measurements

Client: Sample ID: Work Order #:	Teel N/		sal	F	mbry		Sto	t Date & p Date & Test Sp	& Time:	منلم	one 223 (1 Side			
							Da	ays					,	25-
Concentration	0	1		2		3		٠	4	5		6		ari A
STP0-14	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	9:0	14.0	40	14.0	14.0	14.0	14-0	14.0	140	14.0	140	14.0	140	
DO (mg/L)	1	10.2	9.9	10.0	10.0	10.0	100	10.0	9,9	10.0	9.9	10.0	9.9	20
pH		7.5	7.6	7.5	7.5	7.6	7.3	7.8	7.9	7.7	78	7.8	7.9	
Cond. (µS/cm)	,	33	38	3	36	34	D	3	57	33	9	3	38	
Initials	802	30	PL	9	√	80	Ų	8-56	U	CN	NP 91	6	9-	
							Da	ays						965
Concentration	0				2		3		4		2	1	0	F
STRD-15	init.	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	9.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14-0	17.0	
DO (mg/L)	1	10.2	9.9	10.0	10.3	10.0	10.0	100	9.9	10.0	10.0	10.0	9-9	
pH		7.5	7.5	7.5	7.5	7.6	7.6	7.8	7-8	7.7	78	78	7.7	
Cond. (µS/cm)	/	3	38	3	36		46		37	33	39	37		
Initials	Brc	B	PL	3	p	B	84		gc		np	39	L	
												•		
					1000		Da	ays						
Concentration	0)			2		3		4		2	6	,	
STPD-16	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)	9.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	140	14.0	14.0	14.0	
DO (mg/L)	/	10.2	9.8	10.06	19:00	10.D	10.0	10.0	10.0	10.0	9.9	140	9.9	
pH		7.5	7.6	7.5	7.5	7.6	7.5	7.8	7.8	7.7	78	7.8	7.9	
Cond. (µS/cm)	/	33	38	3	36	34	10	33	37	33	9	3	38	
Initials	BOL	B	80	5	8-	B	31	6	2~	Civ	91	5	70	
		-												-
Concentration							Da	ays						
	init	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
pH		*												
Cond. (µS/cm)														
Initials												200		
DO meter:	Con	()- /	3	рН	meter:	pt.	1-3		Condi	BPL /	meter: /AWD/ ts:	Coul	id	-3 KJL
Hardness*	7	,								Allalys				
Alkalinity*	1									Review	ved by:		SS	
* mg/L as CaCO3											iewed:			18
Sample Description Comments:	:			6	(4)			-	[a]					*

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements

Client:	(ei	K Ca	oal .	3	TZ	mbry	Star Stor	t Date 8	R Time:	Ju;	23/2	2019		-
Work Order #:	NIN	2						Test Sp	ecies:	Red	side		ver	
							Da	ays						
Concentration		7	-	3	8		9)	(1		2	
5790-14	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14.0	14.0	14.0	14,0	14.0	14.0	14.0	14.0	14.0	14-0	140	140	
DO (mg/L)		10.1	10,0	10.0	10.2	10.2	10.1	ioil	10.2	10.0	9.9	1001	low	
pH		7.9	78	7.9	7.8	79	78	79	78	7.5	7.8	79	78	
Cond. (µS/cm)		33	6	33	38	3	57	33:	4	3	36	3	37	
Initials		CN		Civ			ME	Civ	4	B			me	
Concentration		-	L	\ \ \	?		Da Da	ays		f 1		1	>	
STPD-B	old	new	old	new	old		old	Garantine to	T-	(old	1	-11	
Temperature (°C)	Old	14.0	140	14.0	140	new 14.0	14,0	new 140	old	new ly-o		new 14-	old	new
DO (mg/L)		1,01	10.0	10.0	ial	10.2	9,9	loct	10.2		14.0	164	10-0	-
pH		79	73	7.9	7.9	79	78	7.9	7.8	7.8	3.9	79	73	
Cond. (µS/cm)		33		33		33		33			36	33		_
Initials		CM		CIM		Ch		Ċ					w	-
inidato		1 0	CL	L		<u> </u>	NY		n(38		4	W	1
				21-			Da	ays			200			-
Concentration		-	7		8		7	1	0	l	1	(2	
57PD-16	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)		14,0	14.0	14.0	14.0	14.0	14.0	14.0	14,0	14.0	14.0	140	140	
DO (mg/L)		10.1	10.2	10.0	10.0	10.2	10.0	10.1	10.2	10.0	10.0	Porl	0.0j	
pH		79	79	7.9	79	7.9	79	7.9	73	35	7.9	79	79	
Cond. (µS/cm)		33	6	33	8	33	7	33	4		36	33		
Initials		Cm	9	Ċ	nl	Ch		CN	ns	B	gr.	ch	J	
Concentration			-				Da	ays						
	old	new	old	new	old	new	old	new	old	new	old	new	old	nout
Temperature (°C)	Jid	THE W	Old	TICW.	Old	HEW	Olu	HEW	Olu	new	Olu	new	olu	new
DO (mg/L)											- 4			
pH														
Cond. (µS/cm)					1									
Initials					-			 						
DO meter:	D	0-3		рН	meter:	jet 1	1-3		Cond	ductivity	meter:	Cou	W	3
of the Paris of the Paris	Co	ntrol				//			1	Analys	SPL /A	WD/C	41/4	1/10
Hardness*	/									·				Territ
Alkalinity*	/								1	Review	wed by:		22	
mg/L as CaCO3										Date re				105
Sample Description												T		
Comments:														

lient:	10	ch (Dal		t	=Uris	oryo.	t Date 8	3 Time:	20	ne -	1119		
Sample ID:	W	A		100		- 1			& Time:			019		
Vork Order #:	N	2				-			pecies:					
	-				41-7					7100010	o ommo			
							Da	ays						
Concentration	-	3	[[4	1	5		0				111	/	-
57110-14	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	140	14,0	14.0	140	140	14.8	14.0	14.0				/		
DO (mg/L)	10.0	101	10.2	10.0	1000	ioil	lo.i	9.9						
рН	79	9.0	79	79	79	8.0	7.9	8.0		/				
Cond. (µS/cm)		36	33		33		33	6	1	/				
Initials	de		Cr		Co		Crv	C	/					-
	-							-1	1.					
			_				Da	ays						7.77
Concentration	13	Y	14		15			-					100	
Concentration	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0						J.W	.1011	514	11011	Ulu	11011	Old
DO (mg/L)	0.0	10.1												
рН	79	7.9												11
Cond. (µS/cm)	3	36											LOS	
Initials	Car													111
			i.				D:	ays						
Concentration	12	,	10	4	10	5	111	1					a solite	/
5780-16	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	14.0	14.0	14.3	14.0	140	Hew	Olu	new	Old	new	Old
DO (mg/L)	0.0	10,0	10.7	100	10,0	10.1	10.1				/			
рН	71	79	79	7.8	39	79	7.9	7.9		-				
Cond. (µS/cm)	37		33	5)	33		331			/				
Initials	Cm		Ch		Cin		Cir		/				27	
		4		VV	UN	1	1 (80	W.	1					
		-					D:	ays						
Concentration							1	ays						
	new	old	new	old	new	old	new	old	new	old	new	old	DOM	old
Temperature (°C)				0,14	11011	- Oid	11044	Old	IICW	Olu	Hew	olu	new	Olu
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														_
								,						_
hermometer:	TA	DC	meter:	1	1-13	-1	l meter:	nH	2					1-
	,	- 50	meter.	100		- pr	meter:	PIL	/	Cond	activity	meter:	10/14	id.
	Cor	ntr6l						1	1	Analys	SPL/A	wo/a	AP/YY	11
Hardness*	/		-5							Allalys	io.	THE STATE OF		
Alkalinity*	/									Review	ved by:		25	-11115
mg/L as CaCO3		1 11			-				1,				91121	05
													11161	2
Sample Description:	:													

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements

Client: Sample ID:	Te	K	(aci	1		Musica	Star	t Date &	K Time:	Su	me.	414	120	19
Vork Order #:	61	10	-				Stop	Test Sr	z imie:	100	cide	stu	ner	
	60	13						103101	Jeoles.		عاراك			
							Da	ays						
Concentration		+		8		9		10			11	1	2	
5710-14	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)			/		/		/	140	140	14.6	14.0	142	140	
DO (mg/L)								10.1	10.1	10.0	9-9	10.1	100	
pH		/		/				78	79	7.8	7.9	79	7.8	
Cond. (µS/cm)		/	5	/		/		/3	34	3	36	3	57	
Initials		l.		/					M	3	XL.			
							-194							
		-		<u> </u>)		Da	ays						
Concentration	and a firm	1	Manage Manage	8	14.53 - 7.03		1	10)		11			
5190-15	old	new	old	new	old	new	old	new	old	new	old	new		new
Temperature (°C)			/		/		/	14.0	14.0	14-0	14.0	1 .	10.00	
DO (mg/L)								101	iolo	10.0	9.8		_	
рН		/		/				79	78	78	7.8	79		
Cond. (µS/cm)		-		/		/		35	•		35			
Initials								ĊM	y	e	2	Co	<u>_</u>	
			-											
0				5	7	1 0	Da	ays			1)		`	-
Concentration		400000000	40.00	THE WAY WAY	Constanting and	The second second		10	ALC: UNKNOWN	I Surren	Land.com	Total Control	_	A Charles
	old	new	old	new	old	new	old	new	old 14.0	new	old		_	new
Temperature (°C)			/		/		/	14.0	1000	(00	9.8	1	2000	
DO (mg/L)						/		10.1	10.2		-		1	
pH		/		/		/		719	7.8	7.8	3.7			
Cond. (µS/cm)		/		/		/		33			36		-	
initials								l 4	np		ga	C	No	
					TU		Da	ays						
Concentration														
	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														
O meter:	Do	0-3		рН	meter:	-pt	1-3		Cond	ductivity	meter:	Ca	1d.	3
	Co	ntrol								Analys	sts:	- 40	-1/1	
Hardness*	/													
Alkalinity*	/										wed by:			
mg/L as CaCO3										Date re	viewed:	_ &	01011121	05
Sample Description:	:		•											
Comments:													140 140 10.1 10.3 14 78 337 CM 140 10.1 10.3 140 140 10.1 10.3 140 140 140 140 140 140 140 140 140 140	

Vork Order #:		(1					Stop	Date i	& Time:	Some	23/2	oig		
	_ N	ID						Test S	pecies:	Redside	e Shinei			
							Da	ys						
Concentration	13)	14		15		16	,	1	7	15	3	j'	9
5180-14	new	old	new	old	new	o!	new	old	new	old	new	old	new	old
Temperature (°C)	140	14.0	14.0	140	140	14.0	14.0	140	15:0	i4-0	142	14.5	145	140
DO (mg/L)	10.0	10.2	10.2	10.0	10.0	joil	10.1	10.0	10.0	10.0	10.1	9.8	100	9.9
pH	7.9	74	79	78	79	71	7.9	75	7.5	7.7	25	7.8	78	79
Cond. (µS/cm)	33	1	33	3	33	4	33	ĺ.	3443	385u	- 3-	50	35	i.J
Initials	Ci	ne	ĆN	18	Ch		Ca			u		,L	W	
	178		11		1 10		Da	ys		7		8	1 .	2
Concentration	E/ wen	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	140	14.0	14,0	140	14.0	140	15.0	14-0.	1472	14.5	145	140
DO (mg/L)	ione	jour	10.2	10.1	1000	10-2	10.1	10.1	100	10. 2		98	10.0	99
pH	79	79	79	79	79	78	79	8.0	7.5	7/	ومرس	73	78	79
Cond. (µS/cm)	33		3:		33		35		2000 3	49 70		10 KO	350	-
Initials		nf	CN	C	Č		Civ			u		L		
inidais		M	L	,		V(I W		1 30				au	
						,	Da	iys						
Concentration	13		10	4	15	5	16		1:	7	1	8	1	,
5<60-16	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	140	140	140	G-41	140	14.0	114.0	140	15.0	14.0	140	14.5	145	14.0
DO (mg/L)	100	koj	10.7	10.0	10.0	0.0	104	10.0	10.0	10.1	101	9.9	13.0	100
pH	79	7.9	7.9	78	79	7.9	79	8.0	7.5	7.6	7.9	7.8	78	79
Cond. (µS/cm)	33		33		3:		33			500	lw 3	50	35	15
Initials		m	Cr		-	20	Cu		17	ille		ci	an	1
							:						1 0.0	
							Da	ays						
											EUL TRUS			
Concentration			(House E.C.					old	new	old	new	old	new	old
	new	old	new	old	new	old	new	Viu					1	
Temperature (°C)	new	old	new	old	new	old	new	Oiu .					1 44	
Temperature (°C) DO (mg/L)	new	old	new	old	new	old	new	- Onu					7 90	
Temperature (°C) DO (mg/L) pH	new	old	new	old	new	old	new	, viu					- Carlo	
Temperature (°C) DO (mg/L)	new	old	new	old	new	Old	new	, old						

Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 14.0 4.7 7.7 50 0 0 13.5 10.5 7.7	new 2 new	old	Stop	o Date & Test Sprys old	z Time: pecies:	Redsid	new	3/200	new	old	
Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 14.0 4.7 7.7 30 old 13.5 10.5 7.7	new	old	Da 2 new Da 2	ys old	new 2	old	new	old	new	old	
Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 14.0 4.7 7.7 30 old 13.5 10.5 7.7	new	old	Da 2	old old	new 2	old	new	old	new	old	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 14.0 4.7 7.7 30 old 13.5 10.5 7.7	new	old	Da 2	old old	new 2	old	new	old	new	old	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 14.0 4.7 7.7 30 old 13.5 10.5 7.7	new	old	new Da	old ys 2	new 2	old	new	old	new	old	
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	14.0 9.7 7.7 50 old 13.5 10.5 7.7	2		Da 2	ys 2	2	-3			new	old	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-15 new o Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new o	old new	9.7 7.7 50 bc old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	7			
pH Cond. (μS/cm) Initials Concentration STPN-15 new of temperature (°C) DO (mg/L) pH Cond. (μS/cm) Initials Concentration STPN-16 new of temperature concentration strendless	old new	7.7 50 old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	-4			
Concentration STRICT ON TEMPERATURE (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STRICT ON TEMPERATURE (°C) DO (mg/L) pH Cond. (µS/cm) Initials	old new	old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	4			
Initials Concentration STPD-15 new of new	old new	old 13.5 19.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	-9			
Concentration STPD-15 new of n	old new	old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	4			
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new o	old new	old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	4	0)-		
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new o	old new	old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	4	9)—		
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new o	old new	old 13.5 10.5 7.7	Carlotte Control	-	2	2	District Williams	100000	2	4	(5)		
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new of	27 17	13.5	new	old	STATES OF STREET	Market St.	District Williams	100000	0				
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new of	27 17	13.5						old	new	old	new	old	
DO (mg/L) pH Cond. (µS/cm) Initials Concentration STPD-16 new o	rs	7.7						Jid	11044	Old	, icw	Old	
pH Cond. (µS/cm) Initials Concentration STPD-16 new o	rs	7.7											
Cond. (µS/cm) Initials Concentration STPD-16 new o	rs					61				150			
Concentration 19 new o	rs									37			
Concentration 19 STPD-16 new o				1		-						_	
97PD-16 new 0								-					
STPD-16 new 0					Da	ys						_	
97PD-16 new 0		20	2			-2	2	3	2.	4			
	old new	old	FORDSHIP A	old	Call Stanton	Name and Post Office of the Owner, where the Owner, which is the Owner, which	The same of	AMERICAN STATE	The Party of the P				
lemperature (°C)	iu liew	13.5	new	olu	new	old	new	old	new	old	new	old	
Temperature (°C) DO (mg/L)	1	10.6					1					-	
pH	1	7.8						_					
Cond. (µS/cm)	/ 2	49					-						
Initials		380				-		7 154					
illiudis /		750											
		-											
Concentration	T				Da	ys						_	
	old -	410			Contract of the Contract of th						M + 3 3 3 3 1		
	old new	old	new	old	new	old	new	old	new	old	new	old	
Temperature (°C)								-	-				
DO (mg/L)													
pH Cond (uS(om)													
Cond. (µS/cm)						-			- La-				
Initials											-		

Embryo-Alevin Toxicity Test Daily Mortality

Client: Sample ID:	Teck Coal	Start Date & Time: June 4/2019 Stop Date & Time: June 23 (2019)
Work Order #:	NA	Test Species: Redside shiner

Concentration	Rep				Day	of Te	st - N	o. of N	lortal	ities				1	Dead
and with	1	1	2	3	4	5	6	7	8	9	(0	L1	15	Eggs/E	mbryosi
57PD-14	1	0	0										-	180	65
STPD-15	2	0	0											85	46
STPD-16	3	0	0											395217	214
	4														
STPD-14 B	1		/	0	0	0	0	O	0	0	10	Ó	0		
C	2		/						0	Qig	0				
D	3		/		or I to				40	3将	Dn				
É	4		/		270				0	0	0				
3TPD-15 R		/			3000				13	3 249	10				
C		/			0				0	0	0				
5787-16 R	3				10			1	20	20	0				
	4				0			10	20	50	0				
D		/			0	1		0	0	0	0				
E		1		V	0	T	1	0	0	0	0	1	1		
	3 /														
	4														
	1														
	2														
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	4													t and a second	
	1														
	2														
	3														
	4														
	1											1			
	2														
	3														
	4														4
	1														
	2									190					
	3														
	4														
Tech Initials		BBL	32L	BRL	300	CMP	80	880	Ba	BOL	80	Ba	cme		

	3				-	-				-	_				
	4	1				-									
Tech Initials		BBL	37L	BRL	30-	CMP	80	B80	BOL	BOL	80	Ba	cmc		
Comments:		i able													all report of
		d due					Au 1	natch							
Reviewed by: Version 1.1 Issued Oct	ober 6 20	S	2		111		Dat	e revi	ewed:		201	16116	05		
10101011 1.1 133000 001	0, 20	10										Nau	itilus Env	ironment	al Company I

Embryo-Alevin Toxicity Test Daily Mortality

Client: Sample ID: Work Order #:	(ee	NI	N//	1		St	op Da Te:	ite & ite & st Spe	Time: Time: ecies:	Reds	ide sh	q 3 (20) iner	19	
Concentration	Rep				Day	of Te	st - N	o. of I	Viortal	ities				Total Dead
		13	14	15	2	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins
578D-14B	1	0 -											-	- 10 N
C	2	0	Ó	Q	9.	-	_				_			
D	3	0											=	
E	4	1		-	1	_								
579D-15 B	1 2	9	-		-									
578D-16 B	3	-			-							-		
5 (L)	4			1										-
D	1			1									_	
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	3													
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	1						Looi Jewes							
	2									*				
	3					1								
Tech Initials	4		0.1	0.0										
recii initiais		1880	CM	CIM	Blo.	_								
Comments:						1								

Reviewed by: Version 1.1 Issued October 6, 2015

Date reviewed:

2019 | 12 | 18 Nautilus Environmental Company Inc.

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck	
Sample ID:		
Work Order #:		

Start Date & Time: Jan. 4/19
Stop Date: Jan. 22 (201)
Test Species: Redside shiner

					Day	f Test	No. of	hatch				T	-	
ID		2	3	4	5	6	7	8	9	10	1.	-	2	Comments
		12	-	-	-	-		-	-	-	24	340	7	
15-14-B		-	-	1-	-	-	1	-	-	-	14	2+0	90	
C		1-	-	-	1-	-	1.	-	-	3		3*0		
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15-B	100000000000000000000000000000000000000	1	+=	-	-	-	-	-	i	6 7	- 5	24	0	
	-	+-	-	1-	1-	1-	7-	-	5"	5 7		37	छ।	
PD-16-B		-	-	1-	-	-			53	3			0	
· C	-		-	1	-		-	-		_	-	_	0	1 1 1 1 1 1 1 1 1 1
D	_	_	-	1		-	. L	-		-	-	-	0	
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73														•
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Tech Initial	s	5PL	BBC	BOL	18/1	Clark	1.71	1080	100	-	100	L	10	break & hatch

SS 2019 112105

(opage york one

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NIC	

Start Date & Time: Stop Date: Test Species: Redside shiner

ID	Day of Test - No. of hatch													
	139	14	15	16				2					Comments	
19D-14B	582	_	_									-		
C	17	io	18									_		
D	ii	0	2		_									
E	21	4	0		_		-							
780-15 B	24	3	-	1								_		
/	29	Ť	_											
57PD-16 B	33	3												
3 (40-10 12	20	3												
C	29	18	1	2										
E	18:81	17	1	-										
E	10011	11.	_											_
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(10)		-												
		111												
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			_			1								
rech Initials	CIMP	SMI	Conf	Cons		1		1		1				-

Comments:	1 1 hatch had opaque yolk sac	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NA	

Start Date & Time: Jour. 4/19
Stop Date: Joe 23/25 A
Test Species: Redside shiner

ID				Day	of Test	- No. o	f Morta	lities (hatch)				
	ľ	. 2	3	4	5	6	7	8	9	10	11	15	Comments
STPINYB		-	-	-	-	~	-	-	-	0	-	7	
57815-15 C	-	-		-	-	-	-	-	-	0	V	O	
-377D-161			-	~	-	-	1	-	-	- 十二	0	0	
É		-	-	_	-	_	_	-	-		-	-	
STPD-15-B	_	-	-	-	-	_	_	-3/	- 35	3500	ව	0	
	_	-	-	-	-	_	-	-	02 + 0	0	0	0	
57PD-16B		_	^	_	-	-	-	_	3+0	-	0	0	. "
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	-												
ech Initials	B32_	BRL	BTL	ani.	CMP	C n	-6	RC.	BgL	80:	21	, 200	

Embryo-Alevin-Fry Test Daily Hatch Mortality

Start Date & Time: Jule 23/20 P1
Test Species: Redside shiner

İD				Day	of Test	- No. o	f Morta	lities (h	atch)				
er krust	13	14	15	16	17	(8	19	20	21	22	23	24	Comments
STED-B-B	0	6	б	0	p	0	1				Physical		, ,
C						1	0	_					
5782 D						0	1						LE KING VICE
E						1		_					
STRD-15 - B						1		_		- 10-			,
C						2		-					*
579 D-16-B						0		-					
						1		-					
D													
E	+	1	1		+	1	1						
										-			
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		-											
Tech Initials	n	comp	~ 0			Ri	ww	•					

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements Empiryo 350 Start Date & Time: Client: Teck Coal Stop Date & Time: 54 12010 AIG Sample ID: NIA **Test Species:** Work Order #: Days 4 0 Concentration old new old new old new old old new new old ER-01 old new new 14.0 14.0 15.0 14.0 140 14.0 140 14.0 14.0 140 14.0 17-5 14.0 Temperature (°C) 10.0 10.1 10,0 10.2 10.1 9.8 10.0 1.01 1001 9.9 DO (mg/L) in.c 7.5 7.6 8.0 78 79 7.9 78 7.4 7.8 79 pH 344 333 336 336 334 337 Cond. (µS/cm) JMW CMP CIMP CMP Comp Cme SPE Initials 1850 Days 2 0 Concentration old new new old new old new old old new ER-02 old new old new 140 140 14.0 0.21 14.0 14-0 140 4.0 14.0 14.0 14.0 14.0 Temperature (°C) 17.5 10.2 10.7 100 ios 10.0 10.1 1001 9.9 DO (mg/L) 101 10-0 ID.C 79 7.9 7.5 7.6 2.0 79 79 48 78 75 7.8 29 pH 336 344 333 334 337 336 Cond. (µS/cm) THEW CMP CMP Cine 126 me Initials SIMP 139-Days Concentration old new old new old new old new old new old old new new Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials

							Da	iys						
Concentration	old	new	old	new	old	new	old	new	old	new	old	new	old	new
Temperature (°C)														
DO (mg/L)														
рН					_									
Cond. (µS/cm)														
Initials														

DO meter:	70-3	pH meter: pH-3	Conductivity meter: Cona ->
	Control		Analysts: TRE COUR TRUE
Hardness*			53Q~
Alkalinity*			Reviewed by: SS
* mg/L as CaCO3		•	Date reviewed: 2019112(17
Sample Description	n:		
Comments:			

Enbago 350 Client: Teck Coal rt Date & Time: Towe 15 /2019
p Date & Time: Jola 5/2019
Test Species: Redside Shiner Start Date & Time: Sample ID: NIA Stop Date & Time: Work Order #: NIA Days Concentration 10 11 12 ER-01 new old new old new old new old new old old new old Temperature (°C) 140 14.0 14.5 14.0 13.5 14.0 14.0 140 14.0 14.0 140 140 DO (mg/L) 10.1 9.7 100 5.01 10.1 10.1 10.1 10.0 5.01 1000 10.1 0.0j 25 7.7 pH 7.8 33 7.9 7.8 78 79 78 Cond. (µS/cm) 250 354 347 355 351 353 Initials Ri Mm CMP SIL me? Cmp Days Concentration 9 10 11 ER-02 new old new old new old new old new old new old new old Temperature (°C) 142 14.0 135 4.0 140 14.0 14.0 14.0 140 140 140 DO (mg/L) 101 98 120 10.2 0.7 101 9.9 10-1 10.2 1000 lou 100 29 pH 7.7 7.8 7.80 79 7.7 7.8 71 7.8 79 79 350 Cond. (µS/cm) 347 354 355 351 355 Initials AL Mm CMP BPL CM CMP Days Concentration new old old new old new old new old old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration new old new old new old new old new old new new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: T-9 DO meter: 00 - 3 pH meter: PH - 3 Conductivity meter: Coval - 3 Control Analysts: RL YYL CMP Hardness* Alkalinity* SOU Reviewed by: * mg/L as CaCO3 Date reviewed: 2019/12/17 Sample Description: Comments:

Client:	-	0 516	Con	0	(ひかり	5°	t Date	B Time:	-7	-	-1		
Sample ID:	- 1,	NA	1	<i></i>			Sto	n Date	R Time.		<u>~ \5</u>	1001	9	
Work Order #:		N	Â				310	Took S	∝ i/ime:		10 4	120	- 80	
		10 1	(3					rest of	pecies:	200011	iyrichus	mykiss	- 86	
							- Fre	21/0		100	dsio	RESH	- Land	
Concentration	B1 7	+13	1	4	T .:	5		ays_	1	7	Τ.	~		
ER-01	new	old	new	old		Old		old	23,579,734	The state of the state of	Decision in the	8	-0.000	
Temperature (°C)	14.0	14.0	14/5	145	14%	14.00	LIL	140	14.0/	old	new	old	new	old
DO (mg/L)	10.2	100	9.9	9.8	9,9	9.8			1	140				
pH	8.0		80	79	83	25	7.5	7.6	7/9	10.0			/	
Cond. (µS/cm)	35	2		5 P	35				-	79	_	-		
	CN	0	7.	2 1	32		35		135	75	-	/_		
Initials	LON	14		A	-		CVV	- G	to Cin	S.	/			
				-					-					
	-	3		4			0.00	ays		_				
Concentration			-	I Company	15	14 Street Str. 975-	1	The state of the s	- 1	7	1	8		_
ER-OZ	new	old	new	old	new	old	new	old	new	ols	new	old	new	old
Temperature (°C)	-/	140											-1	
DO (mg/L)	/	lor					_							
Hq	/	8.0												
Cond. (µS/cm)	/ 35	52												
Initials	Cn	18	-											
			t				·ŕ							
		1			1.		Da	ays						
Concentration					4									
	new	old .	new	old	new	old	new	old	new	old	new	old	new	old -
Temperature (°C)	1								Mess			Old	11019	Old
DO (mg/L)									1	- 4				
рН														
Cond. (µS/cm)														
Initials					1.00		-			**				
middis					1 74		30,000	277 4	1	4.5				
						10-11-2	The same of the sa		9.					
Concentration					T	-	Da	ays						
Concentration		-1-1		-14			TOTAL SE	1						10
T(90)	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)				-					-		,			
DO (mg/L)	-													
pH	-	<u> </u>		L					-				1	
Cond. (µS/cm)	-											V_U_P		
Initials														
Thermometer:	7-9		meter:	_ 170)-3	pH	meter:	-BH	(->				Con	
Uordnoos*	Cor	ntrol			-					Analys			Arot	> 4 7 (
Hardness*	-	-	-						-			000		
Alkalinity*					L			-			ved by:			
* mg/L as CaCO3									1	Jate rev	newed:	_20	19/12/	19
Sample Description	:												A	
Comments:														

Hatch BA

Client:		Teck	Conl			tate	Star		ج £ Time:					191
sample ID:		10	A						& Time:	5-	he "	1/20	710	
Vork Order #:		14	×					Test Sp	pecies:	Oncort	ynéhus	mykiss	52	
1										F	ledes	22 S	hime	•
							Da	ays						
Concentration	7	-	2	3	9		1	0	11		1	2	113	
ER-01	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)		,		1	14.0	/	14.0	140	14.0	14-0	14.0	14.0		
DO (mg/L)		/		/	10.2	/	10-1	10.0	10.2	10.1	101	10.7		1.0
pH	/	1			7.9	1	7.9	7.9	7.9	79	7.9	8.0		
Cond. (µS/cm)	1		/		34	7	3	55	35	1	35	3	10 Z	1
Initials					69			36-	Cr		Civ	Q		
200000000000000000000000000000000000000														
							D	ays						
Concentration		2	Ç	5	0	7		0	1	(- 83	1 -		
ER-02	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	11046)	1104	0.4	14-0	/	14-0	14.0	14.0	14-2	140	14.0	11011	Oid
		/		/	10.2	/	10.1	9.8	10.2	10.0	loi	10.2		
DO (mg/L)		/	-	/	7-9	1	2-9	7.9	79	79	7.9	7.9		
pH		/	1	<u> </u>			1	_	35		35			
Cond. (µS/cm)	1		1		1	47		55			_			
Initials					1 6	SC.	1 8	~	Cr	W1	Cn	11		
						_	D	ays	1		_		I	
Concentration			1	1		Table 100		1		1		1		
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials														
					-		D	ays						
Concentration														
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)														
DO (mg/L)														
рН														
Cond. (µS/cm)														
Initials														
madio														
Thermometer:	T-9	_ DO) meter	· 00	-3	_ pl	d meter	: 84	-3	Con	ductivit	y meter	Con	2-3
	Co	ntrol								Analy	sts:	Ba.	CURP	
Hardness*														
Alkalinity*										Revie	wed by	:	55	
* mg/L as CaCO3									- 20.	Date re	viewed	:	201	12117
Sample Description	1:		187										10.15	V =
Comments:														

Hatch Start Date & Time: Client: Teck Coal Ine 15/2019 Sample ID: NIN Stop Date & Time: TUL 412019 Work Order #: NIA Test Species: Oncornynchus mykiss 13p Real State Shires Days 13 14 Concentration 15 16 17 8 ER-01 new old new old old new old new old old new old Temperature (°C) 4.0 14.0 145 143 142 145 140 140 14.0 14.0 13.5 9,9 9.9 9.8 DO (mg/L) 10.2 101 9:9 (00 101 1,0 10-1 0.01 Dis 8.0 39 K.2 79 pH 79 7.8 73 7.9 7.7 Cond. (µS/cm) 357 354 353 354 353 357 343 Initials cme 2 CMP 204 are w MIM Days Concentration 13 15 18 17 ER-OZ new old new old new new old old new new old new old Temperature (°C) 140 140 146 146 146 145 14.0 14.0 140 14-0 14.0 9,9 9.7 DO (mg/L) 10.2 9,9 98 100 10.0 100 hoi 10.0 10.1 (0.0) 8.0 7.9 20 pH 29 5,0 9 78 7.9 79 75 7.7 350 Cond. (µS/cm) 357 357 354 353 MM 357 343 Initials CMP w CMR sec/com/mor Days Concentration new old new old new old new old new old new old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration new old new old new old new old new old old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials 7-9 DO meter: 00-3 Thermometer: pH meter: et -3 Conductivity meter: cond-3 Control Analysts: CIME ALLO YYL Hardness* SOL OUP MM Alkalinity* Reviewed by: * mg/L as CaCO3 Date reviewed: 2019/12/17 Sample Description: Comments:

Client:	10	ck	Coal		Na	tch	Star	t Data	& Time:	Ku,	e 15	12010		
Sample ID:	10	NIV	0000			7.0	Star	Date	& Time:	0	5 475	1000	6	
Work Order #:		41(1				7.0	510	Date of	& Time: pecies:	3	128	1200	9	
Tronk Graci #.		10 114				-		rest S	pecies:	Uneon	iyaenus	mykiss	Keds	76
							De			-			211	whe
Concentration	1	9	2	2				iys	T -	-	1 2	4		
E(-0)	new	old	STATE STATE	540	2	and the same of	10 Ext 25 21	2	THE RESIDENCE	3	J. 100 J. 100	Garage Call		
Temperature (°C)	14.0/	1400	new	old	new	old	new	old	new	old	new	old	new	old
	101/				-							-		1
DO (mg/L)	7/9	78				-								
pH														
Cond. (µS/cm)	1/34											_		
Initials	Can	U												
		****		-						_	-			
_	12						1	ys	/					
Concentration	Contract of the		AUTO SALOR	.0	2	21	2	The second	2	3	2	4		
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0/	140			-									
DO (mg/L)	10.1/	9.9												
pH	79	7.8			/									
Cond. (µS/cm)	/34			/								332		
Initials &	Cr	nl												
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Concentration														
	new.	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)												- Old	,,,,,,	Old
DO (mg/L)											- 4	77.0		
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Temperature (°C)	11044	l ord	HOW	Ulu	11044	Old	new	Old	new	olu	new	old	new	old
DO (mg/L)							-					-		
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Cond. (µS/cm)									-	-				
Initials	<u> </u>			•										
Thermometer:	T-9	DO	meter:	D6-	3	pH	meter:	PH	-3	Cond	uctivity	meter:	cond	. 3
	Cor	ntrol					T			Analys	ts:	emi	P	
Hardness*										7)				
Alkalinity*]	Review	ved by:		SS	-
* mg/L as CaCO3					-								019/12	129
20 20 20 100														U
Sample Description:	:													5
_														
Comments:														

Embryo-Alevin Toxicity Test Daily Mortality

Client: Sample ID: Work Order #:	Tes	de (N/A N/A	Coop	>		St	op D	ate &	Time:	Jul Reds	4	126	.9		
Concentration	Rep				Day	of Te	st - N	o. of I	Morta	lities				Column Hills and States	Dead
		١	2	3	4	5	6	7	8	9	lo	(1)	12	Eggs/E	mbryos/ vins
Ee-01	1	9	9	-										188	
EQ-02	2	7	7				_						_	219	89
	3														
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ER-01 B	1			Q	Q	0	0	0	0	0	0	Ò	9		
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Tech Initials		EMP	one	Cml	Cins	BSC	BAL	A	ww	CMP	BC-	CME	694	-	
Comments:	<u> </u>	المددن	۷					10							
Reviewed by: Version 1.1 Issued Octo	ber 6, 20°	5	BS			(*)	Dat	te revi	ewed	:		2019 Na	11211	9 ovironmental	Company Inc

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Teck Come	Start Date & Time: June 15/2019	
Sample ID:	m/V	Stop Date & Time: Juin 4/2019	
Work Order #:	NIX	Test Species: Redside shiner	

Concentr	ation	Rep				Day	of Te	st - N	o. of I	/lortali	ities				Total Dead
			13	14	15	(Jo	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins
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Tech Initials		OHP	×	×	w	Cml	ane	and							
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											Na	utilus En	rronmen	tai Compar	y inc.

Embryo-Alevin-Fry Test Daily Hatch

	35
Client: Teck	Start Date & Time: June 15 (2019
Sample ID: N/A	Stop Date: 3014 4 12015
Work Order #: ₩\A	Test Species: Redside shiner

ID						Day o	f Test -	No. of	hatch					
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ER-OI	B	-	-	-	-	~	-	-	_	-	5	2	35	
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	D	_	~	_	-	-	-	. ~		35		8	22	
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Comments:		

Embryo-Alevin-Fry Test Daily Hatch

Client: Teck
Sample ID: N/A
Work Order #: D A

Start Date & Time:

Stop Date:

Test Species: Redside shiner

ID					Day o	f Test	No. of	hatch					
	13	Pi	15	16	17	18	19	20	21	22	2-3	24	Comments
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		+											
**													
		R B			CM								

Embryo-Alevin-Fry Test Daily Hatch Mortality

Client:	Teck
Sample ID:	N/A
Work Order #:	WIA

Start Date & Time: Included Stop Date: Toland 17019
Test Species: Redside shiner

1D E0-01 · B C				Day	of Test	- No. o	f Morta	lities (l	natch)				
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Embryo-Alevin-Fry Test Daily Hatch Mortality

Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: June 15/2019
Stop Date: Surg 4/2019
Test Species: Redside shiner

·ID					Day	of Test	- No. of	Mortal	lities (ha	atch)		MILE		
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Tech Initials	cm(A	N	m.	coup	0.00	BRL	-		-			

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					_	Sto	p Date &	& Time:	701	سررى	1201	٩
ork Order #: ハル Test Species: Oncorhynehus mykiss-												
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						Days						
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Init.	new	old	new	old	new	old	new	old	new	old	new	old
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/	10,0	9.9	10.2	10.0	10.1	9.9	5.01	10.1	10-1	100		100
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	0 Init. 12.0 1	NIA NIA	NIA NIA	Init. new old new 12.0 14.5 14.0 14	Teck Coal. Als NIA NIA NIA O 1	NIA NIA	Teck Coal Star	Start Date Stop Date Test Stop Dat	Start Date & Time: Stop Date & Time: Test Species:	Start Date & Timpe: 300	Start Date & Time: Stop Date & Time: Sto	Start Date & Time: Since Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date & Time: Stop Date Stop Da

Embryo 35 Teda Coal Start Date & Time: June 22/2019 Client: MIA Stop Date & Time: p Date & Time: Take 12/2019
Test Species: Oncorhynchus mykiss Sample ID: NIA Work Order #: Reasion shines ER-03 Days 0) 12 Concentration new old old new old new old new new old new old пеw old 145 14-0 14.0 140 145 140 146 147 14.0 14,0 14.0 Temperature (°C) 140 9,8 9,9 9.8 9.7 9.9 101 99 DO (mg/L) 100 9.5 10.1 10.1 79 78 7.9 7-9 7.6 177 pH HE ZEE WH 354 355 347 Cond. (µS/cm) 354 N Berloudour CMP Initials inu Cmp B(#7 ER-64 Days Concentration 7 10 old new old new old new old new old new new old new old 146 143 145 142 14.0 14.0 140 14-5 14-0 14.0 Temperature (°C) 140 98 9.8 9.8 99 1000 10-1 10.1 DO (mg/L) 9.8 (00) ial 100 1001 50 7.9 79 7.8 7.7 78 7.9 79 pH Mn 356 353 355 347 354 Cond. (µS/cm) Initials CMP Ber low hou (i wi ER-05 Days Concentration 8 9 10 old old old new old new new old new old new new old 146 14.5 14.0 14.0 14.0 Temperature (°C) 142 145 142 140 1400 14.0 98 9 8 10.1 10.0 98 9.8 DO (mg/L) 9/8 100 10.0 lost 10.6 50 831 79 78 29 75 178 7.7 79 77 pH 7ª 354 353 m 355 343 354 355 347 Cond. (µS/cm) nun Initials CMP agricultur Days Concentration new old new new old new old old new new old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials pH meter: pH - 7 Conductivity meter: Cond - 3 T. 9 DO meter: 50-3 Thermometer: AWD YYL CHIP Control Analysts: Hardness* Alkalinity* Reviewed by: Date reviewed: 2010112117 * mg/L as CaCO3 Sample Description: Comments:

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements

Embryo

Client: Start Date & Time: June 22/2019 Teck Come Sample ID: Stop Date & Time: Tolq 12 /200 Work Order #: MA Test Species: Redside shiner Concentration Days 13 15 17 16 ER-03 old new old new old пеж old old I new old new old 140 Temperature (°C) 14.0 150 14,2 145 14,0 14.0 14-0 DO (mg/L) 9.9 100 9.7 98 9,7 9.9 98 pH 7.8 78 7-8 27 7-8 539 Cond. (µS/cm) 347 348 8 Ex- Ben Initials OSL/ JHW/HH/GEL Concentration Days 13 14 15 17 18 16 ER-64 new old new old old new . old new old new old new old Temperature (°C) 14.0 14.0 100 140 145 14,2 14.1 14.0 9,6 DO (mg/L) 9.9 10.0 9.8 9.6 10/0 10.0 рН 7.8 7.6 28 78 77 8 7.8 Cond. (µS/cm) 335 353 347 Initials 58- /Jalu BPL/ 85 Concentration Days 13 15 18 ER-05 new old old new old new old new old new old new old Temperature (°C) 14.0 15.0 150 14,0 147 14.0/ 15 14.0 DO (mg/L) 9.9 10,0 918 9,7 10/0 9.9 7.8 7.6 pH 78 7.8 7.9 339 342 Cond. (µS/cm) 3 48 05 353 BSUJON Initials 800 Concentration Days new old new old old new new old old old new new new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Conductivity meter: Coul-? DO meter: pH meter: Control Analysts: BFL JMW AWD Hardness* Alkalinity* Reviewed by: * mg/L as CaCO3 Date reviewed: Sample Description: Comments: Version 1.1; Issued April 22, 2014

Client:		2ck	Coal						K Time:					
Sample ID:		NIN	_						¼ T/ime:					
Work Order #:		NIA			100			Test Sp	ecies:				المحمد	,
							Da	ys		355	ees in	X4_ 5~	7	_
Concentration	7	+	8		9		15		1		١ ,	2		
ER-03	new	old	пеw.	old	new	old	new	old	new	old	new	old .	new	old
Temperature (°C)	11011	/	11011	1	11011	1	The to	/	11010	/	11011	1	11011	Via
DO (mg/L)		/		/		/		/		/		/		
pH		/	- 1	1		/	1			/	7			
Cond. (µS/cm)		1		/	/	/	/		1	y	/			
Initials			1		/		/		1		/			
imaaro					/						/			1 212
					1.70		Da	ys						
Concentration	-	7		8		7		10		11	1)		
ER-04	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	1.01	1		-		0.4	11011	C	1104	/		14.10		Old
DO (mg/L)		/		/		/		/		/	10.1	10/0	L D	
pH		/		/		/		/		/	79	7/8		
Cond. (µS/cm)		/		1	7.4	/	/		/	/	34			
Initials			1./////////////////////////////////////				1		/					
muais	1 !		-								Cn	16		-
							Da	ıys						
Concentration		7	9	`	-	ጎ		S		10		12		
10-05	new	old	new	old	new	old	new	old	new	old	new	old		ald
Temperature (°C)	11011	7	11CW	Uiu	110.46	J	HEW	July /	14-0	Oid /	14.0	14.0	new	old
DO (mg/L)		/		/		/		/	10.1	/	101	1000		
pH	/	/		/		/		/	7-9	/	79	7.7		
Cond. (µS/cm)	/		1		1	/		/		+3	34			
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Concentration								.,5					-	
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	3.01			0.0	11011	Old	11010	Old	11010	Old	11044	Oid	TICW	Olu
DO (mg/L)														
pH														
Cond. (µS/cm)														
Initials	-						1							
					1									
Thermometer:	T-9	DO	meter:	200	-3	pH	meter:	PH	1	Cond	luctivity	meter:	Con	02-1
	Cor	ntrol							1	Analys	sts:	~~	cup	
										. mary		300		
Hardness*		====								Review	wed by:		SS	
Hardness* Alkalinity*														
									- 1				2/19/0	117

Embryo-Alevin-Fry Toxicity Test Water Quality Measurements

Hatch BR Client: Teds Coal Start Date & Time: June 22/2019 Sample ID: Stop Date & Time: July 12/2019 Work Order #: Test Species: Redside shiner Concentration Days 13 15 17 20 16 ER-03 new old new old new old пеж ola old new old old new new Temperature (°C) 15.0 14.0 14,0 145 140 14.5 7-1-1 W150 14.0 15.5 15.0 15.0 14,0 14.0 9.9 DO (mg/L) 9,7 98 98 97 10.1 10.2 10.0 9.9 (0.3 10.0 10.2 10.2 1.01 7.8 78 pH 7.8 7.8 76 7.8 8-0 7.8 7-8 7.4 79 339 Cond. (µS/cm) 347 350 354 350 348 354 353 BSL JIMW Initials 15/JUL/4H BCY Thu/Ma THUMM BR Concentration Days 15 14 16 17 18 20 ER-04 new old new old new old ola new old new old Temperature (°C) 14.0 14.D 145 19.3 142 14.0 14-0 1851514.0 15.0 14.5 15.0 14.0 14.0 14-9.7 DO (mg/L) 9.9 10.019.5 9.8 9,7 10.0 9-8 10.2 10.2 10.1 10.1 10.2 10-1 10-1 pH 7.8 7.4 9.8 28 77 7.9 8.0 7-8 7-8 7.9 8.1 7-8 Cond. (µS/cm) 339 347 348 353 350 350 351 350 Initials BOL /JHW JHW/HM STYJHU/ HA JAW/HH 32 Concentration Days 15 14 17 18 16 20 ER-05 نماء old old new new old new old old new 14.0 Temperature (°C) 4.0 150 140 140 145 14-0 1955-0740 14.5 K.0 15.0 14-1 9.9 10.0 9.7 9,6 DO (mg/L) 9-8 10.0 10.2 10.210.2 9.7 10.2 10.0 10.1 pH 7.8 7.8 7.8 75 7.8 8.0 7.9 8.0 23 8.0 7.5 339 347 Cond. (µS/cm) 348 350 35= 353 350 351 Initials GOL JAW BRUJHVIMM JHW/MH BF 50U Concentration Days new old new old new old new new old new new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Conductivity meter: _____ Coud - | pH meter: Ot - 1 DO meter: Analysts: BPL JAC /MM Control Hardness* Alkalinity* Reviewed by: SS * mg/L as CaCO3 Date reviewed: 2019 112119 Sample Description: Comments:

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Teck Coop	Start Date & Time: June 22/2019
Sample ID:	.NIV	Stop Date & Time: July 12/2019
Work Order #:	NIN	Test Species: Redside shiner

Concentration	Rep				Day	of Te	st - No	o. of I	Mortal	ities				Total I	
		1	2	3	4	5	6	7	8	9	10	11	12	Eggs/Em	
EL-03	1	0	D	0				٥	0		0	V	0	36=+22	364
ER-04	2	9	0	0				0	0				Ĭ	117	13
ER-05	3	•	U	0				5	0					544	168
	4				-										
ER-03 B	1				Ģ	6	Ø6	0	0	0	0	O	0		
	2						b		1	1	T				
ER-04 B	3						Ť				1				
C	4										1				
D	1										0				_
	2										T				
ER-05-B	3														
C	4									1	H				
D	1														
Ė	2					V	V	1	1	1	1	1	1		
	3				-	Y	-		-				-		
A. 412 F 114	4									-				-	C 10 T
	1												_		-
	2														<u> </u>
PARLED .	3												-		
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	1									-					
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	4								1	-			-	-	
	1								-				-		
	2														
	3								-		-				
-11111111	4									-					
Tech Initials	-	14/1	Cur	0.0		-			-		1		Cine		

	-														
	1														
	2													17 - 74	
	3														
	4									_			N		
Tech Initials		VYL	Coul	RRL	MIO	20	one	A-	~	1.24	040	d. c	Cone		100-1
Comments:															
Comments:															16
Comments:															10
Comments:															10

Embryo-Alevin Toxicity Test Daily Mortality

Client:	Te	ids (Coal			s	tart D	ate &	Time:	r T	ive	22/:	2019	
Sample ID: Work Order #:	Tean Coal N/A				_	top D	ate &	619						
G	_				Des	£ T.	-4 N			1141				
Concentration	Rep		_		T	/ OT 16	est - N	lo. of	viorta	lities			г	Total Dead Eggs/Embryos/
		13	14	15	1.5-	12	12	10	2-	- 1	22	22	201	Alevins

Concentration		Rep	Day of Test - No. of Mortalities											Total Dead	
			13	14	15	16	4	18	19	20	21	22	23	24	Eggs/Embryos/ Alevins
ER-03	B	1	1	0	0	200 J	10	-							
ER-04	B	2	0	(
	C	3	+												
	D	4			1.	1									
ER-05	B	1					_								
	C	2													
	D	3				1	36								
	Ĺ	4	1	1		الحا	20								
		1													
		2		11111											
		3													
		4													
		1													
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		3													
		4									1				(4)
		1													-
		2													
		3										1			
		4													
Tech Initial	S		300	0	2	Car	JHW		_						

Comments:	Odeveloped hit died			
Reviewed by:	SS	Date reviewed:	2019/12/19	
Version 1.1 Issued Octo	ober 6, 2015	Date reviewed:	Nautilus Environmental Compa	ny I

Embryo-Alevin-Fry Test Daily Hatch

Client:	Teck
Sample ID:	N/A
Work Order #:	NA

350	
Start Date & Time:	Jun 22/2019
Stop Date:	July 12/2019 "
Test Species:	Redside shiner

ID	Day of Test - No. of hatch												
	. 1	2	3	7	5	6	7	8	9	10	11	15	Comments
ER-03-B	-	_	1	-	_	-	-	_	-		-	_	
ER-04-B	-	_	~	-	-	-	_	-	-	-	-	42	
C	- 1	-	-	~	_	1	. —	-	~.	-	-	-	
D	-	_	-	-	_	_		-	-	_	-	53	
ER-05-B	-		-	-		-	_	-	-	-	3	33	
C	-	~	-	_	-	_	-	_	-	-	_	12	
D	~		_	_	_	_	_	-	-	-	-	13	
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	*												
ech Initials	-	-	Rr.	CMP	Ber	500	F	d	How	Conf	GMP	CMP	

Client:	Teck
Sample ID:	N/A
Work Order #:	\$ 1 IA

ID						Day o	f Test	- No. o	f hatch					
		13	14	15	16	17	18	19	20	21	22	23	24	Comments
R-03	В	5	0	Ö	0 -	101								
R-04	6	6	0	0	0 -									
	C	50				_		6			_	-		
	D	*33T	60	2	0						-			
R-05	B	13	-											
	C2	1235	0	1	0	-		-	+=	-		-		
	D	37	_	-			_	-		-			<u> </u>	
	E	36	0	D	0	_					-			
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		-												
Tech Initi	als	BAC	- 1	-0	BPC	BRL		-	_				-	-

e

Client:	Teck		
Sample ID:	N/A		
Work Order #:	N	A	_

Start Date & Time:

Stop Date:

Test Species: Redside shiner

, ID				Day	of Test	- No. o	f Mortal	lities (h	atch)				
	ł	.2	3	4	5	6	7	8	9	10	11	12	Comments
ER-03 B	1	-	_	-	-	^	_	_	^	-	_	_	
ER-04 B	-	_	_	_	-	^	-	-	-			-	
	7		-		_	^	_		_		-		
D	r)	-	-	1	-			_	~ .			-	
ER-05-B		^	-	1	1	^	_		-	_	6950	0	
С		-	^	-	-	-	1	_	-	-	_	,	
D.		_	^	-	-	,	•	_	-	_	-	-	
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T				-									
Tech Initials	0	-	001	60	B8-	BOL	A	~	M	OM	Chi?	CHP	
Comments:													

Client:	Teck	
Sample ID:	N/A	_
Work Order #:	MA	_

ID					Day	of Test	- No. o	f Morta	lities (h	atch)				
		13	14	15	16	17	18	19	20	21	22	23	24	Comments
ER-03	B	d-	6	0	O	Q	P	9					/	,
ER-04	B	₫-										/		
	_	-									1./			
	CI	-								1				
10-05-	3	0	0	0	0					/				
	_	-	i	1					/					
	Q	-							1					
	6	1		11		IT	1	1						
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						100			-					1
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2				2										
		8	1.2-77											
												-		
ech Initials		502	R	~	BRU	Bre		38-	_					

lient:	Tec	K Ce	al					t Date 8	1		u 25		
ample ID:	N	A				9		p Date 8		Juli	151	2019	
Vork Order #:	1	14						Test Sp	ecies:	Oncort	ynchus	mykiss	BU
										Red	side	Shire	
				,			Days						
Concentration	0	1		-	2		3	u	1	5			6
ER-66	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0	140	140	140	140	14.0	14.0	145	14,0	145	147	145	140
DO (mg/L)	1	10.2	10.0	1.01	100	10.2	10.0	9.7	9.8	9,9	9,3	120	101
pH		79	78	7.9	79	2.0	79	20	7.9	5.0		79	7.0
Cond. (µS/cm)	/	35		35	3	35	7	3	54	35	73	35	4
Initials	6°L	CN	16	CM		Cr	16		~		2	W	M
											1		
							Days						
Concentration	0		1	2	2		3		1	,	5		6
ER-07	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	140	140	14.0	14.0	140	14.5	140	14,5	142	14.5	140
DO (mg/L)	/	10.2	10.0	101	10.0	5.01	10.0	9.5	9,9	9.9	9.9	10,0	100
рН		79	78	7.9	7.9	8.0	79	40	2,9	6,0	7.9	79	7.8
Cond. (µS/cm)	/	35	1	35	3	35	7	3	54	3	55	34	54
Initials	BPL	C	nl	Cm	2	CM			3-		~		wi
							Days						
Concentration	6				2	3		4		5			
ER-08	init.	new	old	new old		new	old	new	old	new	old	new	old
Temperature (°C)	14.0	140	140	14.0	14.0	140	14.0	14.5	140	14,5	14,2	145	140
DO (mg/L)	1	10.7	1001	10.1	1.01	laz	10.1	9,9	98	9.9	9.8	10.0	100
pH		7,9	79	79	7,9	8,0	7.9	6.0	75	70	79	78	79
Cond. (µS/cm)	/	35	1	35	53	35	7	7	3-54	3	55	35	
Initials	500	C	ne	Ch	3,	CN	10		~		3-	w	
							Days						
Concentration	0		1		2_	1	>	2	1	5	5	1 - 15	6
ER-09	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	140	14.0	140	14.0	14.0	14.0	146	14,0	145	14.0		140
DO (mg/L)	1	102	1001	larl	10.0	10.2	10.1	9.9	9.8	3,9	9.9	(20	98
рН	1	7.9	78	79	7.8	8.0	7.9	8.0	7.9	60	7.9	79	7.3
Cond. (µS/cm)	1	39		35		35			354		55		54
Initials	68L	Çr		Ċw	rl	Can			4		~	w	
				n -	_								
hermometer:	Fq	DO	meter:	10	-3	pH	meter:	pH-	3	Cond	uctivity	meter:	COL
	Cor	itrol								Analys	ts:	BPL/C	MPI
Hardness*	/												
Alkalinity*	1									Review	ved by:	55	
mg/L as CaCO3			-								riewed:		111211
ample Description:													

lient:	_				Eml	عرك	Ctor	t Date 8	G**				
	11/	ecls C	cal			-			-		25/		^
ample ID: Vork Order #:		4			_	-	Stop	Date &	k I/me:	J. N	3 15	1201	1
vork Order #:	_ 14	A			_	-		Test Sp	ecies:				
			_	_			2000			12:0	d Sick	e Shi	her
200000000000000000000000000000000000000					-		Days				-		
Concentration	0	1			2		3		4	5	>	(0
ER-10	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	140	14-5	14.0	140	14.0	14.0	146	14,7	146	14,2	145	140
DO (mg/L)	/	10.7	10,0	ioil	ine	5.01	10.1	98	9,7	9.8	9.9	(20	99
pH	/	7.9	7.8	79	800	8.0	79	1,0	29	20	7.9	79	7.8
Cond. (µS/cm)	/	35	1	35	53	35	7	3	54	3	55	3	54
Initials	BIL		ne	Cau	8	Cm	9.	,	<u>~</u>		~		m
		-											
							Days						
Concentration	0		1	1	2		3		7	5	-		6
ER-11	init	new	old	new	old	100000	old	marri	old	9400-5-E-1	1000	Lance	
		14-0	140	_	14.0	new 14.0	_	new	14.0	new	old	new	old
Temperature (°C)	140	10-2	1	14.0		-	14,0	-		145		14.5	140
DO (mg/L)	/		10.0	10-1	10.5	2.01	100	9.8	98	9.8		10.0	98
pH	/	79	7.9	79	79	8.0	79	80	50	8,0		75	7.0
Cond. (µS/cm)	1	35		35		35		3	54	35	5	35	
Initials	3PL	Civ	16	Ch	26	CA	18		~	A	`	w	in
							Days						
Concentration	0		1	1 2	_	1	3		4	-	5		6
ER-12	init			new old		new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	140	140	14.0	14,0	14,0	14.5	14,0	146	14.0	14.5	140
DO (mg/L)	1	10.2	10.1	1.01	ioil	102	10.1	9,8	9,7	9.8	9.8	100	120
pH	129			7.9	7.9	8.0	79	h.0	40	20	7.8	75	,
	1771			35		35				~	55	- 1	7.0
Cond. (µS/cm)	1000	35							354		3 -	35	
Initials	BIL	C	N.E	CA	NC	1 4	20		~	10-		W	_
		_											
						_	Days	_					
Concentration	0		l .	2			3		4		5		6
ER-13	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	140	14.0	14.0	14.0	14,0	14.0	14.6	1410	14	14.0	14.5	14.0
DO (mg/L)	1	10.2	10.0	10.1	1.01	10.2	101	9.8	9.8	9.8	9.8	120	9.8
рН		7.9	7.9	79	7.9	80	7.8	3,0		6,0	7.8	7.8	7.9
Cond. (µS/cm)	/	35		35		35			354		355	35	
Initials	BR	Cn		Civ		C							_
hermometer:	70		meter	1	0-3		meter:	pt	1-3	Cond	uctivity	meter:	Cou
	Co	ntrol								Analys	its:	BPL/	MP/Y
Hardness*	/												
Alkalinity*	1/									Review	wed by:	50	
mg/L as CaCO3									-1			2010	
Sample Description	:												
Comments:													
Johnnends.													

Embryo-Alevin Freshwater Toxicity Test

Initial and Final Water Quality Measurements Empero Tech Coal. Client: Start Date & Time: June 25/2019 Stop Date & Time: Join 15 | 20, 1 Sample ID: NIA Work Order #: NIA Test Species: Oncorhynchus mykiss Ridside Shoner Days Concentration ER-14 init new old new old new old new old new old new | old 140 Temperature (°C) 140 114.0 14.0 140 145 145 14,0 145 140 14,0 10.2 1000 10.2 9.8 9,9 9.8 9.9 DO (mg/L) 1.01 hol 10.0 120 99 pH 29 79 7.9 8.0 79 79 80 80 79 78 351 Cond. (µS/cm) 353 357 355 354 Initials BEL PIMP CMP um Concentration init. new old new old new old new old new old new old Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. old new new old new old new old new old old new Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration init. new old new old new old new old new old new Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials pH meter: <u>pH-3</u> Conductivity meter: Loud-3 Thermometer: DO meter: Control BPL/CMP/YYL Analysts: Hardness* Alkalinity* Reviewed by:

Comments:

* mg/L as CaCO3

Sample Description:

2019/12/11

Date reviewed:

Sample ID: Work Order #: Concentration FN - O net Temperature (°C) 14.0 DO (mg/L) pH 7.0 Cond. (µS/cm) Initials	T ew O	old 4.0 0.0	new 14.0	old i5.0			Stop	t Date & Date & Test Sp	Time:	Oncorts Oncorts	ynchus Redsa	2019 mykiss		
Concentration File - Ob nee Temperature (°C) 14.(DO (mg/L) 10.(pH 7.0 Cond. (µS/cm) Initials (7 0 11 9 7 353	old 4.0 0.0	14.0	old						Oncorh	ynchus.	mykiss-		
Concentration FR - O o ner Temperature (°C) 14.1 DO (mg/L) 10.1 pH 7.0 Cond. (µS/cm) 3 Initials (7 0 11 1 1 9 3 353	4.0	14.0	old		-	_	rescop	coics.					
Temperature (°C) 14.1 DO (mg/L) 10.1 pH 7.0 Cond. (µS/cm) 3 Initials (0 11 1 1 9 7 353	4.0	14.0	old			-					· cl		
Temperature (°C) 14.1 DO (mg/L) 10.1 pH 7.0 Cond. (µS/cm) 3 Initials (0 11 1 1 9 7 353	4.0	14.0	old			1.15	ays				5717.44		
Temperature (°C) 14.1 DO (mg/L) 10.1 pH 7.0 Cond. (µS/cm) 3 Initials (0 11 1 1 9 7 353	4.0	14.0	old		3	T	0	11		1	2		
Temperature (°C) 14.(DO (mg/L) 10.1 pH 7.0 Cond. (µS/cm) Initials (Concentration	0 11 1 1 9 7 353	4.0	14.0			1					100000			
DO (mg/L) pH 7.0 Cond. (µS/cm) Initials (Concentration	353	7.8	10-1		new [4-0	old	new	15.0	new	old (4/2	new	old	new	old
pH 7.0 Cond. (µS/cm) Initials (Concentration	9 7 353	7.8		9.4	-		14.0	-	15,3		145			
Cond. (µS/cm) Initials (Concentration	353	5		7.7	101	10.0	9.9	9.8		9.3	9.8	9.6		
Initials (7-9		79	78	7.8	7.7	7.8	7.8	7.8	7.7		
Concentration	CWX	,	Ku 34		3:			39	34	17	3	t8		
			wer/	core /wo	a C	ul	B81/	THE	0		1			
	7						Da	ays						
(A)	7		3			1	17		1	1	1	2		
EC-07 ner	_	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C) 14,3		40	14.0	14.0	14.0	14.0	14.0	15.0	150	14,2	145	150		
DO (mg/L) 10.	1 1	10.0	10.1	9.9	101	10.0	9.9	9.9	9,8	9.5	9.8	97		
pH 7.6	9 :	7.9	79	7:07.7	79	78	7.8	7.6	28	77	78	ふぞ		
	353	,	7H 35	4343	34	1	3	39		47	3	48		
Initials	Cms	?	BSUlci	uchuny			82-1			1	1			
							Da	ays						
Concentration	7		8 9			9	10		111		1	7		
ER-08 ne	NIN	old	new	old	new old		new old				l new old		-	ald
Temperature (°C) 14.0		4.0	14-0	15.0	140	14.0	14.0	15.0	15/2	14,0	145	14,0	new	old
DO (mg/L) iou	-	10.0	10-1	10,0	10.1	10.0		10.0		1.12				
pH 70		7.9				10.0			9.1	98	9,5	9 4		
		1.1	7.9	1 1	76		9.9	,	7.8	9.8	9.8	9.8		
Cond. (US/Cm)			2	7.7	79	78	7.8	7.7	28	7.8	7.8	27		
	353		347	3	34	78	7.8	7.7	28	78	7.8			
	Cm				34	78	7.8	7.7	28	7.8	7.8	27		
				3	34	78	7.8 3:	7.7 5000	28	78	7.1	27		
Initials	Cml	9	apulo	3 supleme	34°	78	7.8 3: 86/2	7.7 59 5000	78	78 147	7.1 3	77 48		
Concentration	Cml 7	9	8	3 simplimin	34' C1	78	7.8 3: 86/2 Da	7.7	78	7.8	3	77 48		
Concentration £ (2 - 09 ne	Cml 7	old	8 new	old	34'C	7.8 NP	7.8 3: 86/2 Da 1 C	7.7	7-8	7.8 247	7./ 3	An ye old	пеж	old
Concentration ER-09 ne Temperature (°C) 14.6	Cml 7	old 4.0	8 new 14-6	old 15-0	9 new	7.8 NP Old	7.8 3: 86/2 Da 10 new	7.7	78 new 15:2	7.8 347 ~ old 140	7.8 3 ~ 12 new	77 48 old 142	леш	old
Concentration ER-09 ne Temperature (°C) 14.6	7 = W 0 1 1 1	eld 4.0	8 new 14-6	old 15-0	9 new 14.0	7.8 1 v(? old 14.5 9.9	7.8 3:86/2 Da 1 C new 14.0	7.7	ア が new 15:2 7 i を	78 347 ~ old 140 9,8	7.8 3 new 145	37 48 old 142 9.6	леш	old
Concentration E(2-09 ne Temperature (°C) 14.0 DO (mg/L) 10.1 pH 7.0	7 0 1 1 1	eld 4.0	8 new 14-6	old 15:0 9.9 7.7	9 new 14.0	78 1 48 0ld 14.0 9 9	7.8 3; 8542 10 new 14.0 9.9	7.7 59 5000 15.0 10.0 7.6	new 15.2 9.6 7.8	78 247 ~ old 140 9,8	7.8 3 new 145 98 7.8	3.7 48 0ld 142 9.6 7.7	new	old
Concentration \[\big(\cdot	7 = W 0 1 1 1	e old 4.0	8 new 14-6 10-1 7-4	old 15-0	9 new 14.0	78 1 48 0ld 14.0 9 9	7.8 3; 86/2 new 14.0 9.9 7.8	7.7	new 15.2 9.6 7.8	78 347 ~ old 140 9,8	7.8 3 new 145	3.7 48 0ld 142 9.6 7.7	new	old

Client: Sample ID:	(ee	K (bal		Embs		Sta	rt Date	چرد & Time:	Sun	e 25	/19		
Work Order #:	N	14					Sto	p Date &	& Time: pecies:	- Soncort	ynchus	mykiss	-00	
											dside			
							D	ays						
Concentration	_	+	è		(Ĩ	1	C	1	1	1	2		
ER-10	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	14.0	15-0	140	14-0	14.0	15.0	15,0	14,2	145	140		
DO (mg/L)	10.1	10.0	10.1	9-8	1001	9,9	9.9	9.9	9.8	9,7	19.8	97		1
pH	7.9	7.9	7.9	7.7	31	7.8	7-8	7.6	78	78.	78	73		
Cond. (µS/cm)	35	3	30	13	31	17	3	39	_	47		48		
Initials	Ca	90	200 /c	ine/via	di	18	188-15			2	A			
							-							
Concentration	-	7	1 8)	1	7	1	ays	11	_	\ '	2		
ER-11	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	140	140	14-0	14.0	14.0	14.0	14.0	14.0	1500	14,5	1345	142	116.W	Old
DO (mg/L)	101	10.0	10-1	9.8	io.l	100	9.9	9.9	9.8	9,9	9.8	9.8		
рН	79	7.3	7.5	7.7	7.9	78	7.8	7.6	28	7.8	78	76		
Cond. (µS/cm)	35		34		34	7		39				48		
Initials	60								3	47		78		
mudio		Civer		localcondina Cm			55-/ Thin			in				
			,				Da	ays						
Concentration	_ =	7		3	9	9		10			12			
ER-12	new	blo	new	old	new	old	new old		new	old	new	old	new	old
Temperature (°C)	14,0	14.0	14-0	14,0	[40	14.0	14-0	14.0	5.0	147	145	14,0		
DO (mg/L)	10:1	10-0	10-1	9.3	10.1	10.0	9.9	9.9	918	917	9,8	9.8		
pH	7.9	78	7-4	7.7	7,9	78	7-8	7.6	7.8	78	7.8	3.7		
Cond. (µS/cm)	35	3	34	3	34	7	3	35		47		48		
Initials	Ca	28	lepla	plan	C	ne	85-/	Thick		p	A			
							-							
Concentration	-	7	1 8	3	9		t	ays o	1		, ,	7		
FR-13	new	old	new	old	new	old	new	old	new	old		old	mater	ald
Temperature (°C)	14.0	14.0	14-0	14.0	14.0	14.0	14.0	14.0	1570	140	14/S	140	new	old
DO (mg/L)		10-0	10-1	9.9	101	10.0		9.9	9.8	9.6	9-8			
рН	79	78	7-9	7.7	79	78		7.6	28	7.8		2.3		
Cond. (µS/cm)	35			3	34			39		47	28	48		
Initials	Ċn							JALE	3		3	10		
	J-9		meter:	Do-				pH(-3	Condi	uctivity	meter:	Card	-3
	Cor	trol	17							Analys	ts:	BPZ/CHO	1441	אנן אא
Hardness*	/													
Alkalinity*	6									Review	ved by:		55	
* mg/L as CaCO3										ate rev	riewed:	201	9/12	11
Sample Description: Comments:														

Nork Order #: N A Test Species:	client:	ADDIT!	JA	eck	Coal		emba	Star		Time:		225			
Days	Vork Order #:										Oncorh	ynchus	mykiss	CP	
Concentration Fig. Part								Da	vs		nea	side >	hher		
Temperature (°C)	Concentration	7	-	8			9			1	1	1.	2		
Temperature (°C)		new	old	1000000		new	old	100000	-2 -2 -2	new	old	new	old	new	old
DO (mg/L) Do	Temperature (°C)	14.0	14.0	14-0	14.0	140	140	14.0	14.0	150	14,2	145	147		
Days Days		10,1		10-1	9.8	10,1	9.9	9.9	9.8	918	9.8	918	9.7		
Initials Concentration Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Cond. (µS/cm) Initials Thermometer: Control Hardness* Alkalinity* Alkalinity* Alkalinity* Conceitration Temperature (°C) DO (mg/L) Analysts: BA/WA) YYL/ RM Reviewed by: SS		7.9	7.9	7.9	7.7	79	22	7.8	7.6	78	78	7.8	77.		
Initials Concentration Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Cond. (µS/cm) Initials Thermometer: Control Hardness* Alkalinity* Alkalinity* Alkalinity* Conceitration Temperature (°C) DO (mg/L) Analysts: BA/WA) YYL/ RM Reviewed by: SS	Cond. (µS/cm)	35	3	34	3	34	7	3:	39		342	3	4889		
Concentration New old		Ċr	NS					35-1	shu	A	_	100000			
Concentration new old								De					_		
New old New	Concentration							De	iys						
DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Days Concentration Days Concentration Days Cond. (µS/cm) Initials Days Concentration Days Concentration Days Cond. (µS/cm) Initials Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration Days Concentration PH Cond. (µS/cm) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Ph Cond. (µS/cm) Initials Days Concentration Reviewed by: SS	oonoona aaon	new	old	new	old	new	old	new	old	new	old	new	old	new	old
DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Days Concentration Days Concentration Days Cond. (µS/cm) Initials Days Concentration Days Concentration Days Cond. (µS/cm) Initials Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration Days Concentration PH Cond. (µS/cm) Initials Days Concentration PH Cond. (µS/cm) Initials Days Concentration Reviewed by: SS	Temperature (°C)														
Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: Control Hardness* Alkalinity* Analysts: \$\(\text{QA} \) \(\text{QA} \) \(\te	The state of the s														
Days Concentration new old n															
Days Concentration new old n	Cond. (µS/cm)														
Concentration new old										-					
Concentration new old															
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration new old								Da	ays						
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration new old	Concentration		1								-		Towns and		
DO (mg/L) pH Cond. (µS/cm) Initials Days Concentration new old new		new	old	new	old	new	old	new	old	new	old	new	old	new	old
Days Concentration new old															
Concentration Days	DO (mg/L)	1									12				
Days															
Concentration new old new ol	Cond. (µS/cm)														
Concentration new old	Initials														
Concentration new old															
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Control Hardness* Alkalinity* New old new								Da	ays					1	-Y-
Temperature (°C) DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: PH = 3 Conductivity meter: CBNC Control Hardness* Alkalinity* Reviewed by: SS	Concentration		1		1									No.	
DO (mg/L) pH Cond. (µS/cm) Initials Thermometer: PH = 3 Conductivity meter: CBUC Control Hardness* Alkalinity* Reviewed by: SS		new	old	new	old	new	old	new	old	new	old	new	old	new	old
PH Cond. (µS/cm) Initials Thermometer: PH = 3 Conductivity meter: Cend Control Analysts: BPL/CHP/ YYL/HM Hardness* Alkalinity* Reviewed by: SS		-					-								
Cond. (µS/cm) Initials Pharmometer: Pharmom				-			-								
Initials Thermometer: DO -3 pH meter: DH - 3 Conductivity meter: CBNC Control Analysts: BPL/MP/YYL/HM Hardness* Alkalinity* Reviewed by: SS	The state of the s														
Thermometer: DO meter: DO -3 pH meter: PH - 3 Conductivity meter: CBULL Hardness* Alkalinity* Tometer: DO -3 pH meter: PH - 3 Conductivity meter: CBULL HARDNESS* Reviewed by: SS				-	_	-		-		-				-	
Thermometer: DO meter: DO - 3 pH meter: DH - 3 Conductivity meter: CBNC Control Analysts: BPL/CMP/ YYL / HM Hardness* Alkalinity* Reviewed by: SS	initials	-		1							_			_	_
Hardness* Alkalinity* Reviewed by: SS	Thermometer:	T-1	10 DC) meter	:_De	5-3	_ pl	d meter:	pt	1-3	Cond				
Hardness* Alkalinity* Reviewed by: SS	- F	Co	ntrol					1			Analys	sts:	BALLO	10/441	HH /J
		/				1									
* mg/L as CaCO3 Date reviewed: 2010 12(11		1/											_		
	* mg/L as CaCO3	V									Date re	viewed	2	019/12	111
Sample Description:	Cample Description														

Client:							Star	t Date &	L Time:	Jun	2 25	12019		
Sample ID:							Stop	Date 8	& Time:	101	315	3011		
Work Order #:	NI	+						Test Sp	ecies:	Redside	e shinei			
	_													2
Concentration	1/	2		-		_		lys						
50 1	1	-	1	District Co.	-	5	16	>	1	7	+	8		
ER-06	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	5. F. S.	-										
DO (mg/L)	10.0		10.2	10.2										
pH	7.8	7-8	8.0	7.9										
Cond. (µS/cm)	3	53	35			/								
Initials	6	su d	さんなれん	144	/								0	
					/									
Concentration							Da	iys						
	1	3	1	4	1	5	1		13	-	1	8		
ER-07	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	15.90	15-9		15.0								-
DO (mg/L)	10.0		10.2	10.2	10/1	10.2								
рН	7.8	3.€	8.0	8.0	B.1	8.1								
Cond. (µS/cm)		53	35	1.	350									
Initials	6p		RCZ/JM	_	John		/							
madio	912		de vori			100								
Concentration	-						Da	ıys						
Concentration	1	3	1	J	1	5	11		1	7	1	8		
ER-08	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0			[4.0	15.0/									
DO (mg/L)	10.0		10.2	10.3	10.1	10.3								
рН	7.8	7.8	8.0	7.9	8.1	8.1								
Cond. (µS/cm)		53		50	35	0								
Initials	Bac	-	BOUTH		1 JH	10/414	/							
midais	040		p- 10 ··	-/	1	1190	*							
Concentration							D	ays						
Concentration	1	3	1	1	1			\(\sigma\)	1	7- 1		18	1	
ER-09	new	old	new	old	new	old	new	old	пеж	old	new	old	new	old
Temperature (°C)			Hew	Olu	Hew	Olu	Hew	Oid	Hevy	Olu/	new	Olu	new	Olu
	14.0		-		-					/				
DO (mg/L)	10.0	_	1	-	-	-								
pH	7.8						-							
Cond. (µS/cm)		53	-										-	
Initials	GPL													
124.000	D	1-B		- 22		4	-12			100		6-	10	
DO meter:	100			_ pl	l meter:	PII	.)		Cond	uctivity	meter:	_Cle	id-3	
	-	1	1		T		1		1			00	D 11.	
Handneso*	Co	ntrol	-				-		-	Ar	alysts:	1200	SHK	MM
Hardness* Alkalinity*	/								1	Devis	and b		00	_
* mg/L as CaCO3	/								1			_		2110
myre as Cacos										Date rel	rewed:		2019/1	2119
Sample Desc	ription													
oumpie best	p.aoit.													

Sample ID: Work Order #:							Stop	Date 8	Time:	20	1215	12010	7	
Work Order #.	- P	4						rest Sp	ecies:	Reasia	e sninei			_
Concentration							Da	ıys						
	U	3	1	1	1	5	- (6	1	7	1	8 .		
ER-10	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	15. 15 m	14.0	15.0	14.5								_
DO (mg/L)	10.0	9.8	19.2	10.3	10.1	10.2								
pH	7.8	7-8	8-9	7.9	81	8.1				/				
Cond. (µS/cm)	35	53	35		35	0								
Initials	BEL!		984/JH	/HM	JU	wayon	/							
Concentration							Da	ays					-	-
	7	3	1	4	1	5	11		()		1	8	Г	
ER-11	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	15.5 m			Ciu	il ou	Jiu	HOW	old	new _	Ju	us m	Jid
DO (mg/L)	10.0	9.9		10.3										
pH	7.8	7.9	8.0	7-8										
Cond. (µS/cm)		53	350											
Initials	304	-	RYTHU											
Concentration							Da	ays						
	1.	3	1	4	1	5		6	1	7	1	8		
ER-12	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-6	14.0	15:50	15.0	15.0	14.5								
DO (mg/L)	10.0	9.9	10.2	[0.3	10.1	10.2								
рН	78	7-9	8-9	8.0	81	8-1								
Cond. (µS/cm)	-	353	3:		35			/						
Initials	Bil		おいかりゃ	-/ MM	Duly	/apr	/							
Commention														
Concentration	1	7	1	4	1	_		ays 6		1	1	0		
ER-13	-	old				old		old		old		old	new	ald
Temperature (°C)			new	olu	Hew	Old	Hew	Olu	Hew	olu	HEW	Olu	new	Old
DO (mg/L)	14.0	,												
pH	10.0	7.8	-				-							
Cond. (µS/cm)		53							-	_				
Initials	pry	5)			-	_								
illiduio	11-44				1	1	1 1						1	1
DO meter:	17	9-3	-	pl-	l meter:	: pt	1-3		Cond	uctivity	meter:	Co	ud-	3
	Co	ntrol								A	nalysts	BRL	IMW	IMA
Hardness*														
Alkalinity*										Revie	wed by:		SS	
mg/L as CaCO3									1	Date re	viewed	20	0191121	19
102011012														
	ription													

Emb:10

Client: Sample ID:	Tec	_	,						& Time: & Time:	170	12 13 15 15 15 15 15 15 15 15 15 15 15 15 15	= /20	plog	
Work Order #:				14						Redsid	e shiner	120(0		
Concentration				÷ -			Da	ıys						
	. 1	3	1	4	1	5		6	1	(7	18	3		
ER-14	new	old	new	old	new	old	new	old	new	old	new	old	new	olo
Temperature (°C)	14.0	14.0	2100	150										
DO (mg/L)	10.0	9,8	10.2	10.2						100				
pH	7.8	7-9	8.9	80										
Cond. (µS/cm)	3	53	35	0									i i	
Initials	684	5	8-13H1	-/HM										
			4/5											
Concentration							Da	lys						
	l à		3.5											
	new	old-	new	old	new	old	new	old	new	old	new	old	new	olo
Temperature (°C)			127					0.0		0,0	11011	Old	ALC VI	Oit
DO (mg/L)			1											
- pH						71-71								
Cond. (µS/cm)								-			1			-
Initials					1							-		
muuis			1								- 11 - 12 - 11		-	
Concentration			*	_			Do	140		-				
Concentiation							Da	iys						
	new	old	HAVA	old		old		old	r/edeks	E IV.	SILESSEN !	TO THE		
Temperature (°C)	HOAR	Old	new	old	new	olu	new	olu	new	old	new	old	new	old
DO (mg/L)			-			4					-	-		
pH					-	-					-			
Cond. (µS/cm)									-	-		-		
Initials											-			-
Concentration							Da	iys						
		-									7			
	new	old	new,	old	new	old	new	old	new	old	new	old	new	olo
Temperature (°C)														
DO (mg/L)			1 2										0	
pH														
Cond. (µS/cm)														
Initials			1.					-			-			
DO meter:		0-3		pH	meter:	pt	1-3	7	Cond	uctivity	meter:	Co	ud-	3
	Cor	ntrol	10000							Ar	alysts:	BRL	JMU	120
Hardness*										_			0.5	
Alkalinity* mg/L as CaCO3]		ved by: viewed:			19
Sample Desc	ription:		<u>.</u>					1						

lient:	16	144	Coal					t Date 8					
ample ID:	- 1	VIA						Date 8					
/ork Order #:	7	14						Test Sp	ecies:				
5 7										,	Lodsi	le sh	mes
200000000000000000000000000000000000000		-					Days						
Concentration	Emberou	E813-WG-6	+	5	3	9		-	(0	1	1	13	III ALICENTO
ER-06	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			/	14-0	-/	14.0	/	14-0	/	153	14.0	1333	142
DO (mg/L)			/	10.1	/	10.1	/	9.9	/	9,8	917	9,8	9.6
pН			/	7.9	1	79/		7.8	/	7.8		7.8	7,7
Cond. (µS/cm)		/		237	3	34		33		34	7	34	8
Initials			Ġ	P SKY	come	/Ciu	.C	BC	<u>_</u>	B		~	
		(/									
							Days						
Concentration		7	-		8	9		11	0	1			12
ER-07	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)				14-0	/		/	14.0	/	150	140	145	140
DO (mg/L)			/	10-1	/		/	9.9	/	9,8		9.8	9.8
рН			/	79	/		/	7.8.	1	7.8	7.8	78	7.7
Cond. (µS/cm)			1	1	+3	/	/	3:	379	3	47	34.	8
Initials			30	Ba	long	/		156	2	. ,	~	1	
			- 1	/		,							
	11						Days	0					
Concentration		2	+	5	5	0			[0]	1	1		15
ER-08	init.	new	old	new	old	new	old	new	old	new	old	new	old
emperature (°C)			1	14-0	1		1	14.0	1	1570	140	145	14.3
DO (mg/L)			/	10.1	/		/	9.9	1	9.8	9,7	9.8	9.7
pH		1		7-9	1	/		7-8	1	7-8	7.8	7.8	7.3
Cond. (µS/cm)		/	C	- 3×	13	1			39		47		48
Initials		/	10	Be		/		81					-
				100		1		3,7	-		~	,	
							Days						
Concentration		7		8		0			0		1		2
ER-09	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			1	سيدا	1		1	14.0	/	15-2		145	
DO (mg/L)			15	-	/		/	9.9	1	9.8	9.7	78	9.7
pH			/	7			/	7.8	/	7-8	7.8		7,7
Cond. (µS/cm)		/	,	1		/		33	-		47		48
Initials		/		/		/		BOL					
						/		1 128.0	_		n-		8
nermometer:	T-9	DO	meter:	10-	3	рН	meter:	pH-	3	Cond	uctivity	meter:	COL
								1					
	Co	ntrol								Analys	ts:	BPL	Au.
Hardness*										-			
Alkalinity*										Review	ved by:	5	S
mg/L as CaCO3									- 1	Date rev			
		1											
sample Description:													

Client:	_				Ma	+01		t Doto	Ba				
Sample ID:	- 16	A CAL	000			-	Star	t Date 8	i lime:	Noti	2 2 3 1	2019	
Vork Order #:		NA		_				p Date &					
vork Order #:	-	NIA						Test Sp	ecies:				
1 1				-						Real	side	Shin	4
1277							Days	-					
Concentration	-	. 7	10100000	«	all and the latest	9		1		1		(2
ER-10	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			1	14-0	/	14,0	14-0	140	15.0	100	14,2	14.5	142
DO (mg/L)			/	10.1	/	10.1	100	9.9	9.9	98	9.8	9,8	9,3
pH			/	7:9	/	31	28	7.8	7.4	7.8	7-8	7.5	27
Cond. (µS/cm)		/		3-	+3	34	7	2	399	3	142	34	8
Initials		/		30	Meno	C	2	58c 1	The	A		4	
						-10	Days						
Concentration		7			8-		7		0		16		12
ER-11	init.	new	old	new	old	new	old	new	old	new	old	mour	old
Temperature (°C)	Hitti	HON	/	14-0	Jiu /	14.6	140	14.0				new 14%	
DO (mg/L)			/	10.1	/	-			50	150			14.2
			/	-	/	10-1	100	9-9	9.9	9,8	9,7	9.8	9.1
pH			/	7.9	/	79	78	7.8		3.8	7.48	28	7-8
Cond. (µS/cm)		/			3	34		-	59	3	47	38	f
Initials		/		50	-/cons	Co	NP	BSL/J	Nie	1	-	A	
		l											
Water Control of the							Days						
Concentration		7	-		3	9	L	ı	0	1	\		5
ER-12	init.	new	old	new	old	new	old	new	old	new	old	пеж	old
Temperature (°C)	-		/	14-0	/	14.0	14.2	14.0	15.0	190	14,2	1570	14.0
DO (mg/L)			/	10.1	/	Tal	99	9.9	99	9.8	4.7	9.8	9.7
pH			/	7.9	1	79	7.8	7.8	7.4	2.8	78	28	2,7
Cond. (µS/cm)			/	30	+3	34	1		39		347		8
Initials					· Ling	Cir		BRUT			9-		
		1		12.00	100 4		11		10 -5	-	ñ		
Concentration		7					Days						
Concentration EQ-(3	1.16	NAME OF TAXABLE PARTY.	-	BELLEVILLE		9	1	C. 2-7- I	0	1			(5
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			/	14-0	/	140	14.0		15.0		140	145	
DO (mg/L)		15	/	10.1	/	1.0	9.9	9.9	4.9	9,8	9.6	9.8	9,8
pH			/	79	1	79	79	7.8	7.3	28	78	20	7.7
Cond. (µS/cm)		/	/		43	34	7	33	9	3	++	34	1
Initials		/		BR	long	Cr	nl	3847	Her		-	~	
hermometer:	T-9	/	meter:	136.	3	рН	meter:	ple	-3	Cond	uctivity	meter:	Cou
11.	Cor	ntrol								Analys	ts:	Ba	mo
Hardness*	/											JM	
Alkalinity*	/							T _e		Review	ved by:	8	
mg/L as CaCO3									I	Date rev	riewed:	20	9112
Sample Description													
Comments:													

Concentration CONCENTRATION CONCENTRATION CONCENTRATION CONCENTRATION CONCENTRATION DO (mg/L) pH Cond. (µS/cm) Initials	init.	new new	7 old					Test Sp	Time:			120	19
Concentration と(こー) イ Temperature (°C) DO (mg/L) pH Cond. (µS/cm)			-					Test Sp	ecies:-				
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	Charles and the	-			_							
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	Charles and the	-	,			-			Red	lside	2 3/2	ment
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	Charles and the	-		ર્જ		Days				C		
Temperature (°C) DO (mg/L) pH Cond. (µS/cm)	init.	new	old	C10000000		9	-		0		-	12	10000
DO (mg/L) pH Cond. (µS/cm)			-	new	old	new	old	new	old	new	old	new	old
pH Cond. (μS/cm)			/	14.0	/	14.0	14,0		15.0	1500	140	145	142
Cond. (µS/cm)			/	1.0]	/	10.1	10.0		9.8	98	9:7	98	9,7
			/	7-9	/	79	78.	7.8	7.4	7.8	2.8	7.8	7-7
Initiala		/		134	3	34	1	32		345	7	31	8
IIIIIIIII		/		60	King	C	ne	69	ことは	4	_	A	
		, .							CIL				
							Days						
Concentration													
	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)					Jiu	1,010	Jiu	11011	Olu	11011	olu	IIC W	Jid
DO (mg/L)						-					-		
pH						-							
Cond. (µS/cm)													
Initials								1					
initials				-					1				
								- 2					
-							Days						
Concentration	- TOP 10-A												
-	init.	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)													
DO (mg/L)													422
pH													
Cond. (µS/cm)													
Initials								1.					
												15	
							Days						
Concentration							Days	*					
	init.	new	old	new	old	new	old	new	old	menu	ald	and the same	e la
Temperature (°C)		11011	Olu	TICVY	Olu	HEW	olu	Hew	olu	new	old	new	old
DO (mg/L)			-								-		
pH											_		
UII													
								-					
Cond. (µS/cm)													

Sample ID:		_		. •				p Date 8	/	7	1 2 m	5 120		
Work Order #:	NI	A						Test Sp	ecies:	Redsid	le shine	r		
Concentration							Da	ays						- 1
	- 1	3	į.	4	1	5	16	3	1	7	10	8.	i	9
ER-06	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14-0	13-760	140	15.0	14.5	15.0	14:5	14-0	14.0	14.5	140	i5.0	10.0
DO (mg/L)	10.0	9.9	10.2	10.2		10.0	10.2	10.1	10.0	10.1	9.9	lal	9.9	10.0
рН	7-5	7.8	6.0	8.0	8.1	8.0	7.9	8.0	7.8	78	7.7	28	8.0	8,0
Cond. (µS/cm)		53	35		350		35		3,	49	34	19	: 34	6.
Initials	814	-	かくひとし	hn	Situ	YHUY	JALO	IMM	SQ	L	W	m	N	19
Concentration					1	_		ays						
FO 07	1	V	i.	-	No.	5	The second	6	F-20005-V007	7-		8	1	9
ER-07	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0		15.5-15.		15.0	14.0	15.0	14.0	14.0	14.0	142	14.0	15.0	15:0
DO (mg/L)	10.0	9.9	10.2	10.2	10.1	10.2	10.2	10.2	10.0	10.1	9.9	lai	9.9	10.0
pН	4.8	3.8	8.0	7.4	8.1	7.9	7.9	8.0	3.8	7.8	9577		8.0	5.5
Cond. (µS/cm)		53	35		350	- 10	351		34	9		19.	3	46
Initials	884	£	インスト	/HH	THE	1/44	JAW	144	B	20	W	w	M	4
Concentration							De					•		
Concentiation	1	3	1	1	1	5	1	l.	1	7	1	7	19	
ER-08	100000	555			new	old	new	old	new	old	The state of the s	old	100000	
Temperature (°C)		4.0 14.0 95-915014.0			15.0	14.0	15.0	140	14.0		new 14	(40	new 15,5	old 150
DO (mg/L)	10.0	9.8	10.2	10.1	10.1	10.1	6.2	10.0	10.0	10.1	9.9	101	9.9	[0.0]
pH	7.8	7-8	3.0	7.9	8.1	7.9	7.9	8.0	7.8		27	78	8.0	8.0
Cond. (µS/cm)		353	350		350		35-1	0.0		49	34			46
Initials	BELL	22.7	シケル				Jua/	luna		ip.		w		
illudis	10101		7/5/	-	JIM	1000	1-1900/	70-1		Are	l w	00	1	nq
Concentration							Da	ays		-1				
	1	3	115	٩	1	5		6	1	7	1	8	16	1
ER-09	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14-0	75.515	14.0	15.0	14.0	15.0	14.0	14.0	140	14.	140	15.0	15.0
DO (mg/L)	10.0	9.8	10.5	0.0	10.1	10.3	10.2	10.2	10.0	10.1	9.9	100	9.9	10.0
· pH	3.5	7,8	8-0	7.9	8.1	7.9	7.9	8.0	7.8		77	7,8	8.0	8.0
Cond. (µS/cm)	2	53	, 35	0	357		35		7	49	3.	-		46
Initials	BELI	- 0	シノブサレ	/MM	TH	influit	SALL	0/1414	F	500	Vin		_	M
DO meter:		-35	- Ju		meter:	-1	otl-	35			meter:	CEC /CMP/	1d-3	ST
	Con	ntrol								A	nalysts:			-101-1
Hardness* Alkalinity*	/				-			5		Davis	und boo		CC	
mg/L as CaCO3	-		1					-			wed by:		SS	0
myrL as Cacos	1									Jale re	viewed:		19/12/1	7

Client: Eck
Sample ID: N/A
Work Order #: N/A

Start Date & Time: July 25/2019
Stop Date & Time: July 15 /2019
Test Species: Redside shiner

Concentration							D	ays						
_	Ĺ	3	1	4	1	5	t	6	1	+	1	8	1	9
ER-10	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0	14.0	15-515-7	[5,0	15.0	14.0	15.0	14.5	14.0	14-0	145	140	1900	19.0
DO (mg/L)	10.0	9.8	10.2	10.2	10.1	10.1	10.2	10.0	10.0	10.1	99	191	9.9	10.0
pH	7.8	7.9	8-0	8.0	8.1	8.0	7.9	8.0	7-8	7.8	77	78	9.0	8.1
Cond. (µS/cm)	3	53	350)	350	Ò	351		54		34	9		t6.
Initials	BS-/	6	JOHN	MM	JULL	/Hon		1/414	G		im			তা

Concentration							Da	ays						
	1	3	1	4	l	5	1	6	1	7	(8	1	9
- ER-11	new	old	new	old	пем	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0	14.0 S	150557	15.0	15.0	15.0	15.0	14.5	14.0	14.0	145	14:0	19.0	15.3
DO (mg/L)	10.0	9.7	10.2	10.3	10.1	10.1	10.2	9.9	(0.0)	10-1	9.9	121	9.8	9.9
pH	7.8	7-8	8.0	8.0	8.1	8.0	79	7.9	7.8	7.8	71	78	8.0	0.8
Cond. (µS/cm)	3	53	35	9	350		35	1	31	19	34	9.	34	-
Initials	896	95	/JHU/	HH	Auli	MM	Shi	· / oun	60	2	m			la

Concentration							Da	ays						
	1	3	j	9		15	1	6	1	7	1	8	1	9
ER-12	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14.0	14.0	15.515	014.0	15.0	14.5	15.0	14.5	14.0	14.0	145	140	192	15.0
DO (mg/L)	10.0	9.8	10.2	10.2	10.1	10.2	10.2	10.1	10.0	10.1	93	10.0	9-9	9.9
pH	7.8	7.9	8.0	7.9	9.1	8.0	7.9	8.0	7.8	7.8	77	73	3.5	8.1
Cond. (µS/cm)		353	35	0	350		35	1	3	49	34	9	3	46
Initials	600		1/5HL	/mm	THU	/ Rille	JM	W/My	30	1	in	,		117

Concentration							Da	ays						
	17	3	10	4	1	5	1	6	1	7		18	15	1
ER-13	new	old	new	old	new	old	new	blo	new	old	new	old	new	old
Temperature (°C)	14.0	140	विंक्तां	140	15.0	14.0	15.0	15.0	14.0	140	14.5	iyo	19.0	1900
DO (mg/L)	10.0	9.9	(0.2	10.2	10.1	10.2	10.2	10.1	10.0	10-1	9.3	101	9.9	10.0
pH	7.8	7.8	8.0	8-0	8.1	8.0	7.9	8.1	78	7.8	7.7	79	8,0	8.0
Cond. (µS/cm)	3	53	. 355)	350	>	35	1	3	49	3.	18	?	196
Initials	SC	B	YJHW/	An	TU	while	200	wille	G	RU	ín	~	t√.	157

DO meter: DD-35 Ph meter: PH-35 Phu Conductivity meter: Caud - 35 Phu Control Analysts: BPL/ CHP/YYL/MM/JHW

1.0	
,	

Reviewed by: SS

Date reviewed: 2010[12[19]

Sample Description:

Sample ID: Work Order #:	NI	4					Stop	Date &	& Time:	Podeio	le shine	1201	2	
WORK OTGET W.	.0 ()			-				rest of	becies.	Reusia	e stille		-	
Concentration							Da	iys						7 ÷
	ι	3	1	4	1	5		6	1	7	1 1	<	19	1
ER-14	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	14-0	14:0	15.515	040	15.0.	14.0	15.0	14.5	14.0	140	14.5	140	[9,0	15.0
DO (mg/L)	10.0	9.9.	10.2	10.0	10.1	10.2	10.2		10.0	10.1	9,9	122	9.9	10.0
pH	78	7-8	8.0	7.9	8.1	8.0	7.9	8.0	7.8	7-6	11	18	8.0	8.0
Cond. (µS/cm)	OC.	353	350)	350		35			19	34		: 3	46
Initials	BOU		YJHU	1 MM	THE	7 Hir	JAG	1/404		20	in		ME	
Concentration							Da	iys						
											-			
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)			7											
DO (mg/L)														
pH										7.77				
Cond. (µS/cm)		-		-										
Initials														
Concentration				1			D:	ays						
0011001101011				.3				ay S			T			
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Temperature (°C)	new	Old	ness	Olu	HEW	UIG	lieve	Old	Hew	Old	Hew	Olu	HEVY	Olu
DO (mg/L)											-			
pH														
Cond. (µS/cm)														
Initials								-						
IIIIuais					_		1							-
Concentration	T			71		-	D							
Concentration			T -	_	T		Da	ays	Г	_	Г			
		old	mout	old	new	old	new	old	new	old	new	ald	new	old
Tomporature (9C)	new	Ord	new	Olu	Hew	QIQ	new	Old	new	Olu	new	Old	new	Old
Temperature (°C)					-	-	-		-					
DO (mg/L)				-			-			-				
pH					-			1			-			
Cond. (µS/cm)	-		-		-			-				_	-	
Initials				-					1	_				
	Do	25	JOH	w.	l meter:	i	A5	Tille					1-8	7
DO meter:) y		_ pr	meter:	1011-	2		Cond	uctivity	meter:	180	10 1	, 0 0
	Co	ntrol	1		T				1	Α.	nalizata.	DOI 1	un I vu I	/ MJ 1
Hardness*	Co	nuroi/	- 3	*	-					A	nalysts:	BPC/C	MP/ 49 L	/ 119 /
Alkalinity*	1	/							-	Povio	wed by:		22	
mg/L as CaCO3	/				1				J		viewed:			10
					:					Dute 18	, icweu.		الإالا	14
Sample Desc	ription													

Concentration	Pon			-	Day	of Te	st - N	و. of N	Nortal	ities	0			Total	Dead
Concentration	Rep	į	21	3	4	5	6	7	8	9	10	"	17	Eggs/En	nbryo
ER-OL	1	Q	6		D	0		_		,				163	90
- 03	2		Ť		1									360	(i
-08	3													333	
-09	4													407	7
- (0	1											-		183	14
- 11	2													285	4
- 17	3					1								442	9
- 13	4		1	-		I								405	7
- 11 - 12 - 13 - 14	1	U	4											361	11
ER-06 - By	2														
ER-06- BY	3														
/D	4														
16	1														
ER-07-/ B	2														
/ c	3	-													
/ D	4														
1 6	1														
ER-08-	2														
	3														9
	4		-												
	1								_						1
	2		-										-		
	3														
	4		-												
	1	-						-		_		,			
	2		-												
	3		-												
		-													
	1	-	-				-								
	2		-												
	3	-	-				_								
	1 4	1	1			1-20									

		3?-		
Client:	Teye Coal.	Start Date & Time:	June 25/2019	
Sample ID:	NA	Stop Date & Time:	5-14 15 (2019	
Work Order #:	NA	Test Species: R	Redside shiner	

Concentr	ation	Rep				Day	of Te	st - N	o. of I	Viortal	ities				Total Dead	
			1	2	3	4	5	6	7	8	2	10	13	12	Eggs/Embryos/ Alevins	
ER-06	B	1	Q	9	9	0	0	0	0	0	0	6	0	sup	0	
	C	2				1	1	1	1	1		0	1	0		
	0	3										3				
	É	4										0				
ER-67	B	1					2 1					6		38°/	20	
	C	2										1				
	1	3												GC-	0	
	Ú	4										1		1	0 .	
ER-08	B	1												1		
	C	2														
	D	3							1							
	4	4							11							
ER-09	B	1						1								
	C	2														
	D.	3	11						1				+			
	É	4	11					1							-	
ER-10	B	1									1	1		-		
	c	2									-	1		221		
	D	3												1		
	6	4	1											or-	10	
ER-11	B	1												1	1	
	C	2												-		
	D	3												1		
	6	4							1				1	1		
ER-12	8	1														
	C	2										-		-		
	D	3	1						1					1		
	É	4														
ER-13	B	1	1							1	-		-	-	4	
	C	2	1						1		-		1	1		
	D	3	1				.		-	-	-	-		1	-	
	E	4	1	1	1		1	1	1	1	1	1	1	1		
Tech Initia			350	80-	BSL	8	~	m		Cone				68-		

Tech Initials	38- 30- BBL	hur care care can	S 58- p- 88-
Comments:	O newdood but area	before hotch.	
	3 2 developed but do	ed before hat it. I is	an a with
Reviewed by: Version 1.1 Issued Octo	SS SS	Date reviewed:	zoralisti)
10101011 1.1 133000 0010	-		Nautilus Environmental Company Inc.

		35	
Client:	Teck Coal	Start Date & Time: June 25/2019	1
Sample ID:	NA	Stop Date & Time: July 15/299	
Work Order #:	NIA	Test Species: Redside shiner	

Concentration	Rep				Day	of Te	st - N	o. of N	/lortal	ities				Total Dead
		1	2	3	4	5	6	7	8	9	[0	11	17	Eggs/Embryos Alevins
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	4													
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	4								1					

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Comments:				
Reviewed by: Version 1.1 Issued October	SS -6, 2015	Date reviewed:	Zo(Q[Z]) Nautilus Environme	ntal Company Inc.

Client: Sample ID: Work Order #:	Teck NA NIA	Start Date & Time: July 12019 Stop Date & Time: July 12019 Test Species: Redside shiner

Concent	ration	Rep	Day of Test - No. of Mortalities									Total Dead			
			13	14	15	16	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins
ER-6	B	1	0-												
	(2		-										-	
	D	3		1	-										
	E	4		-										-	
ER-7	B	1	0	-											
	6	2	20	2	_										
	D	3	10	0	0	2									
	E	4	GPZ;	0	0	3	-								
ER-8	B	1	Q	-											
	E	2												-	
	D	3		-										-	
	R	4		-						-				-	
ER-9	B	1	1				·						_		
	C	2	10	_											
	D	3	0	-											
	臣	4		-										-	
ER-10	B	1		_										-	
	C	2		-										-	
	Ð	3		3											
	E	4		-			,							-	
ER-11	B	1		-									_		
	C	2		-		-								_	
	0	3		_								-			
	É	4		-								-			
ER-12	В	1		_									+		
	C	2		-										-	
	0	3		-											
	E	4													
ER-13	B	1		_								3			
	C	2		_									-		
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Tech Initials		38	BOL	JAN	THEY	Æ							22			
Comments:		Hat	thed, I	techn	ician		2									
	(3)	ولمتنعل	Can p	ut di	rd											
Reviewed by:			S	S			Date	e revi	ewed:	2	2019	1121	19			
Version 1.1 Issued Octo	ober 6, 20	115					-				N	lautilus	Envir	onmenta	al Compa	ny Inc.

		SPC	
Client:	Tecle	Start Date & Time: Jone 25 /29	
Sample ID:	NIA	Stop Date & Time: Talans / 2001	
Work Order #:	NIA	Test Species: Redside shiner	

Concentrat	ion	Rep				Day	of Te	st - N	o. of	Mortal	ities				Total Dead
			13	14	15	16	17	18	19	20	21	22	23	24	Eggs/Embryos Alevins
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Tech Initials		4	38-	BRL											

Tech Initials	38-	BRC									
Comments:								-			
Reviewed by: Version 1.1 Issued October 6	, 2015	\$\$		Dat	e revi	ewed:		Zolo	tilus En	vironmenta	I Company Inc.

Client:	Teck	
Sample ID:	N/A	
Work Order #:	NIC	_

ID				Day	of Test	- No. ө	F-Morte	lities (I	natch)	- Had	tch		
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E	_							-		-		26	
ER-11 B	_						_	-	-	-		47	
C	_						-	_	-	-		24	
D	-							Z	-	1		22	
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Client:	Teck	
Sample ID:	N/A	
Work Order #:	NIA	

Start Date & Time: Stop Date: Tuly 15/2019
Test Species: Redside shiner

ID	13-				Day o	f Test	No. of	hatch					•
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Client: Teck
Sample ID: N/A
Work Order #:

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=R-07	В	1	0	0	1	-			-			-		
	C	12	0	0	-				- Charles			-	****	
	0	36	0	1	-		-	-					****	
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	E	13/3		-	-									
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Client:	Teck
Sample ID:	N/A
Work Order #:	

Start Date & Time: June 25/2019

Stop Date: Toly 15/2019

Test Species: Redside shiner

ID						Day o	of Test	- No. of	hatch		1			
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Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: Jone 25/2019
Stop Date: July 12019
Test Species: Redside shiner

ID					Day	of Test	- No. o	f Morta	lities (h	natch)				
		1	. 2	3	4	5	6	7	8	9	10	11	12	Comments
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SS 2019/12/19

	10
Start Date & Tih	ne: June 25/201
Stop Da	te: July 15 /200
Test Specie	es: Redside shiner
	Start Date & Tin Stop Da Test Specie

İD					Day	of Test	- No. of	f Morta	lities (l	natch)				
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Client: Teck
Sample ID: N/A
Work Order #:

Start Date & Time: June 25/2019
Stop Date: July 15/2019
Test Species: Redside shiner

ID					Day	of Test	- No. of	Morta	lities (h	atch)				Comments
		13	14	15	4)	17	18	19	20	21	22	23	254	
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	D													
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ER-08	3			1		+			_					
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ER-09	B		1	-										
	c													
	D			11					-					-
	4													
ER-10-	B						1							
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	C			1	1								5	
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la!	E													
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	6											_	->	
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	D	1		1	1			-					-	
	6		1	1	1									
Tech Initia		BRU	BSV	-	conp	382	w	MCT						

Client:	Teck
Sample ID:	N/A
Work Order #:	NIA

Start Date & Time: Twe 25/200 %

Stop Date: 500 15/200 %

Test Species: Redside shiner

1D					Day	of Test	- No. of	Morta	lities (h	atch)				
		13 14		15	16	17	18	19	20	24	22	23	24	Comments
ER-14	B	G	Ç	P	6	0	0	é	-		-		-	
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END OF REPORT

17 December 2020 1896296-008-R-Rev0

APPENDIX G

Statistical Output

Ordinary Least Squares (OLS) Regression between Redside Shiner Responses and Egg Selenium Concentration: TrichAnalytics data

▼OLS Regression - Survival

Dependent Varia	Survival
N	56
Multiple R	0.024
Squared Multiple	0.001
Adjusted Square	0
Standard Error of	17.532

Regression Coefficients B = $(X'X)^{-1}X'Y$

Effect	Coefficient	indard Error	Std.	Tolerance	t	p-Value
			Coefficient			
CONSTANT	84.264	3.647	0		23.103	0
T_Se_egg	0.05	0.287	0.024	1	0.174	0.863

Allalysis Of Valle	ilice				
Source	SS	df	an Squares	F-Ratio	p-Value
Regression	9.294	1	9.294	0.03	0.863
Decidual	16 507 21	E4	207 256		

35 is an Outlier (Studentized: -4.491) 45 is an Outlier (Studentizec: -4.017)

Durbin-Watson I	1.997
First Order Auto	-0.002

AIC	463.003
AIC (Corrected)	484.114
Schwarz's BIC	489.729

Excluded LNLK (18%) and ER (23%) survival outliers ID'd in original regression

▼OLS Regression - exclude LNLk and ER survival outliers

Dependent	Survival
N	54
Multiple R	0.1
Squared Mu	0.01
Adjusted So	0
Standard E	12 366

Regression coefficients B = (XX) X 1									
Effect	Coefficient Indard Error		Std.	Tolerance	t	p-Value			
			Coefficient						
CONSTANT	88.609	2.64	0		33.56	0			
T_Se_egg	-0.149	0.205	-0.1	1	-0.727	0.47			

Alluly 515 Of	Variance				
Source	SS	df	an Squares	F-Ratio	p-Value
Regression	80.871	1	80.871	0.529	0.47
Desideral	7.054.00	- 50	450,000		

Case	13 is an Outlier (Studentizec:	-3.64
Case	25 is an Outlier (Studentizec:	-4.39

Durbin-Wat	1.614
First Order	0.189

,	120.010
AIC (Correc	429.299
Schwarz's I	434.786

SELECT BEFORE_AFTER\$ ="b" BEFORE method refinement

▼OLS Regression - Fertilization

Dependent '	Fertil
N	31
Multiple R	0.03
Squared Mu	0.001
Adjusted Sq	0
Standard Er	24.156

Effect	Coefficient	ındard Error	Std.	Tolerance	t	p-Value
			Coefficient			
CONSTANT	39.513	6.742	0		5.861	0
log_T_Se_e	1.379	8.619	0.03	1	0.16	0.874

7 11101 7 515 61	* arrarree				
Source	SS	df	an Squares	F-Ratio	p-Value
Regression	14.94	1	14.94	0.026	0.874
Residual	16,921.75	29	583.509		

Durbin-Wat	1.694
First Order	0.121

SELECT BEFORE_AFTER\$ ="a" AFTER method refinement

▼OLS Regression - Fertilization

Dependent '	Fertil
N	25
Multiple R	0.022
Squared Mu	0
Adjusted Sq	0
Standard Er	10 566

Regression Coefficients B = (X'X)⁻¹X'Y

Effect	Coefficient Indard Error		Std.	Tolerance	t	p-Value
			Coefficient			
CONSTANT	66.942	16.887	0		3.964	0.001
log_T_Se_e	1.678	15.968	0.022	1	0.105	0.917

Analysis of Variance

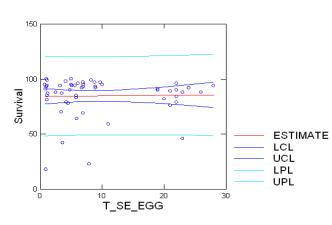
Source	SS	df	an Squares	F-Ratio	p-Value
Regression	4.226	1	4.226	0.011	0.917
Residual	8 804 91	23	382 822		

-4.428)

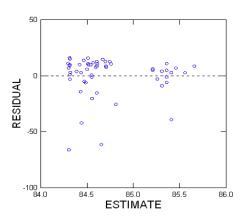
Durbin-Wat	2.331
First Order	-0.169

223.552 224.695

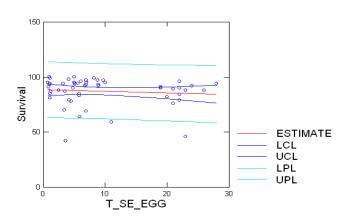
Confidence Interval and Prediction Interval



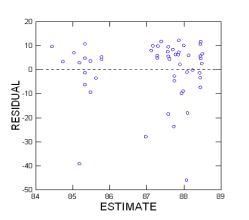
Plot of Residuals vs. Predicted Values



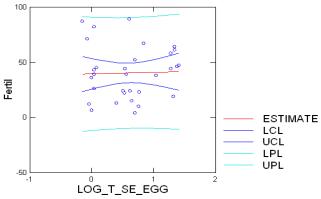
Confidence Interval and Prediction Interval



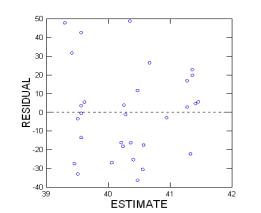
Plot of Residuals ∨s. Predicted Values



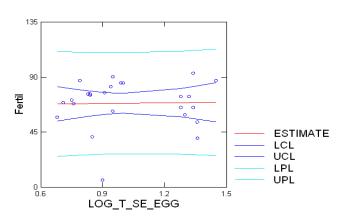
Confidence Interval and Prediction Interval



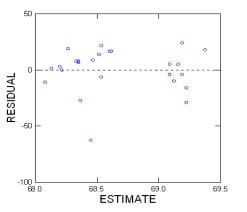
Plot of Residuals vs. Predicted Values



Confidence Interval and Prediction Interval



Plot of Residuals ∨s. Predicted Values



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▼OLS Regression - Length

Dependent '	length
N	56
Multiple R	0.006
Squared Mu	0
Adjusted Sq	0
0	0.204

Regression Coefficients B = (X'X)⁻¹X'Y Effect Coefficient Indard Error Std. Tolerance

Effect	Coefficient	Coefficient Indard Error		Tolerance	t	p-Value
			Coefficient			
CONSTANT	7.246	0.076	0		95.786	0
T_Se_egg	0	0.006	0.006	1	0.041	0.968

arrange SS df an Squares F-Ri

Regression	0	1	0	0.002	0.96
Residual	7.14	54	0.132		

Durbin-wat	1.146
First Order	0.385

Information Criteria					
AIC	49.578				
AIC (Correc	50.04				
Cobworz'o	EEGEA				

▼OLS Regression - Weight

Dependent '	weight
N	56
Multiple R	0.339
Squared Mu	0.115
Adjusted Sq	0.098
Standard Fr	0.052

Regression Coefficients B = (X'X) ^X'Y							
Effect	Coefficient	ındard Error	Std.	Tolerance	t	p-Valu	
			Coefficient				
CONSTANT	0.367	0.011	0		33.913		
T_Se_egg	-0.002	0.001	-0.339	1	-2.646	0.01	

Analysis of Variance							
Source	SS	df	an Squares	F-Ratio	p-Value		
Regression	0.019	1	0.019	7	0.011		
Residual	0.146	54	0.003				

Durbin-Wat	1.598
First Order	0.159

Information	Information Criteria					
AIC	-168.226					
AIC (Correc	-167.764					
Schwarz's I	-162.15					

Site "LNLK" excluded

▼OLS Regression - weight

Dependent '	weight
N	46
Multiple R	0.223
Squared Mu	0.0
Adjusted Sq	0.028
Standard Er	0.056

Regression Coefficients B = (X'X) ⁻¹ X'Y								
Effect	Coefficient indard Error		Std.	Tolerance	t	p-Value		
			Coefficient					
CONSTANT	0.355	0.015	0		24.163	0		
T_Se_egg	-0.002	0.001	-0.223	1	-1.515	0.137		

Analysis of Variance								
Source	SS	df	an Squares	F-Ratio	p-Value			
Regression	0.007	1	0.007	2.296	0.137			

Durbin-Wat	1.58
First Order	0.15

Informatio	Information Criteria			
AIC	-131.3			
AIC (Correc	-130.8			
Schwarz's	-125.9			

▼OLS Regression GSI 1 or more

Dependent	GSI_1_more
N	56
Multiple R	0.21
Squared Mu	0.044
Adjusted So	0.026
Standard F	18 106

Regression Coefficients B = (X'X) "X'Y							
Effect	Coefficient	indard Error	Std.	Tolerance	t	p-Value	
			Coefficient				
CONSTANT	14.962	3.767	0		3.972	0	

Analysis of	Variance				
Source	SS	df	an Squares	F-Ratio	p-Value
Regression	814.308	1	814.308	2.484	0.121
Residual	17.702.31	54	327.82		

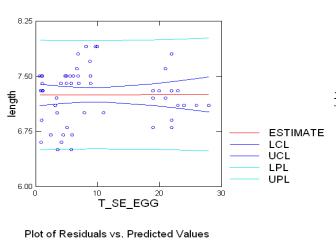
Case	35 is an Outlier (Studentizer:	6 313)

Durbin-Wat	1.975
First Order	0.011

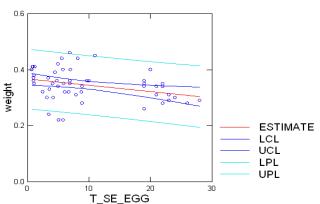
Information Criteria			
AIC 487.263			
AIC (Correc 487.724			
Schwarz's I	493.339		

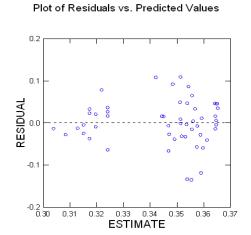
Confidence Interval and Prediction Interval

ESTIMATE

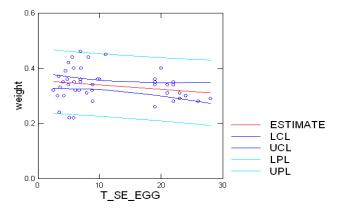


Confidence Interval and Prediction Interval

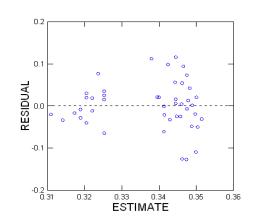




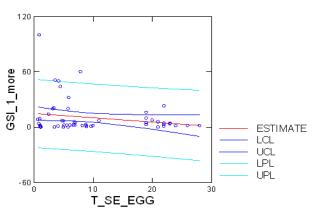
Confidence Interval and Prediction Interval



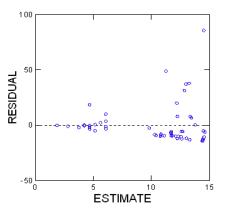
Plot of Residuals vs. Predicted Values



Confidence Interval and Prediction Interval



Plot of Residuals vs. Predicted Values



▼OLS Regression GSI 2 or more

Dependent	GSI_2_mc
N	56
Multiple R	0.228
Squared Mi	0.052
Adjusted S	0.034
Standard E	11.336

Regression Coefficients B = (X'X)⁻¹X'Y

Effect	Coefficient	indard Error	Std.	Tolerance	t	p-Value
			Coefficient			
CONSTANT	10.08	2.358	0		4.274	0
T_Se_egg	-0.319	0.185	-0.228	1	-1.718	0.091

Analysis of Variance

Source	SS	df	an Squares	F-Ratio	p-Value
Regression	379.438	1	379.438	2.953	0.091
Residual	6.939.58	54	128.511		

 Case
 25 is an Outlier (Studentizec: 3.808)

 Case
 26 is an Outlier (Studentizec: 3.466)

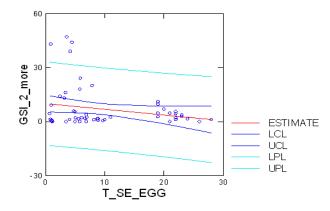
 Case
 35 is an Outlier (Studentizec: 3.240)

Durbin-Wat	1.493
Eirot Ordor	0.252

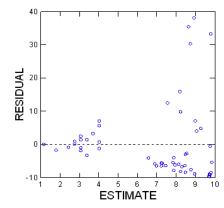
Information Crit

AIC	434.821
AIC (Correc	435.283
0.1 1.	110.007

Confidence Interval and Prediction Interval



Plot of Residuals vs. Predicted Values









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