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March 10, 2022

Project: 666768

BC Ministry of Transportation & Infrastructure
Geotechnical Engineering Section - Victoria
Victoria, BC V8W 3E6

ATTENTION: Julie Sandusky, P.Geo.

REFERENCE: **Results of Humidity Cell Tests - Type A Materials for the Highway #1 Selkirk Mountain 4-Laning Project**

As requested by the BC Ministry of Transportation and Infrastructure (TRAN), SNC-Lavalin Inc. (SNC-Lavalin) prepared this report on the results of humidity cell (HC) tests upon samples of bedrock (i.e., Type A) excavation materials within the Highway 1 Selkirk Mountain 4-Laning Project approximately 40 km west of Golden, BC (i.e., the "Site" or "the Project", Drawing 666768-201).

SNC-Lavalin's scope of work was presented in our work plan entitled "*Proposal and Cost Estimate for Kinetic Test Work – Selected PAG Materials from Selkirk Mountain 4-Laning Project"* (dated April 2, 2020). This work was conducted according to the terms and conditions of TRAN's As & When Contract 860 CS 5040 with SNC-Lavalin (dated December 13, 2017 including Amendments 1 & 2). This work builds on an evaluation of ML/ARD potential for the Type A materials per TRAN's Technical Circular T-04/13[1].

1 Background

Lorax Environmental Service Ltd. (Lorax) completed a limited ML/ARD assessment to support preliminary design (Lorax, 2018). Nine samples were collected from bedrock outcrops and/or road cuts within the Project and submitted for static test work including Acid-Base Accounting (ABA), Total Solid Phase Elemental Analysis, Shake Flask Extraction (SFE) and X-Ray Diffraction (XRD). Key observations included the following:

- Samples of PELITE and QUARTZITE were collected from rocks identified within the Lower Cambrian Hamill Group.
- Four of nine samples of QUARTZITE were classified as potential acid-generating (i.e., PAG) rock based on ABA results and calculated neutralization potential ratio (NPR) less than 2. This was attributed to a relative lack of neutralization potential (NP) rather than elevated acid potential (AP) in the material.
- NPR was based upon the non-sulphate content (i.e., S_{Total} – ($S_{Sulphate}$ + $S_{sulphide}$), and there appeared to be a significant amount of insoluble sulphur.

[1] Available at: https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/technical-circulars.

- The PAG rock was identified within existing rock cuts, including from Preliminary Design stations (STA) 16+140 to 16+310 (“Outcrop A”); STA 16+650 to 16+870 (“Outcrop B”); and STA 18+040 to 18+200 (“Outcrop C”).
- One sample of PELITE was classified as non-PAG based on relatively low NP and non-detectable sulphide sulphur.
- The maximum AP reported for the Lorax samples was 9.1 tonnes $CaCO_3$ equivalent per 1000 tonnes of material (or $kgCaCO_3$/tonne) and the minimum Modified Sobek NP was 1.4 $kgCaCO_3$/tonne.
- Further assessment including sampling from unweathered Type A material (e.g., rock core) was recommended upon completion of the preliminary and functional design.

Further ML/ARD assessment was conducted in the fall of 2019 (SNC-Lavalin, 2020). Our review of Preliminary Design drawings provided by TRAN (dated March 19, 2018) suggested Type A excavation was to occur between Preliminary Design STA 16+650 to 16+870 and 18+020 to 18+170. The highway centerline was to be realigned south between Preliminary Design STA 18+020 to 18+170, where a relatively tall (i.e., about 10 m) rock cut was observed. As such, it was inferred that most of the Type A material was to be generated from this segment and, as such, the additional ML/ARD assessment focussed on bedrock in this area. Rock core samples were recovered from two boreholes (BH19-SM4L-01 and -02) that were advanced using a diamond drill. Existing rock core was also available from a geotechnical borehole (BH19-39) that was advanced near STA 16+400 by Golder Associates Ltd. (Golder) as part of the adjacent Quartz Creek Bridge replacement project. SNC-Lavalin reviewed Golder’s archived core and collected samples for ML/ARD testing.

Results of the additional ML/ARD assessment suggested potential acid-generating (i.e., PAG) material was present in the form of QUARTZITE and ARKOSE. Based on possible moderate acid potential, it was recommended that these materials not be used as fill within a natural water course (e.g., as rip rap or culvert backfill). The results of the assessment were not sufficient to predict actual drainage water chemistry. However, SFE testing suggested a lack of readily soluble metals and/or metalloids. Supplemental test work (e.g., kinetic HC testing) was recommended for the PAG materials to assess more probable longer-term drainage water quality and potential effects on surface water receptors.

SNC-Lavalin conducted ML/ARD assessment under a separate scope of work for the Donald Hill Descending Lane Project, approximately 8.8 km in the eastbound direction (SNC-Lavalin, 2019). Bedrock observed at that location included SLATE, DOLOMITIC LIMESTONE and LIMESTONE with non-detectable sulphide sulphur, an abundance of NP (i.e., up to 656 $kgCaCO_3$/t), and inferred low potential for ML/ARD. Assessment results suggested the carbonate rocks may be useful for the Selkirk Mountain 4-Laning Project as the Donald Hill carbonate rocks could potentially be mixed with the Selkirk Mountain PAG materials to increase the NP. Blending the two materials may provide additional alkalinity to neutralize potential acidity and to aid in the precipitation of soluble metals at near-neutral pH if required.

A copy of TRAN’s 100% Functional Design was provided to SNC-Lavalin on December 1, 2021; the drawings included a revised design that requires 8,559 m^3 of Type A excavation from approximately Functional Design STA 164+50 to 169+30. No other bedrock excavation was planned; however, information obtained in a conference call on December 9, 2021 suggests that a negligible volume (i.e., <1,000 m^3) may be generated along the westbound lane between approximately Functional Design STA 180+20 to 181+60 to achieve the final subgrade.

2 Objective

The objective of the kinetic HC testing was to further characterize the identified PAG materials to improve the overall understanding of potential drainage water quality associated with the disturbance of Type A materials. Testing was conducted on fresh samples of ARKOSE (BH19-SM4L-01), QUARTZITE (BH19-39), and interbedded PELITE/ARKOSE (BH19-SM4L-02). An additional objective was to assess the potential for carbonate rocks from the Donald Hill segment to be used as an amendment for potential PAG material from the Selkirk Mountain area. As such, additional testing was conducted on blended PAG (BH19-39) and net-neutralizing DOLOMITIC LIMESTONE and/or LIMESTONE materials from Donald Hill.

3 Scope of Work and Methods

To achieve TRAN's objectives, SNC-Lavalin submitted rock samples for a total of five HC tests according to ASTM D5744-18 (ASTM, 2018). Opportunistic water sampling was also conducted to supplement the surface water data from SNC-Lavalin (2020) and to inform our understanding of potential temporal changes in water chemistry near the Project.

Specific tasks included:

- Task 1 – Coordination;
- Task 2 – Rock Sampling and Surface Mapping;
- Task 3 – Opportunistic Water Sampling;
- Task 4 – Laboratory Testing;
- Task 5 – Data Analysis and Reporting; and
- Task 6 – Project Management.

Methodology for this assessment included:

Rock Sampling – A site visit was conducted in May 2020 to obtain samples from SNC-Lavalin's 2019 rock core that was being stored by TRAN at the Quartz Creek snowshed, approximately 4.75 km west of the Site. Fresh samples were collected from the same depth intervals to the material that was used for the static testing (SNC-Lavalin, 2020). Additional core from Golder's "BH19-39" borehole was being stored by SNC-Lavalin in our Nelson, BC office and split samples from this material were submitted for the HCT testing.

Rock Surface Mapping – A site visit was conducted on October 18 and 19, 2021 to obtain additional information on the spatial distribution of the identified bedrock materials. This was achieved by visual assessment and mapping key structural features (e.g., bedding planes, folds, faults). Prominent features were recorded using a Brunton Pocket Transit Compass and measurements were based on the right-hand rule[2].

[2] Source: http://www.geo.cornell.edu/geology/faculty/RWA/structure-lab-manual/chapter-1.pdf.

Surface Water Sampling – Surface water samples were collected on May 5, 2020 from the same locations that were sampled in 2019 (SNC-Lavalin 2020). Field measurements of pH, temperature (T), and electrical conductivity (EC) were recorded for each location using hand-held meters. Water samples were collected in bottles provided by the analytical laboratory. Dedicated sampling equipment (e.g., bottles, syringes, and 0.45 µm disc filters) were used for each location to prevent cross-contamination. Samples were collected from the Columbia River (CRDS and CRUS), one sample was collected from a gully near STA 182+60 (GULLY); and one sample was collected from a wetland approximately 300m north of the Project area (SWMP). Further sampling was attempted on October 19, 2021 but no samples could be collected because either no flow was observed or there was no safe access to the sample locations (i.e., due to soft ground at SWMP and downed trees across access to the Columbia River stations). Observations were documented in field notes and the locations were confirmed using a hand-held GPS unit with assumed accuracy within the range of +/- 8 m.

Laboratory Analysis – Rock samples were shipped to Global ARD Testing in Burnaby, BC for a 54-week HC test. HC tests were conducted on one sample of ARKOSE, one sample of interbedded PELITE/ARKOSE, one sample of QUARTZITE, and two samples containing blended QUARTZITE and carbonate rocks from Donald Hill. The mixed materials included 10% and 30% DOLOMITIC LIMESTONE/LIMESTONE with the balance represented by QUARTZITE. The following schedule of tests was conducted for each HCT:

- Pre- and post-HC ABA and elemental composition to assess sulphur content and speciation, acid potential, neutralization potential, and metal concentrations in the sampled material;
- Weekly leachate sampling during the first five weeks (i.e., the “initial test period”) including analysis for: pH, acidity, alkalinity, major anions (chloride, fluoride, sulfate), total suspended solids, and dissolved metal concentrations;
- Sampling every five weeks after the initial test period and analysis for the full set of leachate parameters above; and
- Recording of the volume of leachate recovered each week.

Preliminary results from the HC tests suggested further analysis was warranted past the initial 54-week schedule. As such, the five HC tests were extended for an extra 10 weeks following consultation with TRAN.

No information was available on the physical properties of the Donald Hill carbonate rocks. As such, a preliminary assessment of construction suitability was completed by Micro-Deval abrasion testing (ASTM, 2017) at SNC-Lavalin’s material testing lab in Fort St. John, BC.

4 Screening Criteria

Laboratory analytical results were tabulated and compared to the adopted screening criteria in Table A below.

Table A: Adopted Screening Criteria for ML/ARD Assessment

Method	Screening Criteria/Classification				Reference
ABA	NPR	NPR < 1	PAG	PAG unless sulphide minerals are non reactive.	MEND, 2009
		1 ≤ NPR ≤ 2	Uncertain	Potentially PAG if NP is insufficiently reactive or is depleted at a faster rate than sulphide mineralization.	
		NPR > 2	Non-PAG	Non-acid generating unless sulphide mineralization is exposed along unidentified structural discontinuities (e.g., joints, fractures and/or faults) or extremely reactive sulphides occur in combination with insufficiently reactive NP.	
Leachate Testing (SFE and HC)		Potential for problematic drainage suggested by elevated metal concentrations in leachate.		BC Water Quality Guidelines for the Protection of Freshwater Aquatic Life and Source Drinking Water[3] (BCWQG)	BC Ministry of Environment and Climate Change Strategy (ENV)[4,5]

It is noted that the adopted screening criteria in Table A include conservative comparisons and/or modified criteria as follows:

Leachate Testing:

- It is noted that the BCWQG are intended for direct application to surface water (AW) and drinking water (DW) sources. Any leachate test does not represent field conditions and thus the comparison against the BCWQG is only intended to identify drainage water constituents that may be problematic in the leachate. Furthermore, some parameters (e.g., copper) have BCWQG that are calculated based on other physical or chemical parameters in surface water (e.g., dissolved organic carbon, pH, hardness). Some of these parameters are not relevant to leachate from rock samples and, as such, the comparison of HCT leachate concentrations to the BCWGQ is not direct.
- Leachate results were compared directly to the ENV BCWQG. This may be a conservative comparison because some dilution of leachate may occur along the flow path and geochemical reactions with site soils (e.g., adsorption, precipitation) may affect the drainage water chemistry before it contacts a surface water receptor. Dilution is likely to occur from mixing with water that is not in contact with the Type A materials (e.g., precipitation and/or overland flow from other areas of the catchment). It is noted that this assumption does not apply for material placed directly into a water body (e.g., rip rap).

[3] *British Columbia Approved Water Quality Guidelines, includes Working Water Quality Guidelines for BC* (BCWQG). British Columbia Ministry of Environment & Climate Change Strategy, updated December 2021.
[4] British Columbia Ministry of Environment and Climate Change Strategy. 2021. British Columbia Approved Water Quality Guidelines (BCWQG): Aquatic Life (AW), Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria, B.C.
[5] British Columbia Ministry of Environment and Climate Change Strategy. 2020. B.C. Source Drinking Water (DW) Quality Guidelines: Guideline Summary. Water Quality Guideline Series, WQG-01. Prov. B.C., Victoria, B.C.

5 Results

5.1 Bedrock Mapping

Bedrock surface mapping in October 2021 recorded structural elements of the sedimentary rocks at the Project. The most accessible outcrop was observed in the gully near STA 182+60. Bedding planes oriented approximately 317 +/- 17 with dip 44 +/- 8 were recorded at this location, but visual assessment of a rock cut adjacent to the eastbound lane between STA 180+20 and 182+60 suggested the dip angle increased near STA 180+60 due to regional folding (see Photograph 1 in Attachment 1). Similar structure was observed in a rock cut adjacent to the westbound lane near STA 181+00 (see Photograph 2). Most of the rock observed at this location was PELITE.

Our review of exposed bedrock mapping by Golder Associates Ltd. (Golder, 2021) suggests the observed bedding planes coincide with Golder's joint set numbers "J1" and "J3". Other discontinuities were observed during the bedrock surface mapping, but these features were associated with natural stress-related breaks with no apparent displacement and, as such, did not inform the assessment of PAG vs. non-PAG materials.

5.2 Sample Selection

Borehole locations are shown on Drawings 666768-202, -203, and -204. Three samples of Type A material were selected for HC testing including one sample of ARKOSE (HC1, from BH19-SM4L-01), one sample of interbedded PELITE and ARKOSE (HC2, from BH19-SM4L-02), and one sample of QUARTZITE (HC3, from BH19-39). This approach was intended to assess the weathering characteristics of the three main bedrock types that were observed at the Site. Static testing suggested the QUARTZITE from BH19-39 had the highest sulphide sulphur content (0.88%, SNC-Lavalin, 2020) and, as such, this material was used for blending with two samples of carbonate rock from the Donald Hill segment. Blended HCs were prepared by the laboratory using 10% and 30% carbonate rock with the QUARTZITE (HC4 and HC5, respectively). Laboratory photographs of the HC tests are included in Attachment 1 (Photograph 3).

5.3 Pre- and Post-Humidity Cell ABA Testing

Laboratory testing results are included in Attachment 2. ABA parameters, determined before the HC tests and during the close down procedure, are summarized in Table B, below.

Table B: Summary of ABA Characteristics

Parameter	Units	HC1		HC2		HC3		HC4		HC5	
		BH19-SM4L-01-SA2		BH19-SM4L-02-SA2		BH19-39		Mix: 90% BH19-39 + 10% DH-MD-01		Mix: 70% BH19-39 + 30% DH-MD-02	
		Pre[1]	Post	Pre[1]	Post	Pre[1]	Post	Pre	Post	Pre	Post
Paste pH	pH	8.5	8.1	8.2	7.0	8.7	8.3	8.9	8.3	8.9	8.3
Total Sulphur	wt. %	0.17	0.05	<0.005	0.36	0.88	0.16	0.13	0.11	0.14	0.08
Sulphide Sulphur	wt. %	0.17	0.05	<0.01	0.33	0.88	0.16	0.13	0.11	0.14	0.08
Acid Potential (AP)[2]	kg $CaCO_3$/tonne	5.3	1.6	<0.3	10.5	27.5	5.0	4.1	3.4	4.3	2.5
Neutralization Potential (NP)	kg $CaCO_3$/tonne	1.4	0.1	2.6	3.5	7.2	15.3	81.0	78.9	273.8	271.7
Neutralization Potential Ratio (NPR)[3]	N/A	0.3	0.1	8.6	0.3	0.3	3.1	19.6	23.0	65.4	108.7
Material Characterization		PAG	PAG	NPAG	PAG	PAG	NPAG	NPAG	NPAG	NPAG	NPAG

Notes: 1) Pre-HC test parameters were obtained from static testing in SNC-Lavalin, 2020; 2) Acid Potential = Sulphide-sulphur x 31.25; 3) Neutralization Potential Ratio = NP/AP.

Paste pH for each sample before and after the HC testing was near-neutral (i.e., 7.0) to slightly alkaline (i.e., up to 8.9). These data suggest the sampled materials were not generating significant acidity when the paste pH measurements were recorded.

ABA results before the HC tests recorded sulphide sulphur content from non-detectable in HC2 to a high of 0.88 wt.% in HC3. The sulphide sulphur content in the blended materials was within this range at 0.13 wt.% in HC4 and 0.14 wt.% in HC5.

The Modified Sobek NP in the unblended materials before testing was between 1.4 kg $CaCO_3$/tonne and 7.2 kg $CaCO_3$/tonne. Close down ABA testing suggests the addition of the Donald Hill carbonate rocks increased the Modified Sobek NP of the HC3 QUARTZITE material by factors of about 5 and 18 (i.e., from 15.3 kg $CaCO_3$/tonne to 78.9 kg $CaCO_3$/tonne and 271.7 kg $CaCO_3$/tonne for the 10% and 30% blended materials, respectively).

Comparison of the pre- and post-HC test ABA characteristics for HCs 1, 2, and 3 was considered to have low value based on the significant difference between the results and, in some cases, a different characterization as PAG or non-PAG material. Review of these data suggest the mineral content of the pre- and post-HC test samples was variable. This interpretation was supported by the XRD mineralogy testing in Lorax (2018) and SNC-Lavalin (2020).

5.4 Laboratory Weathering

Analytical results of the HCTs are included in Tables 1 through 4 and key observations from each sample were summarized in the sections below. Summary charts were presented in Attachment 3 including key soluble parameters that were identified in shake flask leachate (SNC-Lavalin, 2020). It is noted that that the BCWQG reference values in the charts were based on site-specific criteria that were calculated for the

GULLY surface water sample in Table 4. This location was selected because it was the closest surface water location to the Project. Based on the uncertainty in the pre-HC ABA testing (discussed in Section 5.3, above), the post-HC ABA values (specifically the close down NP data) were considered for rate calculations as these data were considered the most representative of the material that was present in the humidity cells.

Calculated parameters (e.g., sulphate release rate, time to NP depletion, etc.) presented in the sections below were based on the equations in Table 18.1 of Price (2009) and in Sexsmith et al. (2015). It is noted that the estimated time to NP depletion (i.e., the "lag time") under laboratory conditions was typically based on the calcium and magnesium (Ca + Mg) release rates. Calculations based on the sulphate release rates produced greater lag time estimates, but it was inferred that the Ca + Mg values were more conservative (i.e., weathering of the carbonate minerals appeared to be more rapid than weathering of the disseminated sulphide minerals as suggested by negligible sulphate release rates). One exception was HC2 where the time to NP depletion was based on relatively high sulphate release rate and an apparent lack of reactive carbonate minerals. The calculated values were summarized in Table 5.

HC1 (BH19-SM4L-01-SA2)

- Leachate pH was between 5.60 and 7.55 for the duration of the test and the average for analytical events between weeks 44 and 64 was neutral (7.0).
- Acidity was variable in the first 24 weeks but appeared to stabilize between 3.0 mg $CaCO_3$/L and 6.5 mg $CaCO_3$/L over the remaining cycles. Alkalinity appeared to stabilize within the range of 3.0 mg $CaCO_3$/L and 10.0 mg $CaCO_3$/L after 8 weeks.
- Sulphate was either non-detectable or was only slightly above the laboratory method detection limit (MDL) after 4 weeks. A conservative estimate of the sulphate long-term release rate was 0.476 mg/kg/week, assuming the sulphate concentration in the HC leachate was tending toward the laboratory MDL of 1.0 mg/L.
- Dissolved metal concentrations were low and the reported concentrations of detectable parameters including dissolved antimony, arsenic, and iron were below the BCWQG reference values. Some variability was recorded in the concentration of dissolved aluminum and copper and the reported values were at times greater than the BCWQG reference values.
- The estimated time to NP depletion was two years based on a Ca + Mg release rate of 0.79 mg/kg/wk.

HC2 (BH19-SM4L-02-SA2)

- Leachate pH was acidic (i.e., <5 pH units) after 9 weeks and the average pH for analytical events between weeks 44 and 64 was 4.43.
- Acidity was between 3.3 mg $CaCO_3$/L and 17.7 mg $CaCO_3$/L; the results were variable in the first 9 weeks and an increasing trend was recorded over the final 14 weeks. The average for the last 5 analytical events was 11.3 mg $CaCO_3$/L. Alkalinity was less than the laboratory MDL for the final 30 weeks suggesting a lack of buffering capacity from reactive carbonate and/or silicate minerals.

- This sample reported the lowest initial sulphide sulphur content (<0.01 wt.%) and the lowest AP (<0.3 kg $CaCO_3$/t) but reported the highest values for the close down tests including 0.33 wt.% sulphide sulphur and an AP of 10.5 kg $CaCO_3$/t. Sulphide minerals were disseminated in the sedimentary rocks at the Site and, as such, it is inferred that the sample used for the initial ABA testing did not contain sulphide, whereas the material analyzed for the close down procedure included disseminated sulphide crystals.
- This sample reported the highest average sulphate concentration over the final five analytical events (9.98 mg/L) and the calculated sulphate production rate (4.731 mg/kg/week) was an order of magnitude greater than for the other samples.
- Dissolved iron and aluminum concentrations increased after nine weeks coinciding with decreasing pH and the leachate concentrations were greater than the BCWQG reference values at the end of the test. Dissolved copper in the leachate was also greater than the adopted BCWQG reference value for all but three of the analytical events (i.e., weeks 5, 7 and 14).
- The estimated time to NP depletion based on the close down Modified Sobek NP was 14 years based on a sulphate release rate of 4.731 mg/kg/wk.

HC3 (BH19-39)

- Leachate pH was near-neutral to slightly alkaline (i.e., between 6.07 and 8.44). Except for one measurement at 39 weeks (6.07), the leachate pH was greater than 7.0 for the entire HC test.
- Acidity was between 2.0 $CaCO_3$/L and 17.0 $CaCO_3$/L, and the alkalinity was between 18.0 $CaCO_3$/L and 47.5 mg $CaCO_3$/L. The reported alkalinity exceeded the acidity by at least a factor of two for the entire test.
- Sulphate was either non-detectable or was slightly greater than the laboratory MDL after 24 weeks. A conservative estimate of the sulphate long-term release rate was 0.483 mg/kg/week, assuming the sulphate concentration in the HC leachate was tending toward 1.02 mg/L.
- Metal concentrations were low and the reported concentrations of detectable parameters including dissolved antimony, arsenic, and iron were below the BCWQG reference values. Some variability was recorded in the concentration of dissolved aluminum and copper and the reported values were at times greater than the BCWQG reference values.
- The estimated time to NP depletion based on the close down Modified Sobek NP was 585 years based on a Ca + Mg release rate of 3.67 mg/kg/wk.

HC4 (Blended 90% BH19-39 + 10% DH-MD-01)

- Leachate pH ranged between 6.57 and 8.41 and the average for the final five analytical events was 7.64.
- Acidity was between 2.0 and 17.0 $CaCO_3$/L and the alkalinity was between 19.0 mg $CaCO_3$/L and 42.5 mg $CaCO_3$/L. The reported alkalinity exceeded the acidity by at least a factor of two for the duration of the test.

- Sulphate was either non-detectable or was slightly greater than the laboratory MDL after 24 weeks. A conservative estimate of the sulphate long-term release rate was 0.475 mg/kg/week, assuming the sulphate concentration in the HC leachate was tending toward the laboratory MDL of 1.0 mg/L.
- Metal concentrations were low and the leachate concentrations of detectable parameters including dissolved antimony, arsenic, and iron were below the BCWQG reference values. Dissolved aluminum measurements were relatively consistent and ranged between 0.0293 mg/L and 0.102 mg/L. Except week 34 (0.00031 mg/L) the dissolved copper concentrations were non-detectable and/or less than the BCWQG reference values for each sampling event after week 5.
- The estimated time to NP depletion based on the close down Modified Sobek NP was 3,071 years based on a Ca + Mg release rate of 4.13 mg/kg/wk.

HC5 (Blended 70% BH19-39 + 30% DH-MD-01)

- Leach pH ranged from 7.13 to 8.83 and the average for the final five analytical events was 7.84.
- Acidity was between 0.5 $CaCO_3$/L and 13.0 $CaCO_3$/L and the alkalinity was between 21.0 mg $CaCO_3$/L and 35.0 mg $CaCO_3$/L. The reported alkalinity exceeded the acidity by at least a factor of two for the duration of the test.
- Sulphate was either non-detectable or was slightly greater than the laboratory MDL after 24 weeks. A conservative estimate of the sulphate long-term release rate was 0.478 mg/kg/week, assuming the sulphate concentration in the HC leachate was tending toward the laboratory MDL of 1.0 mg/L.
- Metal concentrations were low and the reported leachate concentrations of detectable parameters including dissolved antimony, arsenic, and iron were below the BCWQG reference values. Dissolved aluminum was greater than the BCWQG during the first nine weeks but then declined to below the BCWQG for the remainder of the test. Some variability was recorded for dissolved copper, but it is noted that the concentrations were either non-detectable or just slightly greater than the laboratory MDL (0.0001 mg/L) for the final seven analytical events (i.e., within the final 30 weeks of flushing).
- The estimated time to NP depletion based on the close down Modified Sobek NP was 10,511 years based on a Ca + Mg release rate of 4.50 mg/kg/wk.

5.5 Surface Water

The results of laboratory testing of surface water samples collected on May 5, 2020 were combined with the results from November 4, 2019, and compared to the BCWQG in Table 4. Sample locations are shown on Drawing 666768-205 (attached). Dissolved chloride at the SWMP location (172 mg/L) exceeded the BCWQG AW long-term average guideline of 150 mg/L and dissolved aluminum (135 µg/L) in the GULLY sample exceeded the BCWQG short-term maximum (100 µg/L) and long-term average concentrations (50 µg/L) for freshwater aquatic life. Finally, total iron in samples from the downstream (CRDS, 656 µg/L) and upstream (CRUS, 549 µg/L) Columbia River locations were greater than the BCWQG for the protection of drinking water (300 µg/L). The concentrations of the other tested parameters were either non-detectable or were less than the BCWQG.

It is noted that the dissolved aluminum concentration in the May 5, 2020, GULLY sample (135 µg/L) was more than one order of magnitude greater than the November 4, 2019 concentration (9.1 µg/L). Reasons for this difference are not clear as the field pH measurements were both near-neutral (7.95 and 7.06 pH units, respectively) and ionic balance calculations for each water sample were within 10% suggesting the laboratory results were of good quality. It is inferred that the difference in dissolved aluminum concentrations was associated with seasonal effects, but further sampling is required to support this interpretation.

Dissolved chloride in the May 5, 2020 SWMP sample (172 mg/L) was also more than one order of magnitude greater than the November 4, 2019, concentration (8.38 mg/L). The May 2020 sample was collected during spring conditions when surface water bodies were receiving runoff from snow melt. As such, a source of the elevated chloride may be the dissolution of salt that was applied to Highway 1 in winter 2019/2020 for driving safety. It is noted that this sample location is more than 300 m from Highway 1 and, therefore, further sampling is needed to confirm the potential for meltwater to transport chloride from Highway 1 to the SWMP location.

5.6 Aggregate Abrasion Testing

Aggregate abrasion testing results for two carbonate rock samples from the Donald Hill area are included in Attachment 2. The Micro-Deval abrasion loss for DH-MD-01 and DH-MD-02 samples was 10.7% and 21.2%, respectively. These data suggest that the Donald Hill carbonate material may be suitable for use in both the main highway embankment and for crushing and blending into upper-zone subbase and base materials.

5.7 QA/QC Results

One duplicate surface water sample was collected in May 2020 at sampling station CRUS and analytical precision was assessed by calculating the relative percent difference between the sample results (RPD, Table 4) based on the following relationship:

$$RPD = \frac{|R1 - R2|}{\left(\frac{R1 + R2}{2}\right)} \times 100,$$

where

$R1$ is sample 1, and

$R2$ is sample 2.

The established data quality objective (DQO) for surface water RPDs was 20% which is consistent with the DQO recommended for laboratories by the ENV (ENV, 2020). The calculated RPDs for dissolved and total parameters were each less than 20% which satisfies the DQO. These data were considered suitable for the assessment of pre-construction water quality.

Duplicate rock samples were not submitted for analysis based on the heterogeneity observed in each rock type. However, ion balance was reported by the laboratory as a check on the HC leachates. Except HC2, ion balance calculations reported by the laboratory were within +/- 10% suggesting good reproducibility.

Ion balance in HC2 differed by as much as 29%. However, most of the higher values were reported near the end of the test when the leachate pH was acidic, sulphate concentrations were relatively high, and alkalinity and chloride was not detectable. In addition, some cations (boron, sodium) were also not detectable in the final weeks and the sum of anions and cations was low (i.e., less than 0.5 mq/L). As such, the greater difference in the ion balance is considered to result from low parameter concentrations rather than an indicator of laboratory error.

The Quality Assurance/Quality Control (QA/QC) results were considered acceptable for the purposes of this ML/ARD assessment.

6 Discussion and Conclusions

Based on the results of the HC tests, leachate pH for the interbedded PELITE and ARKOSE in HC2 was acidic after nine weeks and this material had potential to leach metals due to this low pH. Alkalinity was less than the MDL for the last 30 weeks of the test which suggests a lack of reactive carbonate and/or silicate minerals in this rock type. In contrast, leachate pH for the other four samples was circum neutral and alkalinity was recorded throughout the test suggesting the NP was not depleted within 64 weeks.

Low sulphate release rate suggests a low rate of sulphide oxidation or low initial sulphur content in HC1, HC3, HC4, and HC5. Estimated lag times under laboratory conditions based on Ca + Mg release rates for the non-acidic HC1 (ARKOSE) and HC3 (QUARTZITE) tests suggested conditions may become acidic after 2 and 585 years, respectively. It is noted that these estimates assume that neutralization is only provided by reactive carbonate and/or silicate minerals within the Type A material and that NP depletion occurs at the indicated laboratory rates. It is noted that HC tests are aggressive tests that cannot replicate field conditions. As such, different weathering rates may occur in the field due to site-specific factors including higher or lower ambient temperatures, different drying and/or wetting cycles, larger particle sizes, and/or interactions with the natural drainage water (e.g., alkaline drainage water may provide additional buffering capacity to the system).

Except for the interbedded ARKOSE and PELITE in HC2, the HC tests suggest the Type A materials at the project have low potential for acid generation and/or metal leaching. Nevertheless, field observations in Lorax (2018) and SNC-Lavalin (2020) suggest the interbedded ARKOSE and PELITE occurs at multiple locations of the Site, and it is inferred that segregation of this material (i.e., to minimize the required management of potentially problematic rock) would be challenging. Also, as shown by the results of the ABA tests, the sulfide sulfur content is variable in each of the studied rock types. So, segregating the interbedded ARKOSE and PELITE unit from the others might not mitigate the risk of ARD generation from the other units.

It is noted that excavation and placement of Type A materials will result in mixing of the different rock types. A brief statistical analysis was conducted for the static ABA test results from Lorax (2018) and SNC-Lavalin (2020); the results are presented in Table 5. The purpose was to derive a high-level assessment of the material assuming some material(s) with excess neutralization potential would mix with other materials that were confirmed PAG. Average and median values were derived from the AP and Modified Sobek NP values and an NPR was calculated for an assumed “bulk composition” of the total Type A volume. The resulting NPR values were 1.56 and 1.24 for the average and median values, respectively. Based on these values and the adopted screening criteria in Table A (above) the potential for acid generation from the combined materials was characterized as “uncertain”.

ABA testing showed that addition of the Donald Hill carbonate rocks to HC4 and HC5 significantly increased the NP of the QUARTZITE that was used for HC3. Addition of 10% DH-MD-01 (DOLOMITIC LIMESTONE) to HC4 increased the NP by a factor of five and addition of 30% DH-MD-02 (LIMESTONE) to HC 5 increased the NP by more than one order of magnitude. As such, it is inferred that the excess NP within the Donald Hill carbonate rocks may produce drainage alkalinity that could neutralize acid that would potentially be generated by some of the Selkirk Mountain Type A materials.

7 Recommendations

Results of the static testing (Lorax, 2018 and SNC-Lavalin, 2020) and humidity cells suggest that mitigation of Type A material with the potential to generate acid and/or leach metals is warranted. Based on our understanding of the Project, mitigation may include:

- Incorporating all the Type A material into the highway embankment.
- Considering beneficial use at an off-site location (e.g., within a rest area or other highway improvement structure).
- Encapsulating the material off site.
- Off-site disposal.

Regardless of the selected methodology for material management, it is recommended that the excavated Type A material be placed at a location that minimizes contact with runoff, surface water, and/or groundwater.

It is not possible to predict the final geochemical characteristics of the excavated Type A materials as the final volume will comprise a mix of the Hamill Group sedimentary rocks that vary in thickness and mineralogy across the Site. However, it is noted that the AP and NP values reported from the static tests were low and, in most cases the PAG material was identified based on low NPR values based on low NP rather than high AP. To minimize the risk of ML/ARD, TRAN may wish to consider blending the Selkirk Mountain sedimentary rocks with carbonate rocks from the Donald Hill segment based on: aggregate abrasion tests suggest the Donald Hill carbonate rocks may be suitable for use in construction; the HC test results showed that blending the Donald Hill carbonate rocks was effective at raising the overall NP; and, the elevated Ca + Mg release rates reported for the blended material in HCs 4 and 5 showed that the carbonate rocks were reactive.

Conservatively assuming that the geochemical characteristics of the Selkirk Mountain Type A material can be represented by the highest reported AP (27.5 kg $CaCO_3$/t) and the lowest NP (<0.8 kg $CaCO_3$/t), and assuming a conservative total NP of 600 kg $CaCO_3$/t can be provided by the Donald Hill carbonate rocks with no additional AP (SNC-Lavalin, 2019), it appears that blending a relatively small amount of the carbonate rocks would be successful at mitigating the potential for acid generation as shown in Table C, below.

Table C: Calculated NPR of Potential Blended Materials

Parameter	% Carbonate Rock Addition			
	10%	15%	20%	25%
Neutralization Potential (kg $CaCO_3$/t)	60.7	90.7	120.6	150.6
Acid Potential (kg $CaCO_3$/t)	24.8	23.4	22.1	20.7
NPR (Unitless)	2.4	3.9	5.5	7.3

Considering that NPR > 2 defines non-PAG material, the results above suggest that a blend ratio of 10% to 15% carbonate rocks would be sufficient to mitigate the acid generation potential. It is noted that the estimates above were based on conservative values (i.e., minimum NP and maximum AP) and, as such, the actual NPR values may be higher than the estimates. Based on the estimated Type A excavation volume of 9,600 m^3, it is inferred that this represents blending approximately 1,000 m^3 to 1,500 m^3 of the Donald Hill carbonate rocks with the Selkirk Mountain Type A material.

Based on the rapid onset of acidic conditions in the interbedded ARKOSE and PELITE, it is recommended that excavated Type A materials are placed and covered within a short period of time following their initial disturbance (e.g., within six weeks). Stockpiling for extended periods of time is discouraged unless the materials are isolated from precipitation and/or runoff.

Post-construction environmental monitoring is recommended to document potential changes in drainage water quality and to inform additional mitigation (if required). It is recommended that requirements for environmental monitoring are confirmed after the final location of the Type A material is confirmed. Additional sampling at the SWMP location during freshet is recommended to assess the potential for increased chloride in spring runoff.

8 Notice to Reader

This report has been prepared and the work referred to in this report have been undertaken by SNC-Lavalin Inc. (SNC-Lavalin) for the exclusive use of the Ministry of Transportation and Infrastructure (TRAN), which has been party to the development of the scope of work and understands its limitations. The methodology, findings, conclusions and recommendations in this report are based solely upon the scope of work and subject to the time and budgetary considerations described in the proposal and/or contract pursuant to which this report was issued. Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. SNC-Lavalin accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report. Should this report be submitted to the BC Ministry of Environment & Climate Change Strategy (ENV) by TRAN, the ENV is authorized to rely on the results in the report, subject to the limitations set out herein, for the sole purpose of determining whether TRAN has fulfilled its obligations with respect to meeting the regulatory requirements of the ENV.

The findings, conclusions and recommendations in this report (i) have been developed in a manner consistent with the level of skill normally exercised by professionals currently practicing under similar conditions in the area, and (ii) reflect SNC-Lavalin's best judgment based on information available at the time of preparation of this report. No other warranties, either expressed or implied, are made with respect to the professional services provided to TRAN or the findings, conclusions and recommendations contained

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This report must be read as a whole, as sections taken out of context may be misleading. If discrepancies occur between the preliminary (draft) and final version of this report, it is the final version that takes precedence. Nothing in this report is intended to constitute or provide a legal opinion.

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9 References

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10 Closing

We trust this provides you with the information you currently require. If you have any questions, please contact the undersigned at your earliest convenience.

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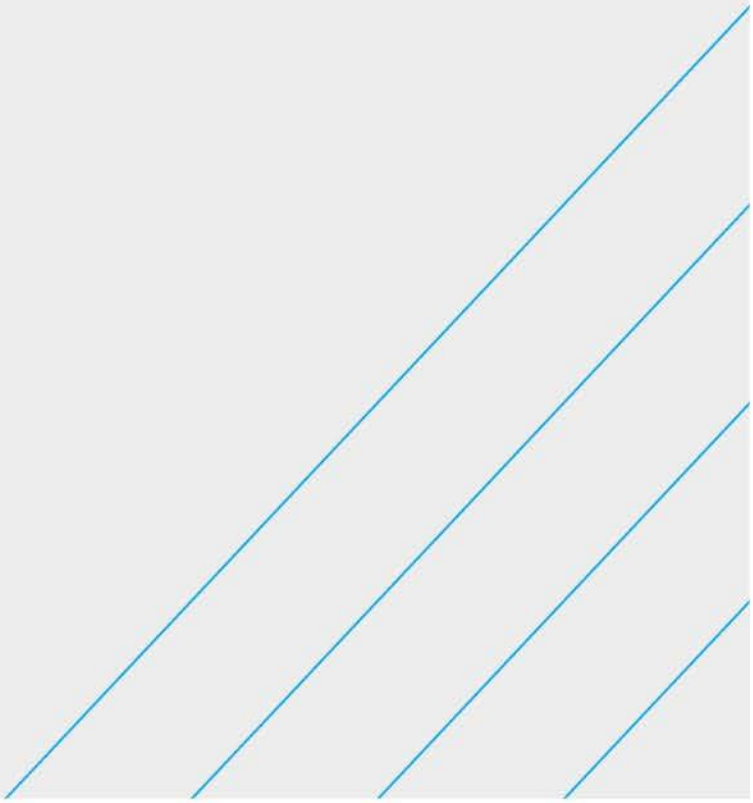

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

			Physical Parameters				Dissolved Inorgnanics					Ion Balance			Dissolved Metals												
Sample ID	Sampling Date (dd-mmm-yy)	Week No.	pH	Hardness (CaCO3)	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Anions	Cations	% Difference	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)
			pH	mg/L	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	meq/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			6.5-9.0	n/a	n/a	n/a	n/a	128-218[c] (LT)	600	0.4-1.01[c]	n/a	n/a	n/a	n/a	0.02-0.1[c]	0.009 (LT)	0.005	1 (LT)	0.00013 (LT)	n/a	1.2 (LT)	0.00004-0.00026[d]	n/a	0.001 (Cr(+6)) (LT)	0.11	0.0003[e]	1
HC-1	27-May-20	0	7.30	16.7	66	3.0	20.0	2.3	1.58	<0.10	48	0.49	0.51	-1.89	0.0435	0.000588	0.0014	0.0076	<0.000010	<0.000010	0.0031	0.0000035	4.94	<0.00010	0.0000232	***0.00054***	<0.0020
HC-1	03-Jun-20	1	6.99	15.6	56	4.0	18.0	4.1	1.27	0.22	32	0.49	0.48	1.52	***0.102***	0.000657	0.00155	0.0087	<0.000010	<0.000010	0.0078	0.0000029	4.09	<0.00010	0.0000157	***0.0007***	<0.0020
HC-1	10-Jun-20	2	***5.97***	12.7	45	26.0	15.4	4.3	0.92	0.16	28	0.43	0.39	5.46	***0.0812***	0.000477	0.00121	0.0075	<0.000010	<0.000010	0.006	<0.0000020	3.3	<0.00010	0.000013	***0.00047***	0.0024
HC-1	17-Jun-20	3	6.85	10.5	40	12.0	12.5	4.7	0.39	0.16	30	0.37	0.32	7.63	0.0471	0.000419	0.000822	0.0067	<0.000010	<0.000010	0.0052	0.0000023	2.65	<0.00010	0.0000122	***0.00041***	<0.0020
HC-1	24-Jun-20	4	7.21	9.5	32	5.0	12.5	0.5	0.36	<0.10	23	0.27	0.29	-3.60	0.0589	0.000399	0.000762	0.0064	<0.000010	<0.000010	<0.0050	<0.0000020	2.47	<0.00010	0.0000122	***0.00046***	0.0025
HC-1	01-Jul-20	5	6.95	7.0	28	6.0	12.0	0.5	0.13	<0.10	33	0.25	0.22	6.82	0.0709	0.000402	0.000985	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	1.68	<0.00010	0.000012	0.0002	0.0062
HC-1	08-Jul-20	6	7.33	8.0	26	4.0	11.0	0.5	0.11	0.18	<28	0.24	0.22	3.87	0.0451	0.000455	0.0015	0.0077	<0.000010	<0.000010	<0.0050	<0.0000020	1.95	<0.00010	0.0000132	***0.00048***	0.0068
HC-1	15-Jul-20	7	6.65	10.4	31	5.8	12.0	1.4	<0.10	<0.10	<15	0.27	0.27	-0.98	0.0411	0.000518	0.00148	0.0086	<0.000010	<0.000010	<0.0050	<0.0000020	2.66	<0.00010	0.0000087	0.00018	0.0052
HC-1	22-Jul-20	8	7.06	5.6	20	5.0	8.0	1.3	<0.10	<0.10	<17	0.19	0.16	6.81	0.031	0.000373	0.00122	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	1.38	<0.00010	0.0000107	***0.00039***	0.0026
HC-1	29-Jul-20	9	***6.20***	5.8	21	9.0	8.0	1.1	<0.10	<0.10	<16	0.18	0.16	6.89	0.0259	0.000274	0.000849	0.0045	<0.000010	<0.000010	0.0053	0.000004	1.47	<0.00010	0.0000117	***0.00039***	0.0039
HC-1	02-Sep-20	14	***5.6***	5.2	15	12.0	6.0	<1.0	<0.10	<0.10	<16	0.12	0.13	-4.63	0.0247	0.000205	0.000665	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	1.36	<0.00010	0.0000085	<0.00010	0.0047
HC-1	07-Oct-20	19	***6.39***	4.2	13	4.5	6.0	<0.50	<0.10	<0.10	37	0.12	0.11	3.33	0.0298	0.000207	0.000443	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	1.12	0.00013	0.0000097	***0.00031***	0.0067
HC-1	Lab Duplicate		-	4.2	-	-	-	<0.50	<0.10	<0.10	-	0.12	0.11	3.12	0.0303	0.000231	0.000435	0.0047	<0.000010	<0.000010	0.0013	<0.0000020	1.11	<0.00010	0.0000118	***0.00033***	0.0114
QA/QC RPD%			*	*	*	*	*	*	*	*	*	*	*	*	2	11	2	1	*	*	*	*	1	*	*	*	*
HC-1	11-Nov-20	24	6.87	6.3	16	3.5	7.3	<1.0	<0.10	<0.10	<17	0.15	0.15	-1.32	0.0182	0.000203	0.000339	0.0077	<0.000010	<0.000010	<0.0050	<0.0000020	1.64	<0.00010	0.0000094	0.00014	<0.0020
HC-1	16-Dec-20	29	7.23	5.5	13	6.5	5.5	<1.0	<0.10	<0.10	<15	0.11	0.13	-9.99	0.0231	0.000261	0.000313	0.0060	<0.000010	<0.000010	<0.0050	<0.0000020	1.42	<0.00010	0.0000211	<0.00010	0.0048
HC-1	20-Jan-21	34	***6.27***	3.7	10	5.5	5.0	<1.0	<0.10	<0.10	37	0.10	0.09	3.26	0.0209	0.000194	0.000618	0.0051	<0.000010	0.000017	<0.0050	0.00002	0.921	0.0001	0.0000186	***0.00042***	0.0107
HC-1	24-Feb-21	39	***5.78***	5.6	15	6.0	7.0	<4.0	<0.10	<0.10	<29	0.14	0.13	2.52	0.0183	0.000179	0.000423	0.0074	<0.000010	<0.000010	<0.0050	0.0000031	1.44	<0.00010	0.0000237	***0.00037***	0.0464
HC-1	31-Mar-21	44	7.03	8.5	23	3.5	10.0	<1.0	<0.10	<0.10	28	0.20	0.21	-1.26	0.0267	0.00027	0.000757	0.0110	<0.000010	<0.000010	<0.0050	<0.0000020	2.18	<0.00010	0.0000184	<0.00010	0.0147
HC-1	05-May-21	49	6.52	4.9	14	3.0	5.0	<1.0	<0.10	<0.10	24	0.10	0.12	-9.94	0.0388	0.000209	0.000302	0.0076	<0.000010	<0.000010	<0.0050	0.000005	1.27	<0.00010	0.0000144	***0.00034***	0.0066
HC-1	Lab Duplicate		-	4.8	-	-	-	-	-	-	-	0.10	0.12	-9.52	0.0373	0.000167	0.000291	0.0074	<0.000010	<0.000010	<0.0020	<0.0000020	1.28	<0.00010	0.0000144	0.00028	0.0069
QA/QC RPD%			*	1	*	*	*	*	*	*	*	*	*	*	4	*	4	3	*	*	*	*	1	*	*	*	*
HC-1	09-Jun-21	54	7.55	3.4	9	4.5	3.0	<1.0	<0.10	<0.10	<15	0.06	0.09	-18.78	0.0383	0.000193	0.000295	0.0054	<0.000010	<0.000010	<0.0050	<0.0000020	0.955	0.0001	0.000015	***0.00037***	0.0099
HC-1	14-Jul-21	59	7.10	3.0	9	6.0	3.5	<1.0	<0.10	<0.10	43	0.07	0.08	-7.08	0.0599	0.000071	0.000241	0.0060	<0.000010	<0.000010	<0.0050	<0.0000020	0.794	<0.00010	0.0000161	0.00011	0.0133
HC-1	18-Aug-21	64	6.82	4.3	8.65	6.3	4.9	<1.0	<0.10	<0.10	<15	0.10	0.10	-1.56	0.0206	0.000079	0.000259	0.0057	<0.000010	<0.000010	<0.0050	0.0000031	1.13	<0.00010	0.0000111	<0.00010	0.0048
HC-2	27-May-20	0	6.60	8.5	66	3.5	7.5	14.1	1.72	<0.10	54	0.49	0.43	6.96	0.0042	0.000454	0.000829	0.0102	<0.000010	<0.000010	0.0055	0.0000121	2.56	<0.00010	0.000286	***0.00061***	<0.0020
HC-2	03-Jun-20	1	***6.02***	22.7	100	4.0	3.5	33.0	0.88	<0.10	53	0.78	0.70	5.31	0.0019	0.000453	0.00165	0.0304	<0.000010	<0.000010	0.0118	0.0000178	6.99	<0.00010	0.000499	***0.0017***	<0.0020
HC-2	10-Jun-20	2	***6.34***	18.3	73	12.0	3.0	25.7	0.22	<0.10	46	0.60	0.51	8.63	0.0021	0.000215	0.000733	0.0201	<0.000010	<0.000010	0.0078	0.0000123	5.79	<0.00010	0.00041	***0.00096***	<0.0020
HC-2	17-Jun-20	3	***5.83***	15.9	66	17.0	2.0	21.7	<0.10	<0.10	38	0.49	0.41	8.91	0.002	0.000167	0.000604	0.0192	<0.000010	<0.000010	0.0071	0.0000129	5.04	<0.00010	0.000489	***0.00065***	0.0035
HC-2	24-Jun-20	4	***5.74***	16.7	61	5.0	2.0	20.8	0.11	<0.10	33	0.48	0.42	5.85	0.0027	0.000142	0.000714	0.0164	<0.000010	<0.000010	0.0067	0.0000135	5.44	<0.00010	0.000582	***0.00082***	0.0025
HC-2	01-Jul-20	5	***5.75***	13.6	56	4.5	1.5	17.7	<0.10	<0.10	38	0.40	0.33	9.03	0.0041	0.000163	0.000718	0.0152	<0.000010	<0.000010	0.0058	0.0000092	4.41	<0.00010	0.000428	0.00013	0.0028
HC-2	08-Jul-20	6	***5.81***	8.7	33	3.3	3.0	11	<0.10	<0.10	49	0.29	0.22	13.36	0.019	0.000155	0.000823	0.0097	<0.000010	<0.000010	0.0056	0.0000075	2.79	<0.00010	0.00031	***0.00045***	0.0041
HC-2	15-Jul-20	7	***5.71***	13.5	44	6.0	1.0	14.5	<0.10	<0.10	<15	0.32	0.31	1.21	0.0148	0.000169	0.000976	0.0172	<0.000010	<0.000010	0.006	0.0000076	4.44	<0.00010	0.000642	0.00026	0.0025
HC-2	Lab Duplicate		-	13.5	-	-	-	-	-	-	-	0.32	0.32	1.06	0.0143	0.000175	0.000928	0.0166	<0.000010	<0.000010	0.0064	0.000007	4.48	<0.00010	0.000633	0.00025	0.0023
QA/QC RPD%			*	0	*	*	*	*	*	*	*	*	*	*	3	*	5	4	*	*	*	*	1	*	1	*	*
HC-2	22-Jul-20	8	***6.29***	11.0	41	7.5	2.0	12.4	<0.10	<0.10	<16	0.30	0.26	6.70	0.0106	0.000224	0.00116	0.0171	<0.000010	<0.000010	0.0061	0.0000078	3.62	<0.00010	0.00045	***0.0004***	0.0033
HC-2	29-Jul-20	9	***4.41***	10.4	42	13.5	<0.5	12.2	<0.10	<0.10	15	0.25	0.24	2.66	0.0088	0.000107	0.000987	0.0133	<0.000010	<0.000010	0.0064	0.0000095	3.48	<0.00010	0.000768	***0.00058***	0.009
HC-2	02-Sep-20	14	***4.48***	11.0	36	7.5	<0.5	12	<0.10	<0.10	23	0.25	0.24	1.84	0.0045	0.000054	0.000663	0.0169	0.00002	<0.000010	<0.0050	0.0000195	3.83	<0.00010	0.00159	<0.00010	0.0348
HC-2	07-Oct-20	19	***4.97***	7.1	25	5.0	1.0	7.3	<0.10	<0.10	51	0.17	0.16	2.39	0.0054	0.000128	0.000531	0.0201	0.000016	<0.000010	<0.0050	0.0000185	2.54	<0.00010	0.0015	***0.00053***	0.0239

Associated Global file: 1964.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

			Physical Parameters				Dissolved Inorgnanics					Ion Balance			Dissolved Metals												
Sample ID	Sampling Date (dd-mmm-yy)	Week No.	pH	Hardness (CaCO3)	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Anions	Cations	% Difference	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)
			pH	mg/L	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	meq/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			6.5-9.0	n/a	n/a	n/a	n/a	128-218[c] (LT)	600	0.4-1.01[c]	n/a	n/a	n/a	n/a	0.02-0.1[c]	0.009 (LT)	0.005	1 (LT)	0.00013 (LT)	n/a	1.2 (LT)	0.00004-0.00026[d]	n/a	0.001 (Cr(+6)) (LT)	0.11	0.0003[e]	1
HC-2	11-Nov-20	24	***5.22***	7.6	26	7.0	0.5	8.1	<0.10	<0.10	<15	0.18	0.17	1.58	0.0095	<0.000050	0.000394	0.0260	0.000047	<0.000010	<0.0050	0.0000297	2.73	<0.00010	0.00246	***0.0025***	0.0732
HC-2	16-Dec-20	29	6.53	5.0	20	7.0	0.5	6.8	<0.10	<0.10	<16	0.15	0.12	11.97	0.0113	0.000067	0.000611	0.0304	0.000062	<0.000010	<0.0050	0.0000239	1.8	<0.00010	0.00199	***0.00116***	0.0287
HC-2	20-Jan-21	34	***4.27***	6.2	30	7.5	<0.5	9.6	<0.10	<0.10	40	0.20	0.15	12.70	***0.0486***	0.000077	0.000523	0.0381	0.000108	<0.000010	<0.0050	***0.0000458***	2.21	0.00023	0.00419	***0.00165***	0.313
HC-2	24-Feb-21	39	***3.31***	6.9	36	12.0	<0.5	7.7	<0.10	<0.10	<25	0.16	0.18	-5.00	***0.0745***	<0.000050	0.000492	0.0306	***0.000139***	<0.000010	<0.0050	***0.0000426***	2.55	0.00013	0.00447	***0.0018***	0.453
HC-2	31-Mar-21	44	***4.20***	5.9	45	10.0	<0.5	10.9	<0.10	<0.10	24	0.23	0.16	18.29	***0.0991***	<0.000050	0.000631	0.0586	***0.000219***	<0.000010	<0.0050	***0.0000442***	2.15	0.00024	0.00487	***0.00171***	0.313
HC-2	05-May-21	49	***4.36***	2.7	31	7.0	<0.5	6.1	<0.10	<0.10	<15	0.13	0.09	19.23	***0.106***	0.000063	0.000467	0.0357	***0.000146***	<0.000010	<0.0050	0.0000251	1.01	0.00035	0.00306	***0.00187***	0.243
HC-2	09-Jun-21	54	***4.49***	2.8	37	10.0	<0.5	11.3	<0.10	<0.10	<15	0.24	0.13	27.50	***0.167***	0.000167	0.000505	0.0258	***0.000175***	<0.000010	<0.0050	0.0000254	1.04	0.00046	0.00355	***0.00385***	0.493
HC-2	14-Jul-21	59	***4.26***	2.3	36	11.8	<0.5	9.0	<0.10	<0.10	29	0.19	0.16	9.23	***0.209***	<0.000050	0.000483	0.0307	***0.000172***	<0.000010	<0.0050	0.0000146	0.861	0.00053	0.00259	***0.00348***	0.577
HC-2	Lab Duplicate		-	2.2	-	-	-	-	-	-	-	0.19	0.16	9.02	***0.210***	<0.000050	0.000461	0.0310	***0.000177***	<0.000010	0.0033	0.0000155	0.847	0.00055	0.00259	***0.00348***	0.582
QA/QC RPD%			*	2.0	*	*	*	*	*	*	*	*	*	*	< 1	*	5	1.0000	3	*	*	6	2	4	0	0	1
HC-2	18-Aug-21	64	***4.84***	3.8	36	17.7	<0.5	12.6	<0.10	<0.10	19	0.26	0.17	20.45	***0.296***	<0.000050	0.000511	0.0333	***0.000144***	<0.000010	<0.0050	0.0000168	1.44	0.00067	0.00326	***0.00171***	***1.12***
HC-3	27-May-20	0	7.76	39.0	113	2.5	35.5	5.0	1.42	<0.10	78	0.85	0.95	-5.57	0.0569	0.000335	0.00145	0.0056	<0.000010	<0.000010	0.0061	<0.0000020	6.75	<0.00010	0.000041	***0.00065***	<0.0020
HC-3	03-Jun-20	1	7.63	42.7	112	4.0	40.0	8.2	0.81	<0.10	60	0.99	1.02	-1.21	0.0939	0.000388	0.00313	0.0069	<0.000010	<0.000010	0.0088	<0.0000020	6.55	<0.00010	0.0000489	***0.00108***	<0.0020
HC-3	10-Jun-20	2	7.13	32.5	85	17.0	32.5	7.2	0.31	0.11	44	0.81	0.76	3.58	0.0949	0.000233	0.00236	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	5.24	<0.00010	0.0000287	***0.00068***	0.0031
HC-3	17-Jun-20	3	7.63	30.1	84	5.5	29.5	5.5	0.10	<0.10	36	0.71	0.69	1.11	0.0843	0.000193	0.00183	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	5.01	<0.00010	0.0000249	***0.00044***	0.0023
HC-3	24-Jun-20	4	7.82	29.3	76	4.0	29.0	5.9	<0.10	<0.10	31	0.70	0.68	1.83	0.0869	0.000188	0.00172	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	5.07	<0.00010	0.0000198	0.00025	0.0034
HC-3	01-Jul-20	5	8.44	27.2	77	<0.5	28.3	5.1	<0.10	<0.10	37	0.67	0.63	3.21	***0.109***	0.000226	0.00157	0.0045	<0.000010	<0.000010	<0.0050	0.0000036	4.25	0.00012	0.0000298	***0.00284***	0.0185
HC-3	08-Jul-20	6	8.04	28.8	73	2.0	32.5	3.3	<0.10	<0.10	55	0.72	0.66	4.59	0.0799	0.000266	0.00142	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	4.48	<0.00010	0.0000212	***0.0006***	0.0058
HC-3	Lab Duplicate		-	28.5	-	-	-	-	-	-	-	0.72	0.65	5.05	0.0786	0.000259	0.00144	0.00479	<0.00001	<0.00001	0.0043	<0.000002	4.44	<0.0001	0.0000227	***0.00061***	0.0059
QA/QC RPD%			*	1	*	*	*	*	*	*	*	*	*	*	2	3	1	1	*	*	*	*	1	*	*	2	*
HC-3	15-Jul-20	7	7.67	28.1	69	7.0	30.0	2.4	<0.10	<0.10	35	0.65	0.63	1.43	***0.133***	0.000229	0.00136	0.0054	<0.000010	<0.000010	<0.0050	<0.0000020	5.1	<0.00010	0.0000306	0.00015	0.0244
HC-3	22-Jul-20	8	7.67	23.2	63	4.0	25.5	2.3	<0.10	<0.10	<16	0.56	0.53	2.47	0.0907	0.000218	0.00109	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	3.97	0.00013	0.0000196	0.00025	0.0094
HC-3	29-Jul-20	9	7.04	22.8	67	10.0	25.5	2.2	<0.10	<0.10	27	0.56	0.51	4.42	0.0739	0.000136	0.000966	0.0038	<0.000010	<0.000010	<0.0050	0.0000022	4.04	0.0001	0.0000176	0.00029	0.0078
HC-3	02-Sep-20	14	7.02	24.0	57	11.0	24.5	1.8	<0.10	<0.10	21	0.53	0.52	0.32	0.0541	0.000135	0.000839	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	4.51	<0.00010	0.0000257	<0.00010	0.0053
HC-3	07-Oct-20	19	7.48	21.7	52	4.5	24.0	1	<0.10	<0.10	43	0.50	0.47	2.89	0.0558	0.000198	0.000546	0.0038	<0.000010	<0.000010	<0.0050	<0.0000020	4.32	<0.00010	0.0000131	0.00011	0.007
HC-3	11-Nov-20	24	7.77	25.2	53	2.5	26.3	<1.0	<0.10	<0.10	24	0.53	0.54	-1.25	0.0452	0.00018	0.000548	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	4.74	<0.00010	0.0000143	0.00014	0.0036
HC-3	16-Dec-20	29	7.33	23.4	52	7.5	24.4	<1.0	<0.10	<0.10	17	0.49	0.51	-1.82	0.0602	0.00024	0.000484	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	4.43	<0.00010	0.0000143	<0.00010	0.0066
HC-3	Lab Duplicate		-	23.7	-	-	-	-	-	-	-	0.49	0.52	-2.72	0.058	0.000221	0.000498	0.0046	<0.000010	<0.000010	<0.0020	<0.0000020	4.54	<0.00010	0.0000156	<0.00010	0.007
QA/QC RPD%			*	1	*	*	*	*	*	*	*	*	*	*	4	*	3	9	*	*	*	*	2	*	*	*	*
HC-3	20-Jan-21	34	7.21	21.2	43	7.0	20.5	<1.0	<0.10	<0.10	38	0.41	0.46	-5.37	0.0542	0.00018	0.000506	0.0042	<0.000010	<0.000010	<0.0050	0.0000062	3.84	0.00013	0.0000255	0.00011	0.0079
HC-3	24-Feb-21	39	***6.07***	21.8	51	11.0	23.0	<4.0	<0.10	<0.10	<28	0.46	0.46	-0.42	0.035	0.000098	0.000329	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	4.41	<0.00010	0.0000216	<0.00010	0.0057
HC-3	31-Mar-21	44	7.88	38.7	88	2.0	47.5	<1.0	<0.10	<0.10	51	0.95	0.82	7.29	0.0326	0.000177	0.000546	0.0088	<0.000010	<0.000010	<0.0050	<0.0000020	8.08	0.00013	0.0000234	<0.00010	0.0079
HC-3	05-May-21	49	7.79	19.0	45	3.5	18.5	<1.0	<0.10	<0.10	15	0.37	0.41	-5.39	0.0674	0.000154	0.000292	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	4.23	0.00011	0.0000174	***0.00092***	0.0136
HC-3	09-Jun-21	54	7.66	21.1	47	4.0	20.0	1	<0.10	<0.10	<15	0.42	0.46	-4.46	***0.127***	0.000221	0.000217	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	5.14	0.00014	0.0000496	***0.00058***	0.0395
HC-3	14-Jul-21	59	7.75	18.4	43	3.5	18.0	1.1	<0.10	<0.10	37	0.38	0.39	-0.84	0.0445	0.00006	0.000207	0.0041	<0.000010	<0.000010	<0.0050	<0.0000020	4.05	<0.00010	0.0000183	<0.00010	0.007
HC-3	18-Aug-21	64	7.15	20.1	41.9	9.2	22.2	<1.0	<0.10	<0.10	30	0.44	0.42	2.66	0.0355	0.000061	0.000233	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	4.36	<0.00010	0.0000207	<0.00010	0.007

Associated Global file: 1964.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

			Physical Parameters				Dissolved Inorgnanics					Ion Balance			Dissolved Metals												
Sample ID	Sampling Date (dd-mmm-yy)	Week No.	pH	Hardness (CaCO3)	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Anions	Cations	% Difference	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)
			pH	mg/L	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	meq/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			6.5-9.0	n/a	n/a	n/a	n/a	128-218[c] (LT)	600	0.4-1.01[c]	n/a	n/a	n/a	n/a	0.02-0.1[c]	0.009 (LT)	0.005	1 (LT)	0.00013 (LT)	n/a	1.2 (LT)	0.00004-0.00026[d]	n/a	0.001 (Cr(+6)) (LT)	0.11	0.0003[e]	1
HC-4	27-May-20	0	7.79	39.8	116	2.5	36.0	5.7	1.54	<0.10	88	0.88	0.96	-4.07	0.0698	0.000959	0.000807	0.0063	<0.000010	<0.000010	0.0051	0.0000028	7.36	<0.00010	0.0000477	***0.00065***	<0.0020
HC-4	03-Jun-20	1	7.81	44.7	118	5.0	41.0	9.2	1.34	0.22	58	1.06	1.05	0.36	0.0932	0.00117	0.00194	0.0077	<0.000010	<0.000010	0.0089	0.000002	7.56	<0.00010	0.0000483	***0.00083***	<0.0020
HC-4	10-Jun-20	2	6.82	34.1	85	17.0	34.5	5.3	0.49	<0.10	74	0.81	0.79	1.56	***0.102***	0.000646	0.00128	0.0053	<0.000010	<0.000010	<0.0050	<0.0000020	6.08	<0.00010	0.0000314	***0.00077***	<0.0020
HC-4	Lab Duplicate		-	31.2	-	-	-	6.1	-	-	-	0.83	0.81	1.34	***0.1***	0.000288	0.00117	0.0048	<0.000010	<0.000010	0.0044	<0.0000020	5.94	<0.00010	0.0000276	***0.00072***	<0.0020
	QA/QC RPD%		*	9	*	*	*	*	*	*	*	*	*	*	2	77	9	10		*	*	*	2	*	13	7	*
HC-4	17-Jun-20	3	7.31	35.6	97	9.5	35.0	4.7	0.28	0.10	35	0.81	0.81	-0.12	0.0766	0.000633	0.00108	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	6.3	<0.00010	0.0000245	0.00029	<0.0020
HC-4	Lab Duplicate		-	35.7	-	-	-	-	-	-	-	0.81	0.81	-0.19	0.0762	0.000626	0.00107	0.00579	<0.00001	<0.00001	0.0051	<0.000002	6.4	<0.0001	0.0000239	***0.00018***	<0.002
	QA/QC RPD%		*	< 1	*	*	*	*	*	*	*	*	*	*	1	1	1	1	*	*	*	*	2	*	*		*
HC-4	24-Jun-20	4	7.89	32.5	81	3.0	33.5	5.1	0.31	<0.10	45	0.78	0.75	2.60	0.0888	0.000522	0.000915	0.0052	<0.000010	<0.000010	<0.0050	0.0000053	6.03	<0.00010	0.0000176	0.00021	0.0028
HC-4	01-Jul-20	5	8.41	29.5	79	<0.5	30.0	6.7	0.14	<0.10	<37	0.74	0.67	4.97	0.0797	0.000491	0.000891	0.0045	<0.000010	<0.000010	<0.0050	0.0000022	5.2	***0.00212***	0.0000455	***0.00055***	0.0136
HC-4	Lab Duplicate		-	29.8	-	-	-	-	-	-	-	0.74	0.68	4.25	0.083	0.000495	0.000906	0.0045	0.00001	0.00001	0.0031	0.000002	5.17	***0.00214***	0.0000502	***0.00057***	0.0138
	QA/QC RPD%		*	-	*	*	*	*	*	*	*	*	*	*	4	1	2	0	*	*	*	*	1	1	10	4	1
HC-4	08-Jul-20	6	7.52	27.4	69	6.0	31.0	3.3	<0.10	<0.10	52	0.69	0.62	5.17	0.0954	0.00041	0.000687	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	4.93	<0.00010	0.0000197	0.00018	0.0094
HC-4	15-Jul-20	7	7.7	32.9	80	3.0	33.0	2.7	<0.10	<0.10	37	0.72	0.73	-0.72	0.0836	0.000514	0.00068	0.0061	<0.000010	<0.000010	<0.0050	<0.0000020	6.53	<0.00010	0.0000159	0.00013	0.0074
HC-4	22-Jul-20	8	7.6	25.8	68	4.0	29.0	2.1	<0.10	<0.10	<16	0.62	0.57	4.10	0.0839	0.000297	0.000576	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	5.13	<0.00010	0.0000146	0.00015	0.006
HC-4	29-Jul-20	9	6.88	28.2	83	12.5	31.0	2.4	<0.10	<0.10	36	0.67	0.62	3.92	0.0711	0.000379	0.000506	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	5.42	<0.00010	0.0000168	0.00018	0.0071
HC-4	02-Sep-20	14	7.15	28.1	65	7.0	30.0	1.7	<0.10	<0.10	33	0.64	0.60	2.49	0.0655	0.000309	0.000427	0.0056	<0.000010	<0.000010	<0.0050	<0.0000020	5.84	<0.00010	0.0000138	<0.00010	0.0051
HC-4	07-Oct-20	19	7.89	25.8	63	2.0	28.0	1.2	<0.10	<0.10	44	0.59	0.56	2.57	0.055	0.000294	0.000395	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	5.58	<0.00010	0.0000137	0.00016	0.0054
HC-4	11-Nov-20	24	7.89	27.5	56	3.0	27.7	<1.0	<0.10	<0.10	17	0.55	0.58	-2.61	0.0465	0.000287	0.000217	0.0050	<0.000010	<0.000010	<0.0050	<0.0000020	5.89	<0.00010	0.0000114	0.00021	<0.0020
HC-4	16-Dec-20	29	7.39	27.2	60	6.5	29.0	<1.0	<0.10	<0.10	31	0.58	0.58	-0.06	0.0505	0.000387	0.000259	0.0050	<0.000010	<0.000010	<0.0050	<0.0000020	5.83	<0.00010	0.0000122	<0.00010	0.0043
HC-4	20-Jan-21	34	7.54	24.7	52	3.5	25.0	<1.0	<0.10	<0.10	45	0.50	0.53	-2.48	0.0589	0.000258	0.000272	0.0050	<0.000010	<0.000010	<0.0050	0.0000027	5.31	0.00014	0.0000138	***0.00031***	0.0073
HC-4	24-Feb-21	39	6.57	24.1	57	8.0	26.0	<4.0	<0.10	<0.10	<27	0.52	0.51	0.65	0.0499	0.000182	0.000226	0.0052	<0.000010	<0.000010	<0.0050	0.0000024	5.76	<0.00010	0.0000288	0.00011	0.009
HC-4	31-Mar-21	44	7.87	42.3	95	2.5	42.5	<1.0	<0.10	<0.10	47	0.85	0.89	-2.42	0.0293	0.000293	0.000387	0.0094	<0.000010	<0.000010	<0.0050	<0.0000020	9.65	0.00011	0.0000167	<0.00010	0.0044
HC-4	05-May-21	49	7.84	19.3	46	2.0	19.0	<1.0	<0.10	<0.10	33	0.38	0.41	-4.27	0.0454	0.000195	0.00015	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	4.77	<0.00010	0.0000274	0.00019	0.008
HC-4	09-Jun-21	54	7.42	22.9	51	9.0	21.5	<1.0	<0.10	<0.10	<15	0.43	0.49	-6.21	0.0616	0.000272	0.000157	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	6.23	0.00011	0.0000495	0.00018	0.0134
HC-4	14-Jul-21	59	7.76	20.8	48	3.0	19.6	<1.0	<0.10	<0.10	49	0.39	0.44	-5.98	0.0522	0.000082	0.000114	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	5.35	<0.00010	0.0000173	<0.00010	0.0087
HC-4	18-Aug-21	64	7.33	22.5	40.4	9.3	27.8	<1.0	<0.10	<0.10	25	0.56	0.47	8.14	0.041	0.000078	0.000107	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	5.6	<0.00010	0.0000159	0.00011	0.0049
HC-5	27-May-20	0	8.16	37.9	137	1.0	33.0	3.8	11.6	<0.10	88	1.07	1.04	1.27	0.0575	0.000398	0.000743	0.0057	<0.000010	<0.000010	0.006	<0.0000020	7.71	<0.00010	0.0000411	***0.00125***	<0.0020
HC-5	03-Jun-20	1	7.93	38.2	120	2.5	35.0	5.9	7.94	0.1	55	1.05	1.03	1.29	***0.123***	0.000473	0.00147	0.0064	<0.000010	<0.000010	0.0088	<0.0000020	7.03	<0.00010	0.000036	***0.00072***	<0.0020
HC-5	10-Jun-20	2	7.41	31.6	90	13.0	32.5	4.9	3.19	<0.10	41	0.84	0.82	1.44	***0.101***	0.000288	0.00118	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	6.03	<0.00010	0.0000262	***0.00072***	<0.0020
HC-5	17-Jun-20	3	7.76	29.7	83	5.0	33.5	7.9	0.61	<0.10	30	0.85	0.72	8.44	0.0718	0.000269	0.000996	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.03	<0.00010	0.0000211	***0.00037***	0.0025
HC-5	24-Jun-20	4	8.37	29.8	74	<0.5	32.5	4.3	0.23	<0.10	<30	0.75	0.71	2.66	0.078	0.000261	0.000889	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.12	0.00011	0.0000157	0.00029	0.0023
HC-5	01-Jul-20	5	8.83	24.1	68	<0.5	28.5	3.3	0.11	<0.10	26	0.64	0.56	6.45	0.0664	0.000248	0.000862	0.0036	<0.000010	<0.000010	<0.0050	<0.0000020	4.62	<0.00010	0.0000184	***0.00077***	0.0035
HC-5	08-Jul-20	6	8.45	26.9	71	<0.5	32.5	3.0	<0.10	<0.10	46	0.71	0.61	8.06	0.0699	0.000288	0.00074	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	5.36	<0.00010	0.0000191	***0.00031***	0.0075
HC-5	15-Jul-20	7	7.91	28.6	68	2.0	30.0	1.1	<0.10	<0.10	22	0.62	0.63	-0.36	0.059	0.000242	0.000738	0.0041	<0.000010	<0.000010	<0.0050	<0.0000020	6.53	<0.00010	0.000013	***0.00038***	<0.0020
HC-5	22-Jul-20	8	7.93	29.0	77	2.0	32.0	1.5	<0.10	<0.10	21	0.67	0.65	1.85	0.0649	0.000345	0.00082	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	6.08	<0.00010	0.0000211	***0.00044***	0.0045
HC-5	29-Jul-20	9	7.26	22.6	67	8.0	27.0	<1.0	<0.10	<0.10	25	0.54	0.50	4.02	0.0601	0.000167	0.00066	0.0035	<0.000010	<0.000010	<0.0050	<0.0000020	4.84	0.00012	0.0000155	0.00024	0.0055

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QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

			Physical Parameters				Dissolved Inorgnanics					Ion Balance			Dissolved Metals													
Sample ID	Sampling Date (dd-mmm-yy)	Week No.	pH	Hardness (CaCO3)	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Anions	Cations	% Difference	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)
			pH	mg/L	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	meq/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			6.5-9.0	n/a	n/a	n/a	n/a	128-218[c] (LT)	600	0.4-1.01[c]	n/a	n/a	n/a	n/a	0.02-0.1[c]	0.009 (LT)	0.005	1 (LT)	0.00013 (LT)	n/a	1.2 (LT)	0.00004-0.00026[d]	n/a	0.001 (Cr(+6)) (LT)	0.11	0.0003[e]	1
HC-5	02-Sep-20	14	7.13	25.4	58	7.5	26.0	1.0	<0.10	<0.10	31	0.54	0.54	-0.05	0.0444	0.000128	0.000538	0.0040	<0.000010	<0.000010	<0.0050	<0.0000020	5.86	<0.00010	0.0000099	<0.00010	0.0041
HC-5	Lab Duplicate		-	25.4	-	-	-	1.0	-	-	-	0.54	0.54	-0.28	0.0442	0.000129	0.000523	0.0039	<0.000010	<0.000010	0.0024	<0.0000020	5.9	<0.00010	0.0000141	<0.00010	0.0041
QA/QC RPD%			*	0	*	*	*	0	*	*	*	*	*	*	< 1	*	3	2	*	*	*	*	1	*	*	*	*
HC-5	07-Oct-20	19	7.95	27.9	66	2.5	30.0	<1.0	<0.10	<0.10	43	0.60	0.60	0.19	0.0443	0.000333	0.000502	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	6.09	0.00028	0.0000139	0.0002	0.0073
HC-5	11-Nov-20	24	7.66	27.0	57	2.5	27.0	<1.0	<0.10	<0.10	26	0.54	0.57	-2.59	0.032	0.0002	0.000337	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	6.39	<0.00010	0.0000118	***0.00086***	0.0074
HC-5	16-Dec-20	29	7.62	28.3	60	6.5	30.0	<1.0	<0.10	<0.10	25	0.60	0.60	0.21	0.0422	0.00021	0.000312	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	6.51	<0.00010	0.0000113	***0.00522***	0.0037
HC-5	20-Jan-21	34	7.52	26.0	55	5.0	27.0	<1.0	<0.10	<0.10	40	0.54	0.54	-0.33	0.0443	0.000148	0.000371	0.0039	<0.000010	<0.000010	<0.0050	<0.0000020	6.65	0.00016	0.0000162	0.00012	0.0064
HC-5	24-Feb-21	39	7.26	26.6	64	9.0	29.5	<4.0	<0.10	<0.10	<43	0.59	0.56	3.01	0.0312	0.000118	0.000263	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.98	<0.00010	0.0000147	<0.00010	0.0044
HC-5	31-Mar-21	44	7.75	38.5	83	12.0	33.7	<1.0	<0.10	<0.10	56	0.67	0.80	-8.71	0.0255	0.000133	0.000335	0.0065	<0.000010	<0.000010	<0.0050	<0.0000020	9.69	0.00011	0.0000143	0.00013	0.0031
HC-5	05-May-21	49	8.20	21.4	50	0.5	21.0	<1.0	<0.10	<0.10	24	0.42	0.45	-3.20	0.0382	0.000128	0.000185	0.0045	<0.000010	<0.000010	<0.0050	***0.0000462***	6.24	<0.00010	0.000111	***0.00108***	0.0066
HC-5	09-Jun-21	54	8.00	24.9	55	0.5	22.5	<1.0	<0.10	<0.10	<15	0.45	0.51	-6.65	0.0405	0.000213	0.000215	0.0034	<0.000010	<0.000010	<0.0050	<0.0000020	7.83	<0.00010	0.0000098	<0.00010	0.0056
HC-5	14-Jul-21	59	7.81	23.6	55	3.0	23.5	<1.0	<0.10	<0.10	47	0.47	0.49	-1.63	0.0268	0.000054	0.000164	0.0033	<0.000010	<0.000010	<0.0050	<0.0000020	6.79	<0.00010	0.0000075	<0.00010	<0.0020
HC-5	18-Aug-21	64	7.46	24.7	47.1	7.7	26.4	<1.0	<0.10	<0.10	27	0.53	0.51	1.97	0.0253	0.000055	0.000159	0.0036	<0.000010	<0.000010	<0.0050	<0.0000020	6.9	<0.00010	0.0000091	<0.00010	0.0021

Associated Global file: 1964.

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* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

Sample ID	Sampling Date (dd-mmm-yy)	Week No.	Dissolved Metals																										
			Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			0.003-0.0293[d]	n/a	n/a	0.815-1.03[d]	0.00002[f]	2	0.025[d] (LT)	n/a	n/a	0.002 (LT)	n/a	0.0001[d]	n/a	n/a	n/a	n/a	0.0008 (LT)	n/a	n/a	n/a	n/a	0.0085 (LT)	n/a	0.033[d]	n/a
HC-1	27-May-20	0	<0.000050	0.00146	1.06	0.0025	<0.000020	0.00196	0.00008	0.011	4.67	<0.00010	2.64	<0.000010	1.19	0.0231	2.06	<0.000050	0.0000051	<0.000010	<0.000050	<0.00020	0.42	0.000139	0.00031	<0.0010	<0.000020
HC-1	03-Jun-20	1	<0.000050	0.00149	1.31	0.0033	<0.000020	0.000267	0.000042	<0.010	3.61	<0.00010	2.26	<0.000010	1.37	0.0194	1.52	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.61	0.000598	<0.00020	<0.0010	<0.000020
HC-1	10-Jun-20	2	<0.000050	0.000998	1.09	0.0023	<0.000020	0.000263	<0.000040	<0.010	2.76	<0.00010	1.92	<0.000010	1.17	0.0148	1.58	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.46	0.000457	<0.00020	<0.0010	0.000039
HC-1	17-Jun-20	3	<0.000050	0.000886	0.946	0.0022	<0.000020	0.000224	<0.000040	<0.010	2.39	<0.00010	1.43	<0.000010	0.85	0.0124	1.43	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.35	0.000366	<0.00020	<0.0010	<0.000020
HC-1	24-Jun-20	4	<0.000050	0.000702	0.805	0.0022	<0.000020	0.000222	<0.000040	<0.010	2.43	<0.00010	1.35	<0.000010	0.74	0.0111	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.32	0.000333	<0.00020	<0.0010	<0.000020
HC-1	01-Jul-20	5	0.000054	0.000554	0.679	0.0016	<0.000020	0.00019	0.000093	<0.010	1.87	<0.00010	1.18	<0.000010	0.59	0.00927	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00023	0.33	0.000376	<0.00020	<0.0010	<0.000020
HC-1	08-Jul-20	6	0.000055	0.000549	0.762	0.0028	<0.000020	0.000164	<0.000040	0.011	1.59	<0.00010	1.11	<0.000010	0.42	0.0104	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00044	0.30	0.000251	<0.00020	<0.0010	0.000026
HC-1	15-Jul-20	7	<0.000050	0.000609	0.918	0.0025	<0.000020	0.000146	<0.000040	<0.010	1.89	<0.00010	1.42	<0.000010	0.29	0.0122	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.30	0.000293	0.00345	<0.0010	0.000028
HC-1	22-Jul-20	8	<0.000050	0.000501	0.521	0.0019	<0.000020	0.000096	<0.000040	0.01	1.41	0.00016	0.96	<0.000010	0.27	0.00726	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000176	<0.00020	<0.0010	<0.000020
HC-1	29-Jul-20	9	<0.000050	0.000374	0.521	0.0022	<0.000020	0.000086	<0.000040	<0.010	1.19	<0.00010	0.84	<0.000010	0.18	0.00713	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000223	<0.00020	<0.0010	<0.000020
HC-1	02-Sep-20	14	<0.000050	0.000277	0.427	0.0017	<0.000020	0.000054	0.000112	<0.010	0.836	<0.00010	0.79	<0.000010	0.09	0.00659	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000191	<0.00020	<0.0010	<0.000020
HC-1	07-Oct-20	19	<0.000050	0.000194	0.338	0.0017	<0.000020	0.000156	0.000118	<0.010	0.811	<0.00010	0.74	<0.000010	0.09	0.00623	<0.50	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000105	0.00082	<0.0010	<0.000020
HC-1	Lab Duplicate		<0.000050	0.000224	0.347	0.0017	<0.000010	0.000076	0.000077	<0.010	0.81	<0.00010	0.71	<0.000010	0.08	0.00602	<0.50	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000102	0.00072	<0.0010	<0.000020
QA/QC RPD%			*	*	3	0	*	69	*	*	< 1	*	4	*	8	3	*	*	*	*	*	*	*	3	*	*	*
HC-1	11-Nov-20	24	<0.000050	0.000275	0.523	0.0019	<0.000020	0.00003	<0.000040	<0.010	0.785	<0.00010	0.71	<0.000010	0.06	0.00801	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000181	<0.00020	0.0012	<0.000020
HC-1	16-Dec-20	29	<0.000050	0.000399	0.463	0.0026	<0.000020	0.000022	0.000045	<0.010	0.774	<0.00010	0.83	<0.000010	0.06	0.00588	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.0000964	0.00022	<0.0010	<0.000020
HC-1	20-Jan-21	34	0.000426	0.000226	0.347	0.0047	0.00002	0.000032	0.00005	0.014	0.556	<0.00010	1.45	0.00001	0.04	0.00492	<1.00	<0.000050	<0.0000040	0.000012	<0.000050	<0.00020	<0.20	0.0000503	<0.00020	0.0019	<0.000020
HC-1	24-Feb-21	39	<0.000050	0.00027	0.471	0.0020	0.00002	0.000028	0.000357	<0.010	0.612	<0.00010	0.87	<0.000010	0.06	0.00704	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000103	<0.00020	<0.0010	<0.000020
HC-1	31-Mar-21	44	<0.000050	0.000587	0.732	0.0032	<0.000020	0.000037	0.000062	<0.010	1.13	<0.00010	1.62	<0.000010	0.07	0.00995	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000104	0.00028	<0.0010	<0.000020
HC-1	05-May-21	49	<0.000050	0.000345	0.41	0.0023	<0.000020	0.00002	0.000061	<0.010	0.681	<0.00010	1	<0.000010	0.06	0.00596	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00037	<0.20	0.0000602	<0.00020	<0.0010	<0.000020
HC-1	Lab Duplicate		<0.000050	0.000342	0.398	0.0021	<0.000020	0.000017	0.000058	<0.010	0.671	<0.00010	0.99	<0.000010	0.06	0.0059	<0.50	<0.000050	<0.0000040	<0.000010	<0.000050	0.00027	<0.20	0.0000604	<0.00020	<0.0010	<0.000020
QA/QC RPD%			*	1	3	12	*	*	*	*	1	*	1	*	0	1	*	*	*	*	*	*	*	< 1	*	*	*
HC-1	09-Jun-21	54	<0.000050	0.000273	0.252	0.0019	<0.000020	0.000023	0.000077	<0.010	0.5	<0.00010	0.74	<0.000010	0.04	0.00374	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00051	<0.20	0.0000271	<0.00020	<0.0010	<0.000020
HC-1	14-Jul-21	59	0.000062	0.000198	0.25	0.0026	<0.000020	0.000011	<0.000040	<0.010	0.445	<0.00010	0.82	<0.000010	0.04	0.00325	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00063	<0.20	0.0000204	<0.00020	<0.0010	0.000113
HC-1	18-Aug-21	64	<0.000050	0.000209	0.346	0.0013	<0.000020	<0.000010	0.000098	<0.010	0.465	<0.00010	0.83	<0.000010	0.04	0.0046	<1.00	0.000058	<0.0000040	<0.000010	0.000101	<0.00020	<0.20	0.0000245	<0.00020	<0.0010	0.000021
HC-2	27-May-20	0	<0.000050	0.00107	0.504	0.0055	<0.000020	0.000518	0.000714	<0.010	8.26	***0.00218***	1.22	<0.000010	1.03	0.0187	4.87	<0.000050	0.0000515	<0.000010	<0.000050	<0.00020	<0.20	0.0000061	<0.00020	<0.0010	<0.000020
HC-2	03-Jun-20	1	<0.000050	0.00125	1.27	0.0155	<0.000020	0.00007	0.00166	<0.010	8.1	***0.00266***	3.1	<0.000010	0.86	0.0415	10.8	<0.000050	0.0000415	<0.000010	<0.000050	<0.00020	<0.20	0.0000032	<0.00020	<0.0010	<0.000020
HC-2	10-Jun-20	2	<0.000050	0.000734	0.919	0.0114	<0.000020	0.000061	0.00135	<0.010	4.82	0.00116	2.17	<0.000010	0.33	0.0297	8.32	<0.000050	0.0000292	<0.000010	<0.000050	<0.00020	<0.20	0.0000061	<0.00020	<0.0010	<0.000020
HC-2	17-Jun-20	3	<0.000050	0.000608	0.795	0.0126	<0.000020	0.00005	0.00159	<0.010	3.33	0.00072	1.94	<0.000010	0.13	0.0255	7.53	<0.000050	0.0000224	<0.000010	<0.000050	<0.00020	<0.20	0.0000022	<0.00020	<0.0010	<0.000020
HC-2	24-Jun-20	4	<0.000050	0.000526	0.76	0.0157	<0.000020	0.000063	0.00188	<0.010	3.23	0.00058	2	<0.000010	0.08	0.0256	7.1	<0.000050	0.0000209	<0.000010	<0.000050	<0.00020	<0.20	0.0000023	<0.00020	<0.0010	<0.000020
HC-2	01-Jul-20	5	<0.000050	0.000425	0.626	0.0136	<0.000020	0.00005	0.00135	<0.010	2.18	0.00045	1.47	<0.000010	0.04	0.0255	6.05	<0.000050	0.0000148	<0.000010	<0.000050	<0.00020	<0.20	0.0000018	<0.00020	<0.0010	<0.000020
HC-2	08-Jul-20	6	<0.000050	0.000318	0.43	0.0113	<0.000020	0.000056	0.00104	<0.010	1.54	0.00032	1.57	<0.000010	0.05	0.0168	3.7	<0.000050	0.0000099	<0.000010	<0.000050	<0.00020	<0.20	0.000008	<0.00020	<0.0010	<0.000020
HC-2	15-Jul-20	7	<0.000050	0.000251	0.58	0.0160	<0.000020	0.000055	0.00238	<0.010	1.57	0.00031	2.34	<0.000010	<0.020	0.0236	5.06	<0.000050	0.0000084	<0.000010	<0.000050	<0.00020	<0.20	<0.0000010	0.00315	<0.0010	<0.000020
HC-2	Lab Duplicate		<0.000050	0.000257	0.573	0.0157	<0.000020	0.000051	0.00195	<0.010	1.55	0.00029	2.24	<0.000010	<0.020	0.0231	4.9	<0.000050	0.0000076	<0.000010	<0.000050	<0.00020	<0.20	0.000001	0.00271	<0.0010	<0.000020
QA/QC RPD%			*	2	1	2	*	8	20	*	1	*	4	*	*	2	*	*	*	*	*	*	*	*		*	*
HC-2	22-Jul-20	8	<0.000050	0.00024	0.468	0.0112	<0.000020	0.000064	0.00114	<0.010	1.37	0.00029	1.07	<0.000010	0.06	0.0214	4.61	<0.000050	0.0000084	<0.000010	<0.000050	<0.00020	<0.20	0.0000033	<0.00020	<0.0010	<0.000020
HC-2	29-Jul-20	9	<0.000050	0.000173	0.417	0.0152	<0.000020	0.000048	0.00208	<0.010	1.07	0.00028	1.42	<0.000010	0.03	0.0189	4.21	<0.000050	0.0000087	<0.000010	<0.000050	<0.00020	<0.20	0.0000042	<0.00020	0.0012	<0.000020
HC-2	02-Sep-20	14	<0.000050	0.000127	0.345	0.0216	<0.000020	<0.000010	0.00359	<0.010	0.699	0.00016	1.64	<0.000010	<0.020	0.0198	3.96	<0.000050	0.0000078	<0.000010	<0.000050	<0.00020	<0.20	0.0000102	<0.00020	0.0016	<0.000020
HC-2	07-Oct-20	19	<0.000050	0.000097	0.19	0.0169	<0.000020	0.000088	0.00316	<0.010	0.682	0.00011	0.85	<0.000010	0.03	0.0145	3.1	<0.000050	0.0000056	<0.000010	<0.000050	<0.00020	<0.20	0.0000102	0.00084	0.0017	<0.000020

Associated Global file: 1964.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

Sample ID	Sampling Date (dd-mmm-yy)	Week No.	Dissolved Metals																										
			Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			0.003-0.0293[d]	n/a	n/a	0.815-1.03[d]	0.00002[f]	2	0.025[d] (LT)	n/a	n/a	0.002 (LT)	n/a	0.0001[d]	n/a	n/a	n/a	n/a	0.0008 (LT)	n/a	n/a	n/a	n/a	0.0085 (LT)	n/a	0.033[d]	n/a
HC-2	11-Nov-20	24	<0.000050	0.000113	0.196	0.0205	<0.000020	<0.000010	0.00417	<0.010	0.535	0.00011	1.39	<0.000010	0.03	0.0148	2.9	<0.000050	0.0000058	<0.000010	<0.000050	<0.00020	<0.20	0.0000241	0.00022	0.0033	<0.000020
HC-2	16-Dec-20	29	<0.000050	0.000132	0.112	0.0141	<0.000020	<0.000010	0.00326	<0.010	0.602	<0.00010	0.75	<0.000010	0.02	0.0114	2.16	<0.000050	0.0000052	<0.000010	<0.000050	<0.00020	<0.20	0.000023	0.00023	0.0023	<0.000020
HC-2	20-Jan-21	34	0.000123	0.000115	0.151	0.0271	<0.000020	<0.000010	0.00631	0.016	0.508	0.00011	2.65	<0.000010	<0.020	0.0139	3.61	<0.000050	0.0000057	<0.000010	<0.000050	<0.00020	<0.20	0.000081	<0.00020	0.0046	<0.000020
HC-2	24-Feb-21	39	0.000078	0.000113	0.126	0.0253	<0.000020	<0.000010	0.00839	<0.010	0.446	0.00015	1.54	<0.000010	0.03	0.012	4.28	<0.000050	0.0000055	<0.000010	<0.000050	<0.00020	<0.20	0.000114	0.00031	0.0049	<0.000020
HC-2	31-Mar-21	44	0.000108	0.000091	0.119	0.0226	<0.000020	<0.000010	0.00667	<0.010	0.585	0.00011	0.94	<0.000010	<0.020	0.0109	3.46	<0.000050	0.0000085	<0.000010	<0.000050	<0.00020	<0.20	0.00015	<0.00020	0.0037	<0.000020
HC-2	05-May-21	49	0.000086	0.000083	0.0497	0.0131	<0.000020	<0.000010	0.00427	<0.010	0.369	<0.00010	0.41	<0.000010	<0.020	0.00555	2.78	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000136	<0.00020	0.003	<0.000020
HC-2	09-Jun-21	54	0.000137	0.000074	0.0414	0.0131	<0.000020	<0.000010	0.00487	<0.010	0.326	<0.00010	0.37	<0.000010	<0.020	0.00451	3.29	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000163	<0.00020	0.0037	<0.000020
HC-2	14-Jul-21	59	0.000108	0.000069	0.0338	0.0089	<0.000020	<0.000010	0.00352	<0.010	0.35	<0.00010	0.37	<0.000010	0.02	0.00365	2.67	<0.000050	<0.0000040	<0.000010	0.000054	<0.00020	<0.20	0.000176	<0.00020	0.0027	<0.000020
HC-2	Lab Duplicate		0.000106	0.000068	0.0341	0.0089	<0.000020	<0.000010	0.0035	<0.010	0.353	0.00012	0.36	<0.000010	0.02	0.00363	3.07	<0.000050	<0.0000040	<0.000010	0.000052	<0.00020	<0.20	0.000174	<0.00020	0.0026	<0.000020
QA/QC RPD%			*	*	0	0	*	*	1	*	1	*	*	*	*	1	*	*	*	*	*	*	*	1	*	4	*
HC-2	18-Aug-21	64	0.00013	0.000068	0.0392	0.0090	***0.00003***	<0.000010	0.00417	<0.010	0.364	<0.00010	0.75	<0.000010	<0.020	0.00544	5.36	<0.000050	<0.0000040	<0.000010	0.000108	<0.00020	<0.20	0.00018	<0.00020	0.0027	<0.000020
HC-3	27-May-20	0	<0.000050	0.00527	5.37	0.0071	<0.000020	0.000926	0.000197	<0.010	4.3	0.00012	1.84	<0.000010	1.30	0.0597	2.3	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	2.95	0.000317	<0.00020	<0.0010	<0.000020
HC-3	03-Jun-20	1	<0.000050	0.00594	6.39	0.0114	<0.000020	0.000639	0.00023	<0.010	3.84	0.00011	2.5	<0.000010	1.20	0.0607	7.04	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	3.02	0.00104	<0.00020	<0.0010	<0.000020
HC-3	10-Jun-20	2	<0.000050	0.00399	4.71	0.0073	<0.000020	0.000523	0.000113	<0.010	2.54	<0.00010	1.99	<0.000010	0.74	0.0433	3.66	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.98	0.000722	<0.00020	<0.0010	<0.000020
HC-3	17-Jun-20	3	<0.000050	0.00369	4.27	0.0077	<0.000020	0.0004	0.000056	<0.010	2.2	<0.00010	1.5	<0.000010	0.54	0.0392	2.56	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.39	0.000711	<0.00020	<0.0010	<0.000020
HC-3	24-Jun-20	4	<0.000050	0.00338	4.04	0.0068	<0.000020	0.000385	0.000056	<0.010	2.39	<0.00010	1.44	<0.000010	0.46	0.0375	1.97	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.36	0.000645	<0.00020	<0.0010	<0.000020
HC-3	01-Jul-20	5	<0.000050	0.00377	4.01	0.0045	<0.000020	0.000372	0.000072	<0.010	2.26	<0.00010	1.53	<0.000010	0.39	0.0379	1.61	<0.000050	<0.0000040	0.000014	<0.000050	0.00058	1.48	0.000713	<0.00020	<0.0010	0.000092
HC-3	08-Jul-20	6	<0.000050	0.00383	4.28	0.0073	<0.000020	0.000332	<0.000040	<0.010	2.2	<0.00010	1.42	<0.000010	0.31	0.0392	1.44	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.33	0.000919	<0.00020	<0.0010	0.000052
HC-3	Lab Duplicate		<0.00005	0.0038	4.23	0.00724	<0.00002	0.000336	<0.00004	<0.01	2.17	<0.0001	1.39	<0.00001	0.302	0.0392	1.35	<0.00005	<0.000004	<0.00001	<0.00005	<0.0002	1.34	0.000928	<0.0002	<0.001	<0.00002
QA/QC RPD%			*	1	1	1	*	1	*	*	1	*	2	*	2	0	*	*	*	*	*	*	*	1	0	*	*	*
HC-3	15-Jul-20	7	<0.000050	0.00331	3.73	0.0064	<0.000020	0.000233	<0.000040	<0.010	1.91	<0.00010	1.44	<0.000010	0.11	0.0371	<1.00	<0.000050	<0.0000040	0.000011	<0.000050	0.00062	1	0.000788	0.00186	<0.0010	0.000147
HC-3	22-Jul-20	8	<0.000050	0.00316	3.23	0.0046	<0.000020	0.000201	0.000051	<0.010	1.83	<0.00010	1.29	<0.000010	0.21	0.0315	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00036	1	0.000582	<0.00020	<0.0010	0.000125
HC-3	29-Jul-20	9	<0.000050	0.00245	3.08	0.0049	<0.000020	0.00019	0.000045	<0.010	1.54	<0.00010	1.03	<0.000010	0.11	0.0292	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.8	0.000663	<0.00020	<0.0010	<0.000020
HC-3	02-Sep-20	14	<0.000050	0.00255	3.1	0.0060	<0.000020	0.000139	<0.000040	<0.010	1.31	<0.00010	1.03	<0.000010	0.08	0.0319	<1.00	<0.000050	<0.0000040	0.000011	<0.000050	<0.00020	0.57	0.000678	<0.00020	<0.0010	0.000094
HC-3	07-Oct-20	19	<0.000050	0.00161	2.65	0.0029	<0.000020	0.000114	0.000131	<0.010	1.14	<0.00010	0.88	<0.000010	0.06	0.0268	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.31	0.000435	0.00103	<0.0010	<0.000020
HC-3	11-Nov-20	24	<0.000050	0.00226	3.24	0.0051	<0.000020	0.000071	<0.000040	<0.010	1.1	<0.00010	0.85	<0.000010	0.05	0.0295	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.28	0.000643	<0.00020	<0.0010	0.000252
HC-3	16-Dec-20	29	<0.000050	0.00323	2.98	0.0039	<0.000020	0.000044	<0.000040	<0.010	1.17	<0.00010	0.79	<0.000010	0.05	0.0265	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.24	0.000572	<0.00020	<0.0010	<0.000020
HC-3	Lab Duplicate		<0.000050	0.00323	3.02	0.0039	<0.000020	0.000048	<0.000040	<0.010	1.19	<0.00010	0.84	<0.000010	0.05	0.0267	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00024	0.24	0.000584	<0.00020	<0.0010	<0.000020
QA/QC RPD%			*	0	1	0	*	*	*	*	2	*	6	*	*	1	*	*	*	*	*	*	*	0	2	*	*	*
HC-3	20-Jan-21	34	<0.000050	0.00189	2.82	0.0062	<0.000020	0.000083	<0.000040	0.016	0.946	<0.00010	1.67	<0.000010	0.04	0.0258	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00026	0.23	0.000467	<0.00020	<0.0010	<0.000020
HC-3	24-Feb-21	39	<0.000050	0.00199	2.61	0.0069	<0.000020	0.000052	0.000047	<0.010	0.882	<0.00010	0.81	<0.000010	0.04	0.0256	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000549	<0.00020	<0.0010	<0.000020
HC-3	31-Mar-21	44	<0.000050	0.00435	4.51	0.0088	<0.000020	0.000053	<0.000040	<0.010	1.52	<0.00010	1.26	<0.000010	0.06	0.0432	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.25	0.000907	0.000907	<0.00020	<0.0010
HC-3	05-May-21	49	<0.000050	0.00199	2.04	0.0064	<0.000020	0.000031	<0.000040	<0.010	0.89	<0.00010	0.76	<0.000010	0.04	0.0218	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00051	<0.20	0.000396	<0.00020	<0.0010	0.000074
HC-3	09-Jun-21	54	<0.000050	0.00156	2.02	0.0070	<0.000020	0.00004	0.000064	<0.010	0.747	<0.00010	0.91	<0.000010	0.04	0.0224	<1.00	<0.000050	<0.0000040	0.000011	<0.000050	0.00077	<0.20	0.000321	<0.00020	<0.0010	0.000102
HC-3	14-Jul-21	59	<0.000050	0.00131	2.01	0.0050	<0.000020	0.000055	<0.000040	<0.010	0.577	<0.00010	0.57	<0.000010	0.03	0.0188	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000246	<0.00020	<0.0010	<0.000020
HC-3	18-Aug-21	64	<0.000050	0.00131	2.23	0.0064	<0.000020	0.000035	0.000044	<0.010	0.541	<0.00010	0.6	<0.000010	0.03	0.0213	<1.00	<0.000050	<0.0000040	<0.000010	0.000069	0.00081	<0.20	0.000308	0.00021	<0.0010	<0.000020

Associated Global file: 1964.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

Sample ID	Sampling Date (dd-mmm-yy)	Week No.	Dissolved Metals																									
			Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			0.003-0.0293[d]	n/a	n/a	0.815-1.03[d]	0.00002[f]	2	0.025[d] (LT)	n/a	n/a	0.002 (LT)	n/a	0.0001[d]	n/a	n/a	n/a	n/a	0.0008 (LT)	n/a	n/a	n/a	n/a	0.0085 (LT)	n/a	0.033[d]	n/a
HC-4	27-May-20	0	<0.000050	0.00531	5.2	0.0039	<0.000020	0.00248	0.000262	<0.010	3.84	0.00016	1.62	<0.000010	1.21	0.0684	2.58	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	3.19	0.000288	<0.00020	<0.0010	<0.000020
HC-4	03-Jun-20	1	<0.000050	0.00745	6.25	0.0064	<0.000020	0.0027	0.000417	<0.010	3.57	0.00014	2.41	<0.000010	1.28	0.0715	4.13	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	3.23	0.000796	<0.00020	<0.0010	<0.000020
HC-4	10-Jun-20	2	<0.000050	0.00504	4.6	0.0047	<0.000020	0.00199	0.000208	<0.010	2.4	0.0001	1.91	<0.000010	0.76	0.0517	2.5	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.94	0.000474	<0.00020	<0.0010	<0.000020
HC-4	Lab Duplicate		<0.000050	0.00415	3.98	0.0043	<0.000010	0.000421	0.00008	<0.010	2.18	<0.00010	1.36	<0.000010	2.66	0.0478	1.85	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.19	0.000631	<0.00020	<0.0010	<0.000020
QA/QC RPD%			*	19	14	10	*	130	*	*	10	*	34	*	111	8	*	*	*	*	*	*	48	28	*	*	*
HC-4	17-Jun-20	3	<0.000050	0.0053	4.83	0.0054	<0.000020	0.00202	0.000139	<0.010	2.42	<0.00010	1.58	<0.000010	0.67	0.0548	2.46	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.77	0.00061	<0.00020	<0.0010	<0.000020
HC-4	Lab Duplicate		<0.00005	0.00541	4.8	0.00536	<0.00002	0.00207	0.000143	<0.01	2.37	0.0001	1.57	<0.00001	0.673	0.0547	2.49	<0.000050	<0.0000040	<0.000010	<0.00005	<0.00020	1.79	0.000613	<0.00020	<0.0010	<0.00002
QA/QC RPD%			*	2	1	1	*	2	*	*	2	*	1	*	< 1	< 1	*	*	*	*	*	*	1	< 1	*	*	*
HC-4	24-Jun-20	4	<0.000050	0.00444	4.23	0.0041	<0.000020	0.00183	0.000087	<0.010	2.42	<0.00010	1.42	0.00001	0.53	0.0483	1.76	<0.000050	<0.0000040	<0.000010	0.00207	<0.00020	1.47	0.000483	<0.00020	<0.0010	0.000023
HC-4	01-Jul-20	5	<0.000050	0.00464	4	0.0019	<0.000020	0.0017	0.00137	<0.010	2.21	<0.00010	1.28	<0.000010	0.40	0.0436	1.99	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.66	0.000481	<0.00020	<0.0010	<0.000020
HC-4	Lab Duplicate		0.00005	0.00466	4.11	0.0020	0.00002	0.0017	0.00133	0.01	2.25	0.0001	1.3	0.00001	0.40	0.0437	2.16	0.00005	0.0000040	0.000010	0.000050	0.00020	1.64	0.000485	0.00020	0.0010	0.000026
QA/QC RPD%			*	< 1	3	3	*	0	3	*	2	*	2	*	0	< 1	*	*	*	*	*	*	1	1	*	*	*
HC-4	08-Jul-20	6	<0.000050	0.00397	3.67	0.0039	<0.000020	0.00132	0.000053	<0.010	1.89	<0.00010	1.11	<0.000010	0.29	0.0443	1.44	<0.000050	<0.0000040	0.000015	<0.000050	0.00027	1.16	0.000465	<0.00020	<0.0010	0.000031
HC-4	15-Jul-20	7	<0.000050	0.0044	4.02	0.0045	<0.000020	0.0013	<0.000040	<0.010	2.03	<0.00010	1.29	<0.000010	0.16	0.0511	1.19	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.19	0.000615	0.0013	<0.0010	0.000033
HC-4	22-Jul-20	8	<0.000050	0.00342	3.14	0.0033	<0.000020	0.000894	<0.000040	<0.010	1.62	<0.00010	1	<0.000010	0.19	0.041	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00021	0.87	0.00046	<0.00020	<0.0010	<0.000020
HC-4	29-Jul-20	9	<0.000050	0.00341	3.55	0.0032	<0.000020	0.00101	<0.000040	<0.010	1.61	<0.00010	0.97	<0.000010	0.15	0.0432	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.89	0.000653	<0.00020	0.0019	0.000041
HC-4	02-Sep-20	14	<0.000050	0.0033	3.27	0.0020	<0.000020	0.000648	<0.000040	<0.010	1.27	<0.00010	0.98	<0.000010	0.07	0.0449	<1.00	<0.000050	<0.0000040	0.000011	<0.000050	<0.00020	0.55	0.000581	<0.00020	<0.0010	<0.000020
HC-4	07-Oct-20	19	<0.000050	0.0021	2.88	0.0024	<0.000020	0.000523	0.000176	<0.010	1.18	<0.00010	0.83	<0.000010	0.06	0.04	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.38	0.000404	0.00103	<0.0010	<0.000020
HC-4	11-Nov-20	24	<0.000050	0.00275	3.1	0.0028	<0.000020	0.000391	<0.000040	<0.010	1.04	<0.00010	0.71	<0.000010	0.04	0.0389	<1.00	<0.000050	<0.0000040	<0.000010	0.000505	<0.00020	0.31	0.00045	<0.00020	<0.0010	<0.000020
HC-4	16-Dec-20	29	<0.000050	0.00408	3.05	0.0042	<0.000020	0.000289	0.000069	<0.010	1.16	<0.00010	0.75	<0.000010	0.05	0.0379	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.3	0.000431	<0.00020	<0.0010	<0.000020
HC-4	20-Jan-21	34	<0.000050	0.00234	2.76	0.0044	<0.000020	0.000391	0.000047	0.014	0.939	<0.00010	1.57	<0.000010	0.03	0.0376	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	0.00021	0.28	0.000359	<0.00020	<0.0010	0.000077
HC-4	24-Feb-21	39	<0.000050	0.00234	2.36	0.0049	<0.000020	0.00028	0.00018	<0.010	0.887	<0.00010	0.78	0.000012	0.04	0.0351	<1.00	<0.000050	<0.0000040	<0.000010	0.00583	0.0003	0.22	0.000363	<0.00020	0.0164	<0.000020
HC-4	31-Mar-21	44	<0.000050	0.00547	4.4	0.0062	<0.000020	0.000335	<0.000040	<0.010	1.61	<0.00010	1.11	<0.000010	0.05	0.0592	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.27	0.000646	0.000646	<0.00020	<0.0010
HC-4	05-May-21	49	<0.000050	0.00209	1.8	0.0048	<0.000020	0.000177	0.000384	<0.010	0.8	<0.00010	0.59	<0.000010	0.03	0.0276	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000266	<0.00020	<0.0010	0.000035
HC-4	09-Jun-21	54	<0.000050	0.00233	1.78	0.0042	<0.000020	0.000147	0.00104	<0.010	0.787	<0.00010	0.62	<0.000010	0.03	0.0304	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000253	<0.00020	<0.0010	0.000309
HC-4	14-Jul-21	59	<0.000050	0.00157	1.81	0.0042	<0.000020	0.000103	<0.000040	<0.010	0.686	<0.00010	0.53	<0.000010	0.03	0.0272	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.0002	<0.00020	<0.0010	0.000038
HC-4	18-Aug-21	64	<0.000050	0.00155	2.07	0.0030	<0.000020	0.000052	<0.000040	<0.010	0.616	<0.00010	0.49	<0.000010	0.03	0.0312	<1.00	<0.000050	<0.0000040	<0.000010	0.000058	<0.00020	<0.20	0.000247	0.00024	<0.0010	<0.000020
HC-5	27-May-20	0	<0.000050	0.00452	4.53	0.0040	<0.000020	0.000615	0.000162	<0.010	3.37	<0.00010	1.22	<0.000010	4.27	0.07	1.79	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.93	0.000236	<0.00020	<0.0010	<0.000020
HC-5	03-Jun-20	1	<0.000050	0.00583	5	0.0060	<0.000020	0.000469	0.00019	<0.010	2.98	<0.00010	1.78	<0.000010	3.88	0.0639	2.75	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.61	0.000669	<0.00020	<0.0010	<0.000020
HC-5	10-Jun-20	2	<0.000050	0.00432	4.02	0.0044	<0.000020	0.000429	0.00008	<0.010	2.22	<0.00010	1.42	<0.000010	2.69	0.0483	2.06	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.22	0.000645	<0.00020	<0.0010	<0.000020
HC-5	17-Jun-20	3	<0.000050	0.00387	3.56	0.0056	<0.000020	0.000385	0.00004	<0.010	1.88	<0.00010	1.1	<0.000010	1.56	0.0445	1.54	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.92	0.00071	<0.00020	0.0010	<0.000020
HC-5	24-Jun-20	4	<0.000050	0.00355	3.52	0.0044	<0.000020	0.000363	<0.000040	<0.010	2.03	<0.00010	1.06	<0.000010	1.16	0.0442	1.19	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.83	0.000705	<0.00020	<0.0010	<0.000020
HC-5	01-Jul-20	5	<0.000050	0.00357	3.05	0.0018	<0.000020	0.000289	0.000041	<0.010	1.6	<0.00010	0.91	<0.000010	0.76	0.0392	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.8	0.000653	<0.00020	<0.0010	<0.000020
HC-5	08-Jul-20	6	<0.000050	0.00379	3.26	0.0043	<0.000020	0.000262	<0.000040	<0.010	1.51	<0.00010	0.95	<0.000010	0.52	0.043	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.68	0.000753	<0.00020	<0.0010	0.000059
HC-5	15-Jul-20	7	<0.000050	0.00319	2.99	0.0042	<0.000020	0.000198	<0.000040	<0.010	1.45	<0.00010	0.94	<0.000010	0.25	0.0418	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.52	0.000648	<0.00020	<0.0010	<0.000020
HC-5	22-Jul-20	8	<0.000050	0.00509	3.35	0.0039	<0.000020	0.000224	0.000044	<0.010	1.72	<0.00010	0.98	<0.000010	0.35	0.045	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.6	0.00079	<0.00020	<0.0010	<0.000020
HC-5	29-Jul-20	9	<0.000050	0.00248	2.55	0.0022	<0.000020	0.000167	<0.000040	<0.010	1.27	<0.00010	0.69	<0.000010	0.15	0.0338	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.43	0.000576	<0.00020	<0.0010	<0.000020

Associated Global file: 1964.

All terms defined within the body of SNC-Lavalin's report.

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n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

BOLD Exceedance of BCWQG AW value.

TABLE 1: Summary of Humidity Cell Test Results - BCWQG Aquatic Life Comparison

Sample ID	Sampling Date (dd-mmm-yy)	Week No.	Dissolved Metals																									
			Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L
BCWQG Aquatic Life (AW)[a]			0.003-0.0293[d]	n/a	n/a	0.815-1.03[d]	0.00002[f]	2	0.025[d] (LT)	n/a	n/a	0.002 (LT)	n/a	0.0001[d]	n/a	n/a	n/a	n/a	0.0008 (LT)	n/a	n/a	n/a	n/a	0.0085 (LT)	n/a	0.033[d]	n/a
HC-5	02-Sep-20	14	<0.000050	0.00231	2.61	0.0019	<0.000020	0.000112	<0.000040	<0.010	0.984	<0.00010	0.65	<0.000010	0.07	0.0385	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.26	0.000528	<0.00020	<0.0010	<0.000020
HC-5	Lab Duplicate		<0.000050	0.00231	2.61	0.0019	<0.000020	0.000114	<0.000040	<0.010	0.973	<0.00010	0.66	<0.000010	0.07	0.0383	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.26	0.000534	<0.00020	<0.0010	<0.000020
QA/QC RPD%			*	0	0	0	*	2	*	*	1	*	2	*	*	1	*	*	*	*	*	*	*	1	*	*	*
HC-5	07-Oct-20	19	<0.000050	0.00275	3.06	0.0019	<0.000020	0.000103	0.000729	<0.010	1.29	<0.00010	0.9	<0.000010	0.06	0.0431	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.28	0.000658	0.00103	<0.0010	<0.000020
HC-5	11-Nov-20	24	0.000054	0.00214	2.69	0.0019	<0.000020	0.000054	0.00005	<0.010	0.862	<0.00010	0.62	<0.000010	0.04	0.0389	<1.00	<0.000050	<0.0000040	<0.000010	0.000051	<0.00020	<0.20	0.000441	<0.00020	0.0017	0.000086
HC-5	16-Dec-20	29	<0.000050	0.00305	2.92	0.0032	<0.000020	0.000044	0.00461	<0.010	0.956	<0.00010	0.65	<0.000010	0.04	0.0391	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000516	<0.00020	<0.0010	<0.000020
HC-5	20-Jan-21	34	<0.000050	0.00623	2.27	0.0048	<0.000020	0.00064	0.000082	0.017	0.679	<0.00010	1.32	<0.000010	0.03	0.0389	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	1.48	0.000311	<0.00020	<0.0010	<0.000020
HC-5	24-Feb-21	39	<0.000050	0.00185	2.23	0.0036	<0.000020	0.000049	<0.000040	<0.010	0.693	<0.00010	0.67	<0.000010	0.03	0.0375	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000364	<0.00020	<0.0010	<0.000020
HC-5	31-Mar-21	44	<0.000050	0.00359	3.46	0.0032	<0.000020	0.000053	<0.000040	<0.010	1.1	<0.00010	0.92	<0.000010	0.04	0.0527	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000506	0.000506	<0.00020	<0.0010
HC-5	05-May-21	49	0.000198	0.00122	1.41	0.0052	<0.000020	0.000027	0.000602	<0.010	0.533	<0.00010	0.48	0.000013	0.03	0.0288	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000208	<0.00020	0.0025	<0.000020
HC-5	09-Jun-21	54	<0.000050	0.000989	1.29	0.0035	<0.000020	0.000033	0.00004	<0.010	0.422	<0.00010	0.38	<0.000010	0.02	0.031	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.000171	<0.00020	<0.0010	<0.000020
HC-5	14-Jul-21	59	<0.000050	0.00108	1.61	0.0016	<0.000020	0.000031	<0.000040	<0.010	0.412	<0.00010	0.44	<0.000010	<0.020	0.0301	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	<0.20	0.00021	<0.00020	<0.0010	<0.000020
HC-5	18-Aug-21	64	<0.000050	0.00111	1.8	0.0019	<0.000020	0.000033	0.000082	<0.010	0.398	<0.00010	0.45	<0.000010	0.03	0.0329	<1.00	<0.000050	<0.0000040	<0.000010	0.000657	<0.00020	<0.20	0.000223	<0.00020	<0.0010	<0.000020

Associated Global file: 1964.

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< Denotes concentration less than indicated detection limit.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD Exceedance of BCWQG AW value.

[a] Guideline to protect freshwater aquatic life.

[b] Long-term Average guideline applied (LT) where no Short-term Maximum guideline available.

[c] Guideline varies with Hardness.

[d] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

[e] Guideline is temperature, pH, DOC and hardness dependent. The lowest reference value was obtained from site-specific criteria that were calculated for surface water at the GULLY location (see Table 4).

[f] Laboratory detection limit exceeds reference criteria.

TABLE 2: Summary of Acid-Base Accounting (ABA) Results (Close Down Residue)

Sample Number		Sample ID	Paste pH pH Units	Fizz Rating -	Total Inorganic C wt %	$CaCO_3$ Equivalents[1] kg CaCO3/tonne	Total Sulphur wt %	Sulphate Sulphur wt %	Sulphide Sulphur[2] wt %	AP[3] kg CaCO3/tonne	Mod. ABA NP kg CaCO3/tonne	NNP[4] kg CaCO3/tonne	NPR[5] -
HC-1	Pre[6]	BH19-5M4L-01-SA2	8.5	None	-	-	0.17	<0.01	0.17	5.3	1.4	-3.9	0.3
	Post		8.1	None	<0.02	<1.7	0.05	<0.01	0.05	1.6	0.1	-1.5	0.1
HC-2	Pre[6]	BH19-5M4L-02-SA2	8.2	None	-	-	<0.005	<0.01	<0.01	<0.3	2.6	2.6	8.6
	Post		7.0	None	<0.02	<1.7	0.36	0.03	0.33	10.5	3.5	-7.0	0.3
HC-3	Pre[6]	BH19-39	8.7	None	-	-	0.88	<0.01	0.88	27.5	7.2	-20.3	0.3
	Post		8.3	Moderate	0.18	15.0	0.16	<0.01	0.16	5.0	15.3	10.3	3.1
HC-4	Pre	Mix: 90% BH19-39 + 10% DH-MD-01	8.9	Strong	1.17	97.5	0.13	<0.01	0.13	4.1	81.0	76.9	19.6
	Post		8.3	Strong	1.03	85.8	0.11	<0.01	0.11	3.4	78.9	75.5	23.0
HC-5	Pre	Mix: 70% BH19-39 + 30% DH-MD-02	8.9	Strong	3.37	280.8	0.14	<0.01	0.14	4.3	278.0	273.8	65.4
	Post		8.3	Strong	3.23	269.2	0.08	<0.01	0.08	2.5	271.7	269.2	108.7

[1] CaCO3 Equivalents: based on TIC

[2] Sulphide-Sulphur: Total-sulphur - sulphate-sulphur

[3] AP (Acid Potential): Sulphide-Sulphur x 31.25

[4] NNP (Net Neutralization Potential): NP - AP

[5] NPR (Neutralization Potential Ratio): NP/AP

[6] Pre-HCT data were obtained from SNC-Lavalin, 2020.

TABLE 3: Summary of Analytical Results for Metals in Solids (4-Acid Digest - Close Down Residue)

Sample Number	Sample ID	Sample Date (dd-mmm-yy)	Paste pH	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Indium (In)	Potassium (K)	Lanthanum (La)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)	Sodium (Na)	Niobium (Nb)	Nickel (Ni)
			pH	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
HC-1	BH19-5M4L-01-SA2	05-Nov-19	8.1	36,700	<0.5[a]	***12.8***	***559***	0.49	0.10	500	<0.02	38.58	1.5	177	***1.12***	2.4	6,900	8.13	<0.05	0.50	0.011	27,300	15.3	7.2	2.9	1,000	33	0.67	3,300	***1.90***	6.4
HC-2	BH19-5M4L-02-SA2	07-Nov-19	7.0	25,800	***1***	***17.4***	***251***	0.48	0.16	200	<0.02	27.99	1.9	190	***1.05***	2.2	8,700	6.38	<0.05	0.40	0.011	13,800	11.2	5.3	1.9	900	16	0.70	300	***2.00***	6.1
HC-3	BH19-39	27-Aug-19	8.3	60,800	***1.2***	2.8	***701***	***1.75***	0.03	6,300	<0.02	70.61	***5.6***	158	***4.40***	1.6	15,800	15.95	0.05	1.40	0.032	30,400	29.6	2.0	13.7	5,700	***171***	0.50	2,700	***6.20***	18.0
Average Crustal Abundance Values 10x Sandstones[b]			n/a	250,000	0.1	10	100	1	D	391,000	0.1	920	3	350	1	10	98,000	120	80	39	0.10	107,000	300	70	150	70,000	100	2	33,000	0.1	20
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01[c]	-	8.3	64,200	1.5	2.7	777	1.85	0.06	31,000	<0.02	90.47	8.8	136	4.80	1.6	19,100	16.16	0.10	1.80	0.043	33,100	37.4	3.2	14.9	8,700	317	0.50	2,700	8.30	21.6
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02[c]	-	8.3	50,200	1.1	2.9	583	1.35	0.04	103,300	<0.02	72.77	6.6	95	3.68	2.1	16,000	12.08	0.07	1.50	0.035	25,900	30.3	3.3	10.4	6,400	587	0.39	2,300	5.70	15.9

Associated Global file: 1964.

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n/a Denotes no applicable standard/guideline.

D Denotes data for this element is not available.

[a] Laboratory detection limit exceeds reference criteria.

[b] Average crustal abundance in Sandstones (Price, A.W. 1997).

[c] No reference criteria available (samples HC-4 and HC-5); these samples represent a laboratory mixture.

BOLD Sample concentration greater than average crustal abundance values.

TABLE 3: Summary of Analytical Results for Metals in Solids (4-Acid Digest - Close Down Residue)

Sample Number	Sample ID	Sample Date (dd-mmm-yy)	Phosphorous (P) ppm	Rubidium (Rb) ppm	Rhenium (Re) ppm	Sulphur (S) ppm	Scandium (Sc) ppm	Selenium (Se) ppm	Silver (Ag) ppm	Tin (Sn) ppm	Stronium (Sr) ppm	Tantalum (Ta) ppm	Tellurium (Te) ppm	Thorium (Th) ppm	Titanium (Ti) ppm	Thallium (Tl) ppm	Uranium (U) ppm	Vanadium (V) ppm	Tungsten (W) ppm	Yttrium (Y) ppm	Zinc (Zn) ppm	Zirconium (Zr) ppm
HC-1	BH19-5M4L-01-SA2	05-Nov-19	117	76.6	<0.002	700	1.5	<1[a]	0.04	0.5	26.9	***0.15***	<0.05	5.2	600	0.41	0.60	12	0.2	2.10	3	16.6
HC-2	BH19-5M4L-02-SA2	07-Nov-19	64	45.6	<0.002	***4,000***	1.6	<1[a]	0.03	0.5	7.1	***0.15***	<0.05	3.6	700	0.23	0.40	16	0.2	1.60	2	13.1
HC-3	BH19-39	27-Aug-19	194	106.5	<0.002	2,000	7.3	<1[a]	0.10	***1.5***	32.7	***0.47***	<0.05	12.6	2,100	0.48	3.20	46	0.5	6.40	10	46.6
Average Crustal Abundance Values 10x Sandstones[b]			1,700	600	D	2,400	10	0.5	0.1	1.0	200	0.1	D	17	15,000	8.2	4.5	200	16	400	160	2,200
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01[c]	-	202	114.6	<0.002	1,600	8.5	<1	0.02	1.7	135.3	0.61	<0.05	16.2	2,800	0.51	3.80	52	0.6	8.40	15	57.3
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02[c]	-	302	84.8	<0.002	1,100	6.3	<1	0.02	1.2	297.2	0.41	<0.05	12.0	1,900	0.38	2.90	38	0.4	8.70	9	46.6

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D Denotes data for this element is not available.

[a] Laboratory detection limit exceeds reference criteria.
[b] Average crustal abundance in Sandstones (Price, A.W. 1997).
[c] No reference criteria available (samples HC-4 and HC-5); these samples represent a laboratory mixture.

BOLD Sample concentration greater than average crustal abundance values.

TABLE 4: Summary of Analytical Results for Dissolved Inorganics and Metals in Surface Water

Sample Location		CRDS		CRUS				SWMP				GULLY		BC Guideline		
Sample ID		CRDS-20191104	CRDS 200505	CRUS-20191104	CRUS 200505	CRDP 200505	QA/QC	SWMP-20191104	SM-DUPA-20191104	QA/QC	SWMP 200505	GULLY-20191107	GULLY 200505	BCWQG Aquatic Life Short-term Maximum (AW)[b]	BCWQG Aquatic Life Long-term Average (AW)[c]	BCWQG Drinking Water (DW)
Sample Date (yyyy mm dd)		2019 11 04	2020 05 05	2019 11 04	2020 05 05	Duplicate	RPD %	2019 11 04	Dupicate	RPD %	2020 05 05	2019 11 04	2020 05 05			
Parameter	Units	Analytical Results														
Physical Parameters																
pH	pH	-	-	-	-	-	-	-	-	-	-	7.50	-	6.5 - 9	6.5 - 9	6.5 - 8.5
Hardness	mg/L	-	162	-	164	166	1	-	-	-	158	-	28.9	n/a	n/a	n/a
Total Hardness	mg/L	150	165	147	167	169	1	115	109	5	158	54.9	28.4	n/a	n/a	n/a
Total Dissolved Solids	mg/L	170	181.35	178	188.5	-	-	149	143	4	450.45	75	35.1	n/a	n/a	n/a
Total Suspended Solids	mg/L	3.4	24.5	3.4	26.7	23.7	12	4.2	< 2.0	*	< 3.0	< 2.0	< 3.0	n/a	n/a	n/a
Dissolved Organic Carbon	mg/L	0.61	2.46	0.68	2.50	2.60	4	2.27	2.46	*	11.9	1.64	14.5	n/a	n/a	n/a
Total Nitrogen-N	mg/L	0.0550	-	0.100	-	-	-	0.0640	0.142	*	-	< 0.0500	-	n/a	n/a	n/a
Field Parameters																
Field Temperature	C	1.1	6.8	1.1	7	7	*	6.9	6.9	*	3.2	3.4	2.8	n/a	n/a	15
Field Conductivity	µS/cm	284.5	279	283.0	290.4	290.4	*	240.2	240.2	*	693.7	122.2	54.3	n/a	n/a	n/a
pH (field)	pH	7.73	8.33	8.15	8.39	8.39	*	7.25	7.25	*	6.94	7.06	7.95	6.5 - 9	6.5 - 9	6.5 - 8.5
Field ORP	mV	233.8	212.2	249.7	181.8	181.8	*	22	22	*	187.3	218.6	152.2	n/a	n/a	n/a
Field TDS	mg/L	-	181.35	-	188.5	188.5	*	-	-	-	450.45	-	35.1	n/a	n/a	n/a
Dissolved Oxygen	mg/L	11.7	11.35	12.18	11.05	11.05	*	6.45	6.45	*	4.36	9.56	10.5	n/a	n/a	n/a
Dissolved Inorganics																
Dissolved Aluminum	µg/L	< 5.0	3.6	< 5.0	3.3	3.6	*	< 5.0	< 5.0	*	20.4	9.1	***135***	100 (pH>=6.5)	50 (pH>=6.5)	n/a
Dissolved Calcium	mg/L	33.8	39.2	32.8	38.4	39.4	3	28.6	27.3	5	37.1	11.4	6.33	n/a	n/a	n/a
Dissolved Iron	µg/L	28	22	22	20	20	*	50	98	65	28	11	52	350 (max)	n/a	n/a
Dissolved Magnesium	mg/L	15.9	15.7	15.7	16.5	16.4	1	10.5	9.93	6	16.0	6.40	3.17	n/a	n/a	n/a
Dissolved Manganese	µg/L	5.32	3.88	5.21	3.97	4.05	2	8.54	9.03	6	3.26	9.52	0.76	n/a	n/a	n/a
Dissolved Potassium	mg/L	0.50	0.585	0.49	0.603	0.602	0	0.55	0.52	6	0.805	0.95	0.464	n/a	n/a	n/a
Dissolved Sodium	mg/L	2.12	2.51	2.12	2.59	2.63	2	8.06	6.78	17	81.0	2.24	0.938	n/a	n/a	n/a
Total Alkalinity	mg/L	122	144	122	143	144	1	99.3	95.5	4	75.1	55.6	25.8	n/a	n/a	n/a
Nitrate (as N)	µg/L	105	154	102	156	155	1	16	14	*	27.8	36	< 5.0	32,800 (max)	3,000	10,000
Nitrite (as N)	µg/L	< 10	< 1.0	< 10	< 1.0	< 1.0	*					< 10	< 1.0	60 (Cl (mg/L)<2)	20 (Cl (mg/L)<2)	1,000
									< 10	*				240 (Cl (mg/L) 6-<8)	80 (Cl (mg/L) 6-<8)	
								< 10						300 (Cl (mg/L) 8-<10)	100 (Cl (mg/L) 8-<10)	
											< 5.0			600 (Cl (mg/L)>=10)	200 (Cl (mg/L)>=10)	
Chloride	mg/L	0.85	1.35	0.86	1.28	1.28	0	8.38	7.51	11	**172**	0.20	< 0.50	600	150	250
Fluoride	µg/L	< 100	70	100	70	70	*	< 100	< 100	*	< 100	< 100	< 20	835 - 1,538[d]	n/a	1,500
Sulfate	mg/L												2.99	n/a	128 (H 0-30)	500
												10.3			218 (H 30-75)	
		36.8	25.3	36.8	25.4	25.4	0	21.1	21.4	1	8.93				309 (H 75-180)	
Alkalinity, Bicarbonate (as CaCO3)	mg/L	122	140	122	139	140	1	99.3	95.5	4	75.1	55.6	25.8	n/a	n/a	n/a
Alkalinity, Carbonate (as CaCO3)	mg/L	< 1.0	4.8	< 1.0	3.8	4.6	*	< 1.0	< 1.0	*	< 1.0	< 1.0	< 1.0	n/a	n/a	n/a
Alkalinity, Hydroxide (as CaCO3)	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	*	< 1.0	< 1.0	*	< 1.0	< 1.0	< 1.0	n/a	n/a	n/a
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	< 1.0	2.4	< 1.0	1.9	2.3	*	< 1.0	< 1.0	*	< 1.0	< 1.0	< 1.0	n/a	n/a	n/a
Kjeldahl Nitrogen-N	mg/L	0.055	-	0.100	-	-	-	0.064	0.142	*	-	< 0.050	-	n/a	n/a	n/a
Dissolved Metals																
Antimony	µg/L	< 0.20	< 0.10	< 0.20	< 0.10	< 0.10	*	< 0.20	< 0.20	*	< 0.10	< 0.20	< 0.10	n/a	n/a	n/a
Arsenic	µg/L	< 0.50	0.42	< 0.50	0.40	0.40	*	< 0.50	< 0.50	*	0.16	< 0.50	0.20	n/a	n/a	n/a
Barium	µg/L	44.6	42.4	43.6	41.0	41.6	1	62.5	61.5	2	168	128	97.9	n/a	n/a	n/a
Beryllium	µg/L	< 0.10	< 0.100	< 0.10	< 0.100	< 0.100	*	< 0.10	< 0.10	*	< 0.100	< 0.10	< 0.100	n/a	n/a	n/a
Boron	µg/L	7.7	< 10	10.0	< 10	< 10	*	< 5.0	< 5.0	*	< 10	14.0	< 10	n/a	n/a	n/a
Cadmium	µg/L	< 0.010	< 0.0050	< 0.010	< 0.0050	< 0.0050	*	< 0.010	< 0.010	*	< 0.0050	< 0.010	< 0.0050	0.164 - 0.991[d]	0.085 - 0.307[d]	n/a
Chromium	µg/L	1.02	< 0.10	< 0.50	< 0.10	< 0.10	*	< 0.50	< 0.50	*	< 0.10	< 0.50	< 0.10	n/a	n/a	n/a
Cobalt	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	*	< 0.10	< 0.10	*	< 0.10	< 0.10	< 0.10	n/a	n/a	n/a
Copper	µg/L	< 0.40[a]	0.46	< 0.40	0.44	0.37	*	< 0.40	< 0.40	*	0.62	< 0.40[a]	0.65	1.6 - 31.1[e]	0.3 - 5.2[e]	n/a
Lead	µg/L	< 0.20	< 0.050	< 0.20	< 0.050	< 0.050	*	< 0.20	< 0.20	*	< 0.050	< 0.20	< 0.050	n/a	n/a	n/a
Lithium	µg/L	2.08	1.9	2.02	2.2	2.2	0	0.75	0.68	10	< 1.0	6.51	< 1.0	n/a	n/a	n/a
Mercury	µg/L	< 0.010	< 0.0050	< 0.010	< 0.0050	< 0.0050	*	< 0.010	< 0.010	*	< 0.0050	< 0.010	0.0069	n/a	n/a	n/a
Molybdenum	µg/L	0.68	0.504	0.67	0.518	0.488	6	< 0.10	< 0.10	*	0.116	< 0.10	< 0.050	n/a	n/a	n/a
Nickel	µg/L	0.55	< 0.50	< 0.40	< 0.50	< 0.50	*	< 0.40	< 0.40	*	< 0.50	< 0.40	< 0.50	n/a	n/a	n/a
Selenium	µg/L	< 0.50	0.067	< 0.50	0.063	0.072	*	< 0.50	< 0.50	*	< 0.050	< 0.50	< 0.050	n/a	n/a	n/a
Silver	µg/L	< 0.050	< 0.010	< 0.050	< 0.010	< 0.010	*	< 0.050	< 0.050	*	< 0.010	< 0.050	< 0.010	n/a	n/a	n/a
Thallium	µg/L	< 0.020	< 0.010	< 0.020	< 0.010	< 0.010	*	< 0.020	< 0.020	*	< 0.010	< 0.020	< 0.010	n/a	n/a	n/a
Titanium	µg/L	< 5.0	< 0.30	< 5.0	< 0.30	< 0.30	*	< 5.0	< 5.0	*	< 0.30	< 5.0	0.97	n/a	n/a	n/a
Tungsten	µg/L	< 1.0	< 0.10	< 1.0	< 0.10	< 0.10	*	< 1.0	< 1.0	*	< 0.10	< 1.0	< 0.10	n/a	n/a	n/a
Uranium	µg/L	0.979	0.807	0.963	0.809	0.822	2	0.209	0.197	6	0.017	0.052	0.068	n/a	8.5	n/a
Vanadium	µg/L	< 1.0	< 0.50	< 1.0	< 0.50	< 0.50	*	< 1.0	< 1.0	*	< 0.50	< 1.0	< 0.50	n/a	n/a	n/a
Zinc	µg/L	< 4.0	< 1.0	< 4.0	1.6	1.1	*	< 4.0	< 4.0	*	3.5	< 4.0	1.4	n/a	n/a	n/a
Bismuth	µg/L	< 0.10	< 0.050	< 0.10	< 0.050	< 0.050	*	< 0.10	< 0.10	*	< 0.050	< 0.10	< 0.050	n/a	n/a	n/a
Phosphorous	µg/L	< 50	< 50	< 50	< 50	< 50	*	< 50	< 50	*	< 50	< 50	< 50	n/a	n/a	n/a
Silicon	µg/L	2,500	2,570	2,400	2,530	2,590	*	5,100	5,000	2	4,140	4,300	3,800	n/a	n/a	n/a
Strontium	µg/L	291	342	287	334	342	2	229	218	5	308	281	84.9	n/a	n/a	n/a
Sulphur	µg/L	12,900	8,490	12,700	8,740	8,830	1	7,200	7,500	*	3,770	3,300	940	n/a	n/a	n/a
Tellurium	µg/L	< 0.50	< 0.20	< 0.50	< 0.20	< 0.20	*	< 0.50	< 0.50	*	< 0.20	< 0.50	< 0.20	n/a	n/a	n/a
Thorium	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	*	< 0.10	< 0.10	*	< 0.10	< 0.10	< 0.10	n/a	n/a	n/a
Tin	µg/L	< 0.20	< 0.10	< 0.20	< 0.10	< 0.10	*	< 0.20	< 0.20	*	< 0.10	< 0.20	< 0.10	n/a	n/a	n/a
Zirconium	µg/L	< 0.10	< 0.20	< 0.10	< 0.20	< 0.20	*	< 0.10	< 0.10	*	0.25	0.15	1.11	n/a	n/a	n/a
Total Metals																
Aluminum	µg/L	32.3	320	25.0	248	237	5	7.5	10.2	*	22.0	15.0	143	n/a	n/a	9,500
Antimony	µg/L	< 0.20	< 0.10	< 0.20	< 0.10	< 0.10	*	< 0.20	< 0.20	*	< 0.10	< 0.20	< 0.10	n/a	9	n/a
Arsenic	µg/L	0.61	0.85	0.57	0.76	0.79	4	< 0.50	< 0.50	*	0.18	< 0.50	0.22	5	n/a	10
Barium	µg/L	46.5	45.6	45.5	43.7	44.6	2	61.2	64.3	5	160	136	91.3	n/a	1,000	n/a
Beryllium	µg/L	< 0.10	< 0.100	< 0.10	< 0.100	< 0.100	*	< 0.10	< 0.10	*	< 0.100	< 0.10	< 0.100	n/a	0.13	n/a
Bismuth	µg/L	< 0.10	< 0.050	< 0.10	< 0.050	< 0.050	*	< 0.10	< 0.10	*	< 0.050	< 0.10	< 0.050	n/a	n/a	n/a
Boron	µg/L	13.1	< 10	16.9	< 10	< 10	*	8.8	7.2	*	< 10	16.6	< 10	n/a	1,200	5,000
Cadmium	µg/L	< 0.010	0.0052	< 0.010	0.0056	0.0061	*	< 0.010	< 0.010	*	0.0054	< 0.010	< 0.0050	n/a	n/a	5
Calcium	µg/L	36,100	39,200	35,500	40,200	40,500	1	28,700	30,300	5	36,100	12,300	6,160	n/a	n/a	n/a
Chromium	µg/L	< 0.50	0.48	0.74	0.38	0.37	*	< 0.50	< 0.50	*	< 0.10	< 0.50	0.11	n/a	1 (Cr(+6))	n/a
Cobalt	µg/L	< 0.10	0.34	< 0.10	0.28	0.30	*	< 0.10	< 0.10	*	< 0.10	< 0.10	< 0.10	110	4	n/a
Copper	µg/L	1.10	0.91	0.48	0.85	0.82	*	0.75	0.66	*	0.66	0.79	0.68	n/a	n/a	1,000
Iron	µg/L	158	**656**	129	**536**	**549**	2	109	134	21	36	20	60	1,000 (max)	n/a	300
Lead	µg/L	0.30	0.742	0.22	0.674	0.663	2	< 0.20	< 0.20	*	< 0.050	< 0.20	< 0.050	16.813 - 156[d]	3.966 - 9.381[d]	10
Lithium	µg/L	2.25	2.5	2.13	2.5	2.4	4	0.77	0.82	6	< 1.0	6.88	< 1.0	n/a	n/a	n/a
Magnesium	µg/L	16,400	16,400	16,000	16,100	16,500	2	9,870	10,600	7	16,600	6,880	3,150	n/a	n/a	n/a
Manganese	µg/L	9.45	24.3	8.72	22.3	22.5	1	8.44	9.04	7	7.11	11.5	0.90	858 - 2,369[d]	767 - 1,335[d]	50
Mercury	µg/L	< 0.010	< 0.0050	< 0.010	< 0.0050	< 0.0050	*	< 0.010	< 0.010	*	< 0.0050	< 0.010	0.0078	n/a	0.02[f]	1
Molybdenum	µg/L	0.69	0.460	0.73	0.478	0.462	3	< 0.10	< 0.10	*	< 0.050	< 0.10	< 0.050	2,000	1,000	250
Nickel	µg/L	< 0.40	0.76	0.63	0.66	0.66	*	0.43	< 0.40	*	< 0.50	< 0.40	< 0.50	n/a	25 - 140[d]	n/a
Phosphorous	µg/L	< 50	< 50	< 50	< 50	< 50	*	< 50	< 50	*	< 50	< 50	< 50	n/a	n/a	n/a
Potassium	µg/L	540	650	520	637	634	0	550	580	5	842	1,020	450	n/a	n/a	n/a
Selenium	µg/L	< 0.50	0.074	< 0.50	0.053	0.067	*	< 0.50	< 0.50	*	< 0.050	< 0.50	< 0.050	n/a	2	10
Silicon	µg/L	2,600	2,990	2,600	2,960	2,920	*	4,900	5,200	*	4,220	4,800	3,830	n/a	n/a	n/a
Silver	µg/L											< 0.050	< 0.010	0.1 (H <=100)	0.05 (H <=100)	n/a
		< 0.050	< 0.010	< 0.050	< 0.010	< 0.010	*	< 0.050	< 0.050	*	< 0.010			3 (H >100)	1.5 (H >100)	
Sodium	µg/L	2,180	2,510	2,130	2,440	2,540	4	8,070	8,340	3	82,200	2,440	919	n/a	n/a	n/a
Strontium	µg/L	293	336	291	331	337	2	220	231	5	311	298	82.5	n/a	n/a	n/a
Sulphur	µg/L	12,700	8,780	12,800	8,930	9,300	4	7,400	7,300	*	3,780	3,300	980	n/a	n/a	n/a
Tellurium	µg/L	< 0.50	< 0.20	< 0.50	< 0.20	< 0.20	*	< 0.50	< 0.50	*	< 0.20	< 0.50	< 0.20	n/a	n/a	n/a
Thallium	µg/L	< 0.020	< 0.010	< 0.020	< 0.010	< 0.010	*	< 0.020	< 0.020	*	< 0.010	< 0.020	< 0.010	n/a	0.8	n/a
Thorium	µg/L	< 0.10	0.15	< 0.10	0.11	0.11	*	< 0.10	< 0.10	*	< 0.10	< 0.10	< 0.10	n/a	n/a	n/a
Tin	µg/L	< 0.20	< 0.10	< 0.20	< 0.10	< 0.10	*	< 0.20	< 0.20	*	< 0.10	< 0.20	< 0.10	n/a	n/a	n/a
Titanium	µg/L	< 5.0	< 6.30	< 5.0	5.03	< 5.10	*	< 5.0	< 5.0	*	< 0.30	< 5.0	1.12	n/a	n/a	n/a
Tungsten	µg/L	< 1.0	< 0.10	< 1.0	< 0.10	< 0.10	*	< 1.0	< 1.0	*	< 0.10	< 1.0	< 0.10	n/a	n/a	n/a
Uranium	µg/L	0.991	0.828	0.954	0.818	0.808	1	0.202	0.240	17	0.017	0.060	0.065	n/a	8.5	n/a
Vanadium	µg/L	< 1.0	0.52	< 1.0	0.51	< 0.50	*	< 1.0	< 1.0	*	< 0.50	< 1.0	< 0.50	n/a	n/a	n/a
Zinc	µg/L	< 4.0	3.5	< 4.0	4.3	< 3.0	*	< 4.0	< 4.0	*	< 3.0	< 4.0	3.0	33 - 90[d]	7.5 - 64.5[d]	5,000
Zirconium	µg/L	< 0.10	< 0.20	< 0.10	< 0.20	< 0.20	*	< 0.10	< 0.10	*	0.22	< 0.10	1.06	n/a	n/a	n/a

Associated ALS file(s): VA20A6078.

Associated CARO file(s): N001171, N001350.

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

[a] Laboratory detection limit exceeds regulatory standard/guideline.

[b] Guideline to protect freshwater aquatic life, short-term maximum (i.e. "acute").

[c] Guideline to protect freshwater aquatic life, long-term average (i.e. "chronic").

[d] Standard varies with Hardness.

[e] Guideline is temperature, pH, DOC and hardness dependent.

[f] Total Mercury guideline is based on the % of MethylMercury present. WQG = 0.0001 / (MeHg/total Hg), where MeHg is mass (or concentration) of methyl mercury and THg. Guideline shown assumes MeHg<0.5% of Total Hg.

BOLD	Concentration greater than BCWQG Aquatic Life Short-term Maximum (AW) guideline
SHADOW	Concentration greater than BCWQG Aquatic Life Long-term Average (AW) guideline
SHADED	Concentration greater than BCWQG Drinking Water (DW) guideline

TABLE 5: Summary of Calculated Values from HC Tests

Inputs	Fixed Analytical Parameters[a]												Measurements Averaged Over Final 5 Analytical Events								
Samples	Sample Weight	Initial Total S	Initial Sulphide-S	Close Down Sulphide-S	Remaining Sulphide-S	Initial AP	Close Down AP	Remaining AP	Initial NP[1]	Close Down NP	Remaining NP	Test Duration	Acidity	Alkalinity	Vol. Leachate Collected	Mg	Ca	K	Na	Sulphate	pH
	kg	*wt. %*	*wt. %*	*wt. %*	*%*	*kg $CaCO_3$/t*	*kg $CaCO_3$/t*	*%*	*kg $CaCO_3$/t*	*kg CaCO3/ t*	*%*	*wk*	*mg $CaCO_3$/L*	*mg $CaCO_3$/L*	*L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*pH Units*
BH19-5M4L-01-SA2 (HC1)	1	0.17	0.17	0.05	29.4%	5.3	1.6	30.2%	1.4	0.1	7.1%	64	4.66	5.28	0.476	0.398	1.27	0.644	0.05	1	7.00
BH19-5M4L-02-SA2 (HC2)	1	**0.0025**	**0.005**	**0.33**	6600.0%	0.3	10.5	3500.0%	2.6	3.5	134.6%	64	11.3	**0.25**	0.474	0.057	1.3	0.399	0.01	9.98	4.43
BH19-39 (HC3)	1	0.88	0.88	0.16	18.2%	27.5	5.0	18.2%	7.2	15.3	212.5%	64	4.44	25.24	0.474	2.562	5.172	0.855	0.0396	1.02	7.65
Mix: 90% BH19-39 + 10% DH-MD-01 (HC4)	1	0.13	0.13	0.11	84.6%	4.1	3.4	82.9%	81	78.9	97.4%	64	5.16	26.08	0.475	2.372	6.32	0.9	0.0336	1	7.64
Mix: 70% BH19-39 + 30% DH-MD-02 (HC5)	1	0.14	0.14	0.08	57.1%	4.3	2.5	58.1%	278	271.7	97.7%	64	4.74	25.42	0.478	1.914	7.49	0.573	0.0302	1	7.84

Notes: a) Initial paramters for HC-1, HC-2, and HC-3 were obtained from static tests in SNC-Lavalin, 2020.
b) **BOLD** values were non-detectable as reported by the laboratory. Half the repotable detection limit was assumed for the calculations.

Calculations	Acidity Production Rate		Alkalinity Production Rate		Sulphate Release Rate		Time to NP Depletion	Cumulative Sulphate Production Rate	Ca Leach Rate	Mg Leach Rate	Ca+Mg Leach Rate		Time to NP Depletion
Samples	*mg $CaCO_3$/kg/wk*	*kg $CaCO_3$/t*	*mg $CaCO_3$/kg/wk*	*kg $CaCO_3$/t/wk*	*mg/kg/wk*	*kg/t/year*	*Years*	*mg/kg*	*mg/kg/wk*	*mg/kg/wk*	*mg/kg/wk*	*kg/t/year*	*Years*
BH19-5M4L-01-SA2 (HC1)	2.218	0.002	2.513	0.00251	0.476	0.025742	4	30.464	0.605	0.189	0.794	0.041286	2
BH19-5M4L-02-SA2 (HC2)	5.356	0.005	0.119	0.00012	4.731	0.255827	14	302.753	0.616	0.027	0.643	0.033447	105
BH19-39 (HC3)	2.105	0.002	11.964	0.01196	0.483	0.026147	585	30.943	2.452	1.214	3.666	0.190628	80
Mix: 90% BH19-39 + 10% DH-MD-01 (HC4)	2.451	0.002	12.388	0.01239	0.475	0.025688	3071	30.400	3.002	1.127	4.129	0.214692	368
Mix: 70% BH19-39 + 30% DH-MD-02 (HC5)	2.266	0.002	12.151	0.01215	0.478	0.025850	10511	30.592	3.580	0.915	4.495	0.233746	1162

"Bulk" NPR Calculations for Static Tests			
Samples	*NP*	*AP*	
Lorax, 2018			
Selkirk 02	2	0.3	
Selkirk 04	29	2.1	
Selkirk 05	2.8	1.7	
Selkirk 06	2.5	6.8	
Selkirk 07	3.3	0.7	
Selkirk 08	8.5	9.7	
Selkirk 10	1.9	0.4	
Selkirk 11	1.4	1.2	
Selkirk 01	2.4	0.3	
SNC-Lavalin, 2020			
01-SA2	1.4	5.3	
02-SA1	2.2	0.3	
02-SA2	2.6	0.3	
02-SA3	4.1	0.3	
02-SA4	0.6	4.6	
39-RC01	48.8	16.3	
39-RC02	42.8	8.8	
39-RC03	9.2	22.3	
39-RC04	7.2	27.5	**NPR**
Average	9.59	6.05	**1.59**
Median	2.70	1.90	**1.42**

Blended Materials				
	Carbonate Rock Content			
	10%	15%	20%	25%
NP	60.72	90.68	120.64	150.6
AP	24.78	23.42	22.06	20.7
NPR	2.5	3.9	5.5	7.3
Assumptions				
Min NP of Selkirk Mountain Rocks				0.8
Max AP Selkirk Mountain Rocks				27.5
NP Carbonates				600
AP Carbonates				0.3

Drawings

- 666868-201: Site Location Plan
- 666868-202: Borehole Location Plan (Key Plan 101)
- 666868-203: Borehole Location Plan (Key Plan 102)
- 666868-204: Borehole Location Plan (Key Plan 106)
- 666868-205: Water Sampling Location Plan

LEGEND

- Selkirk Mountain Location
- Highway
- Roads
- Railway

World Hillshade

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

REFERENCES

Service Layer Credits: World Imagery: Earthstar Geographics
World Hillshade: Esri, NASA, NGA,

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Ministry of Transportation and Infrastructure	Columbia- Shuswap Regional District, BC

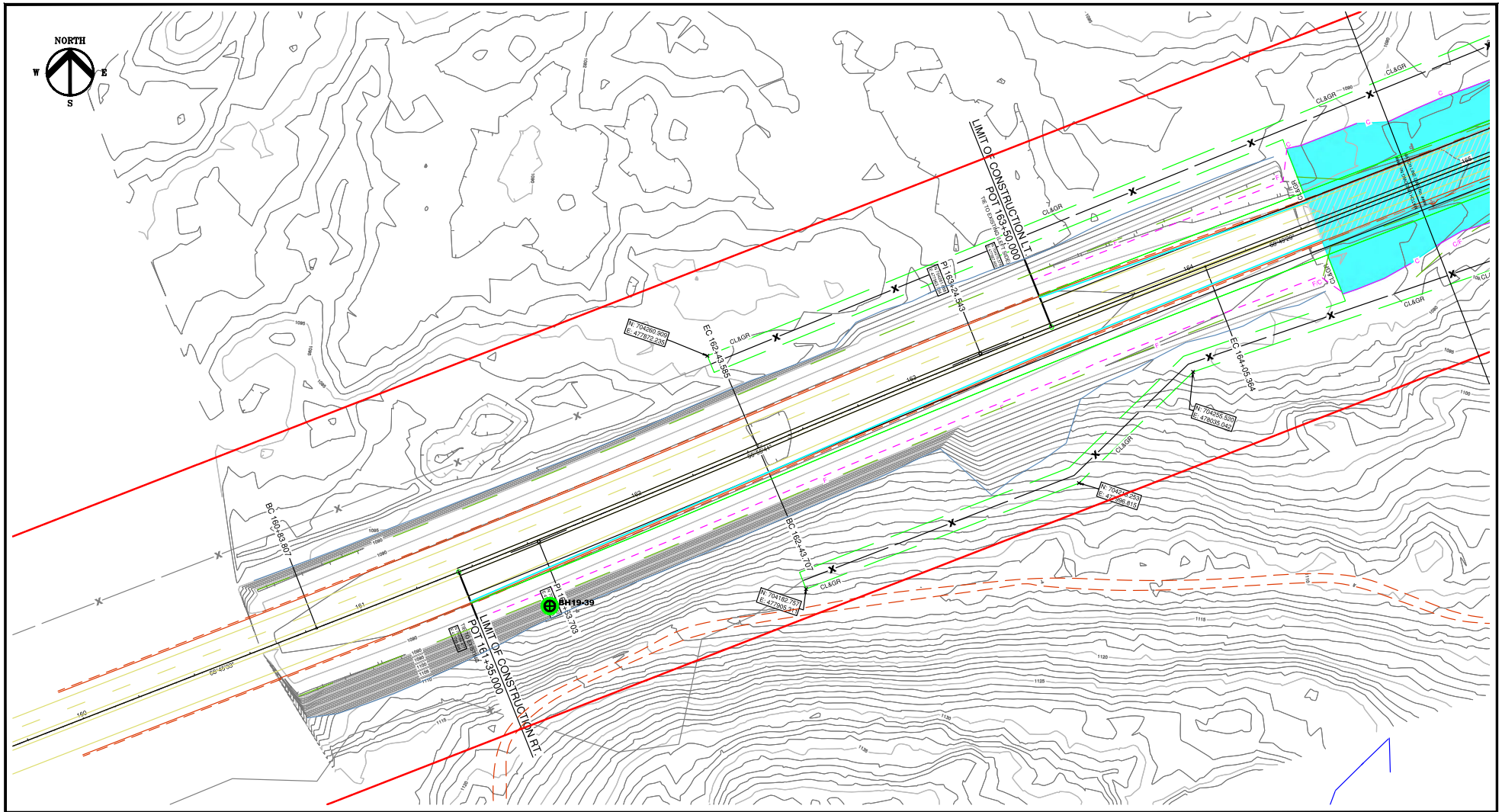
Site Location Plan

0 500 1,000 2,000 3,000 4,000 Meters

BY: ECH	DATE: 2020-03-13	REF No:	REV:
CHK'D: GG	SCALE: 1:60,000	668768-201	

MXD Path: \\Sli4395\projects\Current Projects\Ministry of Transportation\666768 - HWY 1 Selkirk Mtn 4 Lane ML_ARD\40_Execution\45_GIS_Dwgs\GIS\666768_Pro\666768_Pro.aprx

Project Path: \\Sli2606\projects\Current Projects\Ministry of Transportation\666768 - HWY 1 Selkirk Mtn 4 Lane ML_ARD



LEGEND

- RIGHT-OF-WAY
- LOT BOUNDARY
- FENCE
- MAJOR CONTOUR
- MINOR CONTOUR
- PAVEMENT EDGE
- CREEK
- DRAINAGE DITCH
- DIRT ROAD
- HIGHWAY SEGMENT REQUIRING TYPE A EXCAVATION
- TESTHOLE LOCATION

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
R2-1041-100	2019-09-12	M.O.T.I.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2022-03-09	ISSUED TO CLIENT	PES	MA
0	2022-02-17	ISSUED TO CLIENT AS DRAFT	PES	MA

CLIENT NAME:
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

PROJECT LOCATION:
HWY 1 SELKIRK MOUNTAIN 4-LANING PROJECT

SNC·LAVALIN

TITLE:
BOREHOLE LOCATION PLAN (KEY PLAN 101)

DWN BY: PES	SCALE: 1:1,250	DATE: 2022-01-17	DWG No:	REV.: 1
CHK'D: RW	PLOT: 20220309.1336	CADFILE: 666768R1	666768-202	

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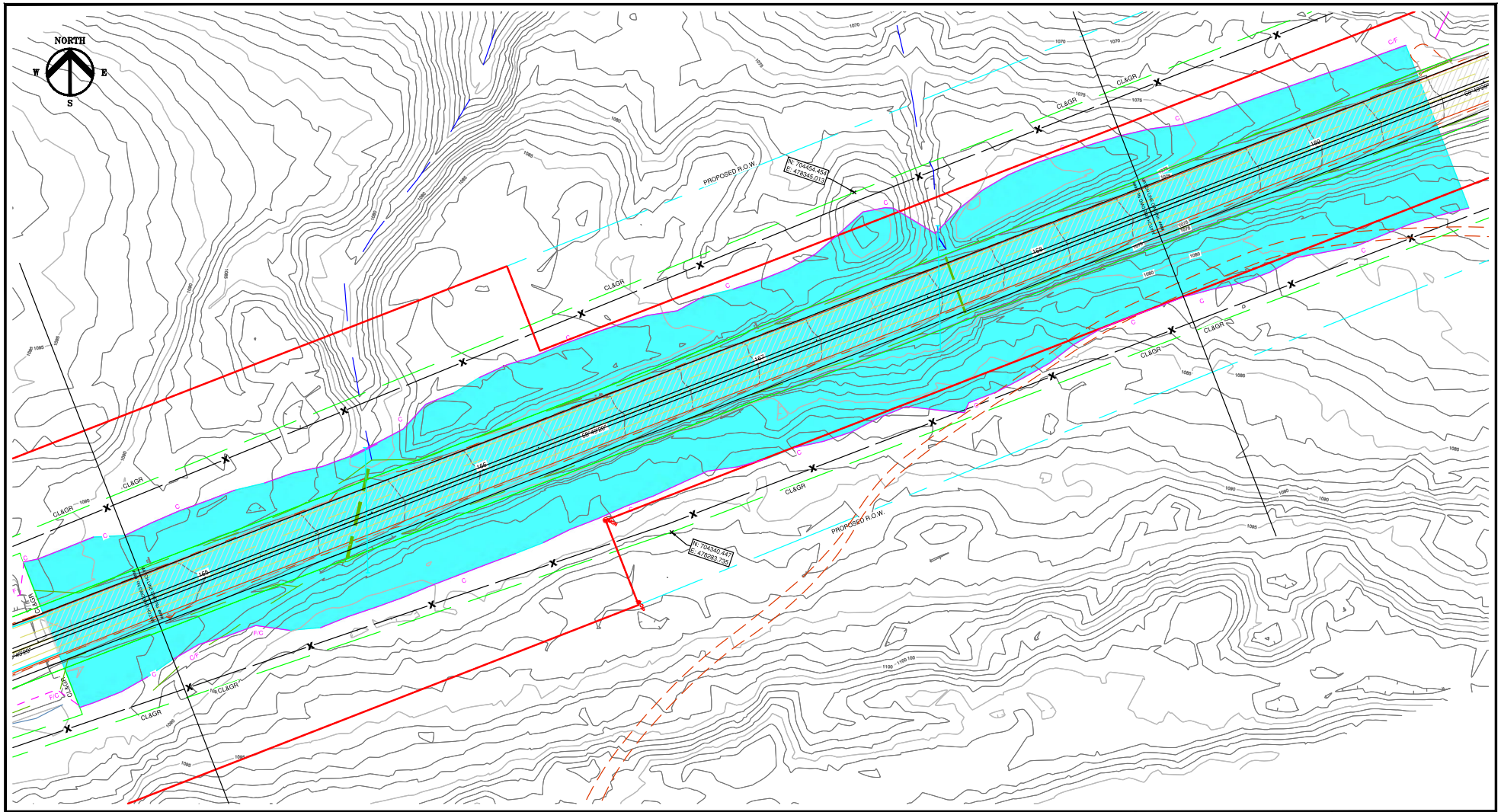

LEGEND

0 10 50

- RIGHT-OF-WAY
- LOT BOUNDARY
- FENCE
- MAJOR CONTOUR
- MINOR CONTOUR
- PAVEMENT EDGE
- CREEK
- DRAINAGE DITCH
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NOTES

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REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
R2-1041-100	2019-09-12	M.O.T.I.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2022-03-09	ISSUED TO CLIENT	PES	MA
0	2022-02-17	ISSUED TO CLIENT AS DRAFT	PES	MA

CLIENT NAME:
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

PROJECT LOCATION:
HWY 1 SELKIRK MOUNTAIN 4-LANING PROJECT

SNC·LAVALIN

TITLE:
BOREHOLE LOCATION PLAN (KEY PLAN 102)

DWN BY: PES	SCALE: 1:1,250	DATE: 2022-01-17	DWG No:	REV.: 1
CHK'D: RW	PLOT: 20220309.1338	CADFILE: 666768R1	666768-203	

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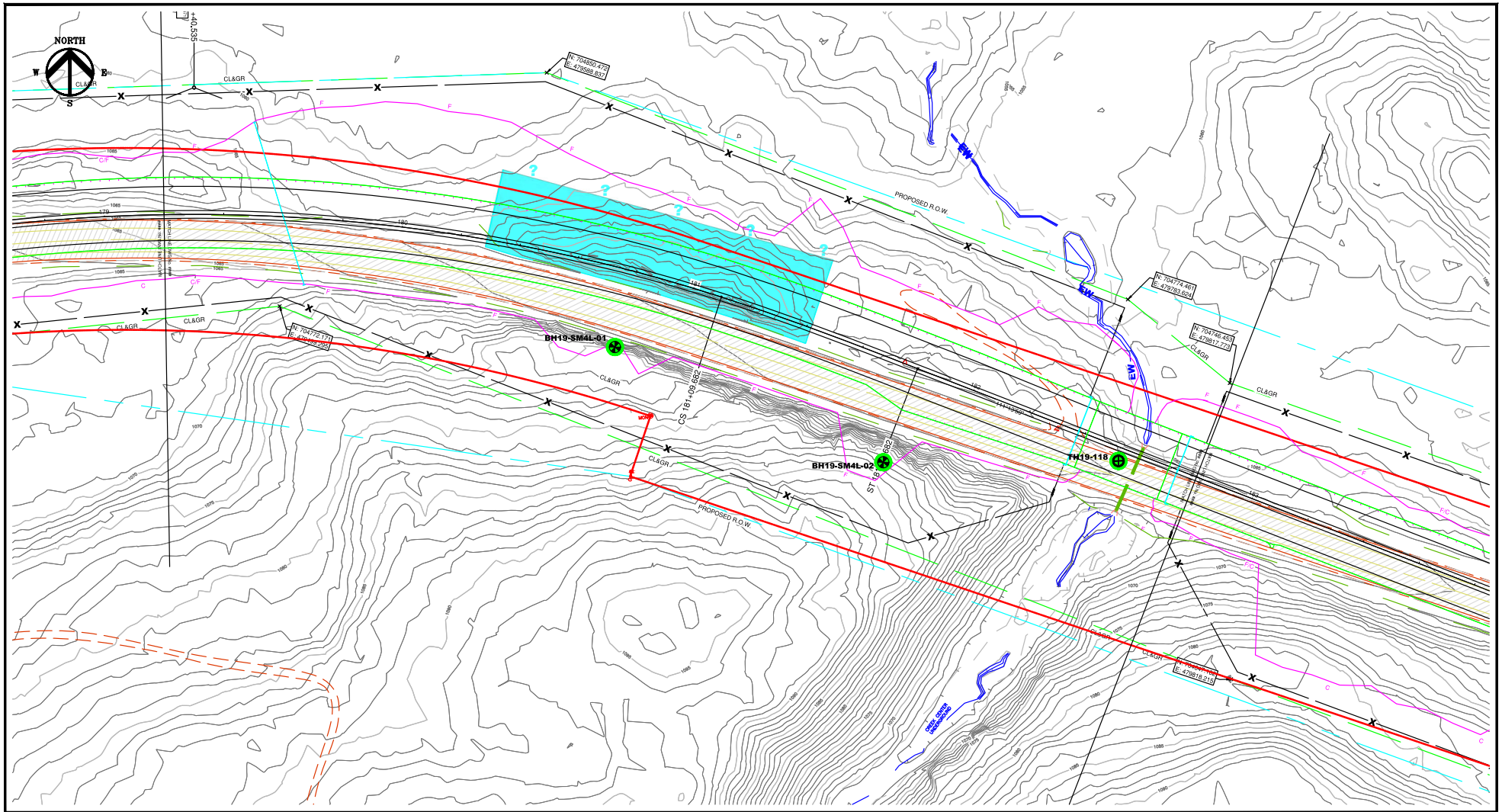

LEGEND

0 10 METRES 50

- RIGHT-OF-WAY
- LOT BOUNDARY
- FENCE
- MAJOR CONTOUR
- MINOR CONTOUR
- PAVEMENT EDGE
- CREEK
- DRAINAGE DITCH
- DIRT ROAD
- HIGHWAY SEGMENT REQUIRING TYPE A EXCAVATION
- TESTHOLE LOCATION
- BEDROCK BOREHOLE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
R2-1041-100	2019-09-12	M.O.T.I.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2022-03-09	ISSUED TO CLIENT	PES	MA
0	2022-02-17	ISSUED TO CLIENT AS DRAFT	PES	MA

CLIENT NAME: MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

PROJECT LOCATION: HWY 1 SELKIRK MOUNTAIN 4-LANING PROJECT

SNC·LAVALIN

TITLE: **BOREHOLE LOCATION PLAN (KEY PLAN 106)**

DWN BY: PES	SCALE: 1:1,250	DATE: 2022-01-17	DWG No: 666768-204	REV.: 1
CHK'D: RW	PLOT: 20220309.1339	CADFILE: 666768R1		

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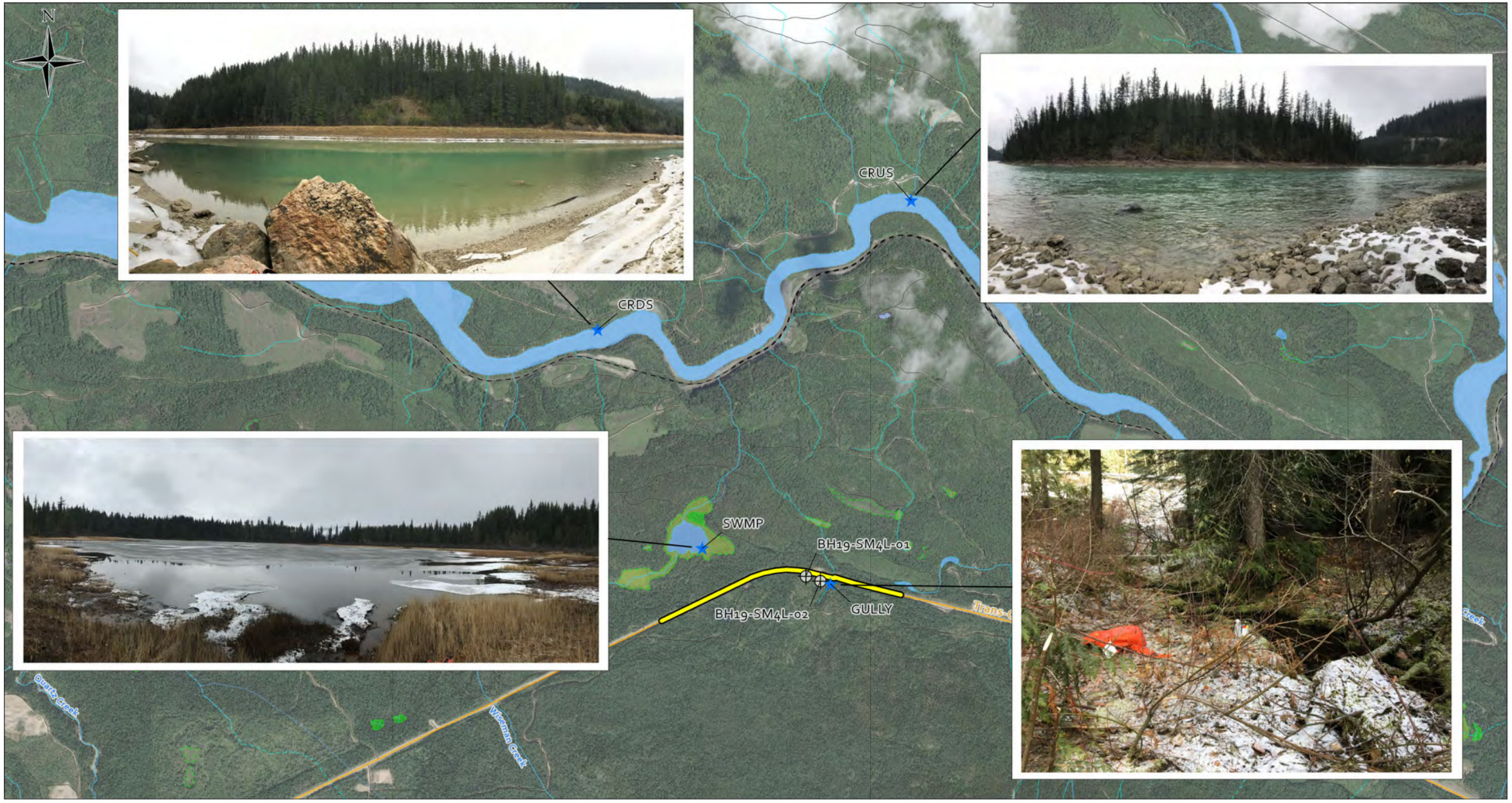


LEGEND

Layer

- Borehole
- Water Sample Location
- Selkirk Mountain Location
- Highway
- Roads
- Railway

0 175 350 700 1,050 1,400 Meters

REFERENCES

1. Map data source include ESRI Base Layers.....

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

SNC·LAVALIN

CLIENT NAME:	PROJECT LOCATION:
Ministry of Transportation and Infrastructure	Columbia-Shuswap Regional District

Water Sampling Location Plan

BY: ECH	SCALE: 1:25,000	DATE: 2022-02-17	REF No:	REV: 0
CHK'D: GG	PROJ COORD SYS: NAD 1983 UTM Zone 10N		666768-205	

Project Path: \\Sll2606\projects\Current Projects\Ministry of Transportation\666768 - HWY 1 Selkirk Mtn 4 Lane ML_ARD

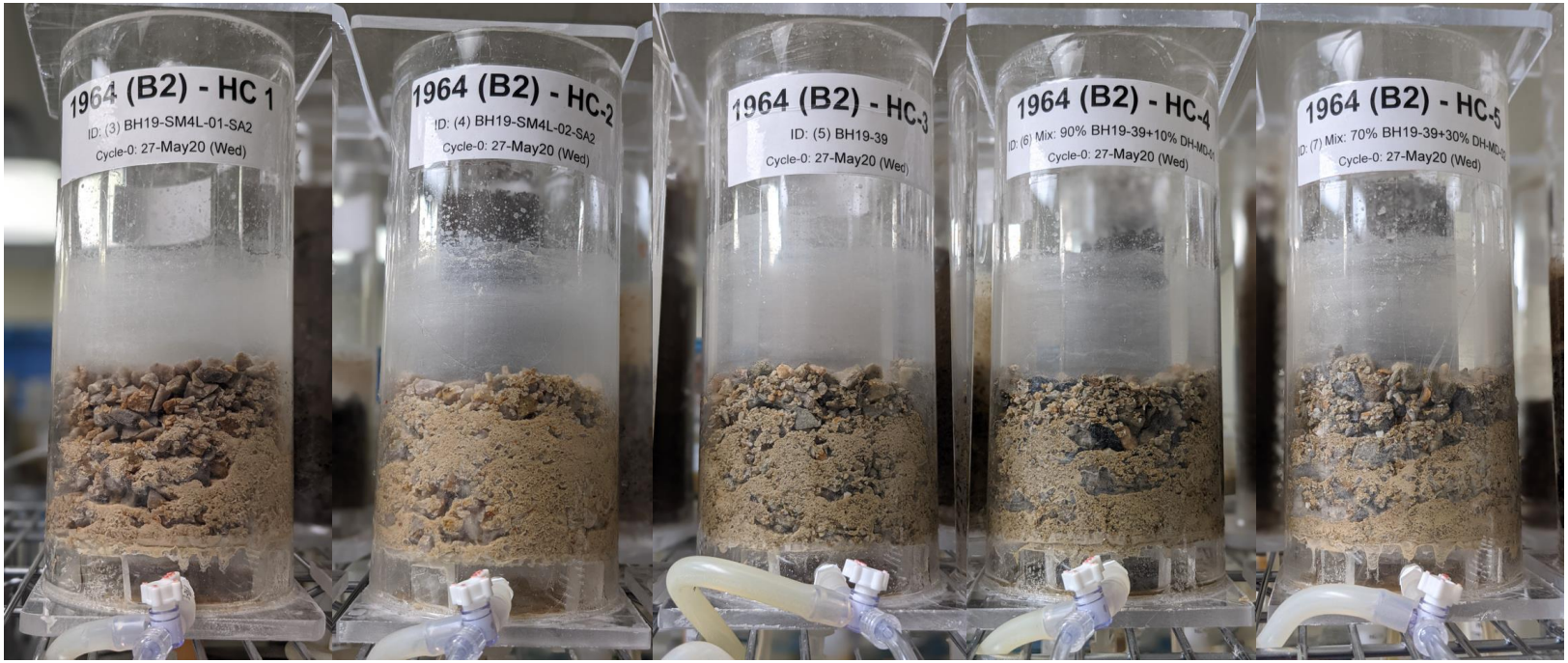
MXD Path: \\Slk439\projects\Current Projects\Ministry of Transportation\666768 - HWY 1 Selkirk Mtn 4 Lane ML_ARD\40_Execution\45_GIS_Dwgs\GIS\666768_Pro\666768_Pro.aprx

Attachment 1

Photographs

Photograph 1: Interbedded PELITE and ARKOSE eastbound near STN 181_20.

Photograph 2: Primarily PELITE westbound near STN 181-60.



Photograph 3: Laboratory photos of HC tests.

Attachment 2

Laboratory Documents

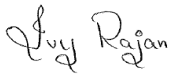
CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Company:	SNC-Lavalin Inc.
Project Manager:	Randy S. Williams, P.Geo., Geoscientist/Project Manager, Environment & Geoscience, Infrastructure.
Contact Person:	Randy S. Williams, P.Geo., Sr. Project Manager/Nelson Operations Manager,
	Environment & Geoscience, Engineering, Design and Project Management.
Email Address:	Randy.Williams@snclavalin.com
Mailing Address:	520 Lake Street, Nelson, BC V1L 4C6.
Contact No:	Off: (250) 505-3772; D: (250) 354-1664 x 53204
Fax No:	

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue, Burnaby, BC, Canada V5J 4M5.
Contact No:	Main: (604) 428-2730
	Ivy Rajan (Cell): (604) 319-7707
	Prab Bhatia (Cell): (604) 603-1359
Fax No:	(604) 428-2731

PROJECT INFORMATION	
Project Name:	MOTI Selkirk Mtn. 4-Laning (Batch-2)
Project Number:	666768

REPORTING	
Global Project No:	1964 (B2)
Pages (Including Cover):	10
Report Title:	MOTI HCT Report
Analysis Reviewed By:	Ivy Rajan (IRajan@GlobalARDTesting.com)
Position:	Acid Rock Drainage (ARD) Lab & Project Manager
Report Certified By:	Ivy Rajan
Signature:	

RESULTS		
Reported To:	**1**	Randy S. Williams (Randy.Williams@snclavalin.com)
	2	Vicky Lipinski (Vicky.Lipinski@snclavalin.com)
cc:		N/A
Date(s) Reported:		1st Update: 10-Jun20; 2nd: 24-Jun20; 3rd: 20-Jul20; 4th: 18-Aug20; 5th: 16-Sep20; 6th: 22-Oct20; 7th: 19-Nov20; 8th: 23-Dec20; 9th: 7-Jan21; 10th: 27-Jan21; 11th: 28-Jan21; 12th: 11-Mar21; 13th: 31-Mar21; 14th: 30-Apr21; 15th: 31-May21; 16th: 16-Jun21; 17th: 21-Jun21; 18th: 30-Jun21; 19th: 28-Jul21; 20th: 31-Aug21.

INVOICE	
Submitted To:	Accounts Payable Processing Centre (payables@snclavalin.com)
cc:	Randy S. Williams (Randy.Williams@snclavalin.com)
Address:	SNC-Lavalin Inc.
	520 Lake Street, Nelson, BC V1L 4C6.
Contact No:	+1 (250) 354-1664 x 53204
Client PO No:	N/A
Global Invoice No:	ARD1964-0821-15
For the Month of:	August 2021 (Weeks 62 - 65)
Date Submitted:	August 31, 2021

GLOBAL NOTES
HCT, column, custom leach columns (Lysimeters) & SAD column samples will be stored free
for 90 days past kinetic testing program or Closedown.
Please contact the lab if you require additional sample storage time. Storage charges will apply.
Reporting Schedule: Once a month.
Invoicing Schedule: Once a month.
Date Samples Received: May 08, 2020 (Friday)
Analyses requested on HCT leachates:
1) Particle Size Analysis on head HCT sample.
2) pH, EC, acidity & alkalinity.
3) Anions: Sulphate (SO4), Chloride (Cl) & Fluoride (F).
4) Total Dissolved Solids (TDS)
5) Dissolved metals by ICP-MS scan

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)
PROJECT NO: 666768

Sample Receipt Info:	
Date Samples Received:	May 08, 2020 (Friday)
No. of Samples Received:	6 (shipped back 1 sample)
Samples Received By:	Aman

Analytical Instructions:	
From:	Randy S. Williams (Randy.Williams@snclavalin.com)
	by Email
Date:	May 14, 2020 (Thursday)

Sample List:

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Reject Wt. Available (kg)	Global Notes (if any)		Global HCT ID
1	DH-MD-01	Rock	Dry	5.50	3.75		Rec'd in 1 x5L blue plastic pail	N/A
2	DH-MD-02	Rock	Dry	5.20	3.50	Rec'd #2 & #4 in 1 x20L plastic pail	Rec'd in 1 x5L yellow plastic pail	N/A
3	BH19-5M4L-01-SA2	Rock	Dry	7.20	5.55	Rec'd #3 & #5 in 1 x20L plastic pail	Rec'd in 1 x 5L yellow plastic pail (2 of 2)	HC-1
4	BH19-5M4L-02-SA2	Rock	Dry	5.75	4.05	Rec'd #2 & #4 in 1 x20L plastic pail	Rec'd in 1 x5L yellow plastic pail	HC-2
5	BH19-39	Rock	Dry	6.20	4.50	Rec'd #3 & #5 in 1 x20L plastic pail	Rec'd in 1 x 5L yellow plastic pail (1 of 2)	HC-3
Composited Prepared at Global ARD Testing Services Inc.								
6	Mix: 90% BH19-39 + 10% DH-MD-01	Wts used to composite (Total: 1.5 kg):		1350g + 150g	250 g	Used Wts: 1.0 kg - HCT testing; 150 g: PSA; 100 g: Pulp for static testing.		HC-4
7	Mix: 70% BH19-39 + 30% DH-MD-02	Wts used to composite (Total: 1.5 kg):		1050g + 450g	250 g	Used Wts: 1.0 kg - HCT testing; 150 g: PSA; 100 g: Pulp for static testing.		HC-5
Sample Shipped Back:								
	DH-MD-01	Rock	Dry	18.95		Rec'd in 1 x20L plastic pail. Sample was shipped back.		

Total wt. of samples rec'd (kg): 29.85

NOTES:

Shipped back sample (indicated in red colour) to address on pail on 12-May20.

SNC-Lavalin Inc.
Fort St. John Laboratory
9628 - 100 Street
Fort St. John, BC V1J 3X8
Phone 250.785.9898 Fax: 250.785.9083

Please use our Loomis Account # - N30060.

CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-1

Global ARD Testing Services Inc.

PAGE: 3 of 10
GLOBAL PROJECT NO: 1964 (B2)
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)/666768
SAMPLE ID: BH19-5M4L-01-SA2

Instrument/Method:				pH Meter	EC Meter	Tiration/Calc.	Tiration/Calc.	Colouri-metry	IC	SIE or IC	Gravimetry	Calc.	
Sampling Date	Week No.	Input Vol. (DI Water)	Output Vol. (Leachate)	pH	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Hardness (CaCO3)	Job No.
	Unit:	mL	mL	pH Units	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	
	RDL:	5	5	0.01	1	0.5	0.5	0.50	0.50	0.02	5	0.1	
27-May-20	0	750	621	7.30	66	3.0	20.0	2.3	1.58	<0.10	48	16.7	0052568-01
03-Jun-20	1	500	467	6.99	56	4.0	18.0	4.1	1.27	0.22	32	15.6	0061004-01
10-Jun-20	2	500	468	5.97	45	26.0	15.4	4.3	0.92	0.16	28	12.7	0061385-01
17-Jun-20	3	500	464	6.85	40	12.0	12.5	4.7	0.39	0.16	30	10.5	0062011-01
24-Jun-20	4	500	464	7.21	32	5.0	12.5	0.5	0.36	<0.10	23	9.5	0062680-01
01-Jul-20	5	500	477	6.95	28	6.0	12.0	0.5	0.13	<0.10	33	7.0	0070520-01
08-Jul-20	6	500	479	7.33	26	4.0	11.0	0.5	0.11	0.18	<28	8.0	0070820-01
15-Jul-20	7	500	465	6.65	31	5.8	12.0	1.4	<0.10	<0.10	<15	10.4	0071696-01
22-Jul-20	8	500	462	7.06	20	5.0	8.0	1.3	<0.10	<0.10	<17	5.6	0072338-01
29-Jul-20	**9**	500	470	6.20	21	9.0	8.0	1.1	<0.10	<0.10	<16	5.8	0073105-01
05-Aug-20	10	500	464										
12-Aug-20	11	500	475										
19-Aug-20	12	500	471										
26-Aug-20	13	500	473										
02-Sep-20	**14**	500	476	5.6	15	12.0	6.0	<1.0	<0.10	<0.10	<16	5.2	0090630-01
09-Sep-20	15	500	483										
16-Sep-20	16	500	478										
23-Sep-20	17	500	469										
30-Sep-20	18	500	483										
07-Oct-20	**19**	500	478	6.39	13	4.5	6.0	<0.50	<0.10	<0.10	37	4.2	20J1032-01
							Replicate analysis:	<0.50	<0.10	<0.10	N/A	4.2	
14-Oct-20	20	500	460										
21-Oct-20	21	500	476										
28-Oct-20	22	500	461										
04-Nov-20	23	500	481										
11-Nov-20	**24**	500	474	6.87	16	3.5	7.3	<1.0	<0.10	<0.10	<17	6.3	20K1497-01
18-Nov-20	25	500	483										
25-Nov-20	26	500	476										
02-Dec-20	27	500	466										
09-Dec-20	28	500	473										
16-Dec-20	**29**	500	482	7.23	13	6.5	5.5	<1.0	<0.10	<0.10	<15	5.5	20L2199-01
23-Dec-20	30	500	469										
30-Dec-20	31	500	480										
06-Jan-21	32	500	479										
13-Jan-21	33	500	480										
20-Jan-21	**34**	500	484	6.27	10	5.5	5.0	<1.0	<0.10	<0.10	37	3.7	21A1888-01
27-Jan-21	35	500	483										
03-Feb-21	36	500	479										
10-Feb-21	37	500	470										
17-Feb-21	38	500	480										
24-Feb-21	**39**	500	472	5.78	15	6.0	7.0	<4.0	<0.10	<0.10	<29	5.6	21C0669-01
03-Mar-21	40	500	470										
10-Mar-21	41	500	476										
17-Mar-21	42	500	475										
24-Mar-21	43	500	478										
31-Mar-21	**44**	500	480	7.03	23	3.5	10.0	<1.0	<0.10	<0.10	28	8.5	21D1371-01
07-Apr-21	45	500	475										
14-Apr-21	46	500	478										
21-Apr-21	47	500	470										
28-Apr-21	48	500	478										
05-May-21	**49**	500	475	6.52	14	3.0	5.0	<1.0	<0.10	<0.10	24	4.9	21E0690-01
											Replicate analysis:	4.8	
12-May-21	50	500	473										
19-May-21	51	500	480										
26-May-21	52	500	476										
02-Jun-21	53	500	478										
09-Jun-21	**54**	500	476	7.55	9	4.5	3.0	<1.0	<0.10	<0.10	<15	3.4	21F1397-01
16-Jun-21	55	500	470										
23-Jun-21	56	500	475										
30-Jun-21	57	500	470										
07-Jul-21	58	500	465										
14-Jul-21	**59**	500	470	7.10	9	6.0	3.5	<1.0	<0.10	<0.10	43	3.0	21G1983-01
21-Jul-21	60	500	475										
28-Jul-21	61	500	470										
04-Aug-21	62	500	477										
11-Aug-21	63	500	473										
18-Aug-21	**64**	500	480	6.82	8.65	6.3	4.9	<1.0	<0.10	<0.10	<15	4.3	21H2244-01
25-Aug-21	65	500	481										
01-Sep-21	66	500	480										
08-Sep-21	67	500	480										
15-Sep-21	68	500	480										

Dissolved Metals by ICP-MS (continued; only weeks with analyses shown, other weeks have no values)

Sampling Date	Week No.	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)
	Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	RDL:	0.001	0.00005	0.00005	0.0001	0.00001	0.00001	0.002	0.000002	0.04	0.0001	0.000005	0.0001	0.002	0.00005
27-May-20	0	0.0435	0.000588	0.0014	0.0076	<0.000010	<0.000010	0.0031	0.0000035	4.94	<0.00010	0.0000232	0.00054	<0.0020	<0.000050
03-Jun-20	1	0.102	0.000657	0.00155	0.0087	<0.000010	<0.000010	0.0078	0.0000029	4.09	<0.00010	0.0000157	0.0007	<0.0020	<0.000050
10-Jun-20	2	0.0812	0.000477	0.00121	0.0075	<0.000010	<0.000010	0.006	<0.0000020	3.3	<0.00010	0.000013	0.00047	0.0024	<0.000050
17-Jun-20	3	0.0471	0.000419	0.000822	0.0067	<0.000010	<0.000010	0.0052	0.0000023	2.65	<0.00010	0.0000122	0.00041	<0.0020	<0.000050
24-Jun-20	4	0.0589	0.000399	0.000762	0.0064	<0.000010	<0.000010	<0.0050	<0.0000020	2.47	<0.00010	0.0000122	0.00046	0.0025	<0.000050
01-Jul-20	5	0.0709	0.000402	0.000985	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	1.68	<0.00010	0.000012	0.0002	0.0062	0.000054
08-Jul-20	6	0.0451	0.000455	0.0015	0.0077	<0.000010	<0.000010	<0.0050	<0.0000020	1.95	<0.00010	0.0000132	0.00048	0.0068	0.000055
15-Jul-20	7	0.0411	0.000518	0.00148	0.0086	<0.000010	<0.000010	<0.0050	<0.0000020	2.66	<0.00010	0.0000087	0.00018	0.0052	<0.000050
22-Jul-20	8	0.031	0.000373	0.00122	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	1.38	<0.00010	0.0000107	0.00039	0.0026	<0.000050
29-Jul-20	**9**	0.0259	0.000274	0.000849	0.0045	<0.000010	<0.000010	0.0053	0.000004	1.47	<0.00010	0.0000117	0.00039	0.0039	<0.000050
02-Sep-20	**14**	0.0247	0.000205	0.000665	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	1.36	<0.00010	0.0000085	<0.00010	0.0047	<0.000050
07-Oct-20	**19**	0.0298	0.000207	0.000443	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	1.12	0.00013	0.0000097	0.00031	0.0067	<0.000050
Replicate analysis:		0.0303	0.000231	0.000435	0.0047	<0.000010	<0.000010	0.0013	<0.0000020	1.11	<0.00010	0.0000118	0.00033	0.0114	<0.000050
11-Nov-20	**24**	0.0182	0.000203	0.000339	0.0077	<0.000010	<0.000010	<0.0050	<0.0000020	1.64	<0.00010	0.0000094	0.00014	<0.0020	<0.000050
16-Dec-20	**29**	0.0231	0.000261	0.000313	0.0060	<0.000010	<0.000010	<0.0050	<0.0000020	1.42	<0.00010	0.0000211	<0.00010	0.0048	<0.000050
20-Jan-21	**34**	0.0209	0.000194	0.000618	0.0051	<0.000010	0.000017	<0.0050	0.00002	0.921	0.0001	0.0000186	0.00042	0.0107	0.000426
24-Feb-21	**39**	0.0183	0.000179	0.000423	0.0074	<0.000010	<0.000010	<0.0050	0.0000031	1.44	<0.00010	0.0000237	0.00037	0.0464	<0.000050
31-Mar-21	**44**	0.0267	0.00027	0.000757	0.0110	<0.000010	<0.000010	<0.0050	<0.0000020	2.18	<0.00010	0.0000184	<0.00010	0.0147	<0.000050
05-May-21	**49**	0.0388	0.000209	0.000302	0.0076	<0.000010	<0.000010	<0.0050	0.000005	1.27	<0.00010	0.0000144	0.00034	0.0066	<0.000050
Replicate analysis:		0.0373	0.000167	0.000291	0.0074	<0.000010	<0.000010	<0.0020	<0.0000020	1.28	<0.00010	0.0000144	0.00028	0.0069	<0.000050
09-Jun-21	**54**	0.0383	0.000193	0.000295	0.0054	<0.000010	<0.000010	<0.0050	<0.0000020	0.955	0.0001	0.000015	0.00037	0.0099	<0.000050
14-Jul-21	**59**	0.0599	0.000071	0.000241	0.0060	<0.000010	<0.000010	<0.0050	<0.0000020	0.794	<0.00010	0.0000161	0.00011	0.0133	0.000062
18-Aug-21	**64**	0.0206	0.000079	0.000259	0.0057	<0.000010	<0.000010	<0.0050	0.0000031	1.13	<0.00010	0.0000111	<0.00010	0.0048	<0.000050

Sampling Date	Week No.	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)
	Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	RDL:	0.00005	0.005	0.00005	0.00002	0.00001	0.00004	0.01	0.01	0.0001	0.1	0.00001	0.02	0.0001	1
27-May-20	0	0.00146	1.06	0.0025	<0.000020	0.00196	0.00008	0.011	4.67	<0.00010	2.64	<0.000010	1.19	0.0231	2.06
03-Jun-20	1	0.00149	1.31	0.0033	<0.000020	0.000267	0.000042	<0.010	3.61	<0.00010	2.26	<0.000010	1.37	0.0194	1.52
10-Jun-20	2	0.000998	1.09	0.0023	<0.000020	0.000263	<0.000040	<0.010	2.76	<0.00010	1.92	<0.000010	1.17	0.0148	1.58
17-Jun-20	3	0.000886	0.946	0.0022	<0.000020	0.000224	<0.000040	<0.010	2.39	<0.00010	1.43	<0.000010	0.85	0.0124	1.43
24-Jun-20	4	0.000702	0.805	0.0022	<0.000020	0.000222	<0.000040	<0.010	2.43	<0.00010	1.35	<0.000010	0.74	0.0111	<1.00
01-Jul-20	5	0.000554	0.679	0.0016	<0.000020	0.00019	0.000093	<0.010	1.87	<0.00010	1.18	<0.000010	0.59	0.00927	<1.00
08-Jul-20	6	0.000549	0.762	0.0028	<0.000020	0.000164	<0.000040	0.011	1.59	<0.00010	1.11	<0.000010	0.42	0.0104	<1.00
15-Jul-20	7	0.000609	0.918	0.0025	<0.000020	0.000146	<0.000040	<0.010	1.89	<0.00010	1.42	<0.000010	0.29	0.0122	<1.00
22-Jul-20	8	0.000501	0.521	0.0019	<0.000020	0.000096	<0.000040	0.01	1.41	0.00016	0.96	<0.000010	0.27	0.00726	<1.00
29-Jul-20	**9**	0.000374	0.521	0.0022	<0.000020	0.000086	<0.000040	<0.010	1.19	<0.00010	0.84	<0.000010	0.18	0.00713	<1.00
02-Sep-20	**14**	0.000277	0.427	0.0017	<0.000020	0.000054	0.000112	<0.010	0.836	<0.00010	0.79	<0.000010	0.09	0.00659	<1.00
07-Oct-20	**19**	0.000194	0.338	0.0017	<0.000020	0.000156	0.000118	<0.010	0.811	<0.00010	0.74	<0.000010	0.09	0.00623	<0.50
Replicate analysis:		0.000224	0.347	0.0017	<0.000010	0.000076	0.000077	<0.010	0.81	<0.00010	0.71	<0.000010	0.08	0.00602	<0.50
11-Nov-20	**24**	0.000275	0.523	0.0019	<0.000020	0.00003	<0.000040	<0.010	0.785	<0.00010	0.71	<0.000010	0.06	0.00801	<1.00
16-Dec-20	**29**	0.000399	0.463	0.0026	<0.000020	0.000022	0.000045	<0.010	0.774	<0.00010	0.83	<0.000010	0.06	0.00588	<1.00
20-Jan-21	**34**	0.000226	0.347	0.0047	0.0000	0.000032	0.00005	0.014	0.556	<0.00010	1.45	0.00001	0.04	0.00492	<1.00
24-Feb-21	**39**	0.00027	0.471	0.0020	0.0000	0.000028	0.000357	<0.010	0.612	<0.00010	0.87	<0.000010	0.06	0.00704	<1.00
31-Mar-21	**44**	0.000587	0.732	0.0032	<0.000020	0.000037	0.000062	<0.010	1.13	<0.00010	1.62	<0.000010	0.07	0.00995	<1.00
05-May-21	**49**	0.000345	0.41	0.0023	<0.000020	0.00002	0.000061	<0.010	0.681	<0.00010	1	<0.000010	0.06	0.00596	<1.00
Replicate analysis:		0.000342	0.398	0.0021	<0.000020	0.000017	0.000058	<0.010	0.671	<0.00010	0.99	<0.000010	0.06	0.0059	<0.50
09-Jun-21	**54**	0.000273	0.252	0.0019	<0.000020	0.000023	0.000077	<0.010	0.5	<0.00010	0.74	<0.000010	0.04	0.00374	<1.00
14-Jul-21	**59**	0.000198	0.25	0.0026	<0.000020	0.000011	<0.000040	<0.010	0.445	<0.00010	0.82	<0.000010	0.04	0.00325	<1.00
18-Aug-21	**64**	0.000209	0.346	0.0013	<0.000020	<0.000010	0.000098	<0.010	0.465	<0.00010	0.83	<0.000010	0.04	0.0046	<1.00

Sampling Date	Week No.	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)	Tungsten (W)	Ion Balance: Anions	Cations	% Difference
	Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	meq/L	meq/L	meq/L
	RDL:	0.00005	0.000004	0.00001	0.00005	0.0002	0.000001	0.0002	0.001	0.00002	0.2			
27-May-20	0	<0.000050	0.0000051	<0.000010	<0.000050	<0.00020	0.000139	0.00031	<0.0010	<0.000020	0.42	0.49	0.51	-1.89
03-Jun-20	1	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000598	<0.00020	<0.0010	<0.000020	0.61	0.49	0.48	1.52
10-Jun-20	2	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000457	<0.00020	<0.0010	0.000039	0.46	0.43	0.39	5.46
17-Jun-20	3	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000366	<0.00020	<0.0010	<0.000020	0.35	0.37	0.32	7.63
24-Jun-20	4	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000333	<0.00020	<0.0010	<0.000020	0.32	0.27	0.29	-3.60
01-Jul-20	5	<0.000050	<0.0000040	<0.000010	<0.000050	0.00023	0.000376	<0.00020	<0.0010	<0.000020	0.33	0.25	0.22	6.82
08-Jul-20	6	<0.000050	<0.0000040	<0.000010	<0.000050	0.00044	0.000251	<0.00020	<0.0010	0.000026	0.30	0.24	0.22	3.87
15-Jul-20	7	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000293	0.00345	<0.0010	0.000028	0.30	0.27	0.27	-0.98
22-Jul-20	8	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000176	<0.00020	<0.0010	<0.000020	<0.20	0.19	0.16	6.81
29-Jul-20	**9**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000223	<0.00020	<0.0010	<0.000020	<0.20	0.18	0.16	6.89
02-Sep-20	**14**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000191	<0.00020	<0.0010	<0.000020	<0.20	0.12	0.13	-4.63
07-Oct-20	**19**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000105	0.00082	<0.0010	<0.000020	<0.20	0.12	0.11	3.33
Replicate analysis:		<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000102	0.00072	<0.0010	<0.000020	<0.20	0.12	0.11	3.12
11-Nov-20	**24**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000181	<0.00020	0.0012	<0.000020	<0.20	0.15	0.15	-1.32
16-Dec-20	**29**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.0000964	0.00022	<0.0010	<0.000020	<0.20	0.11	0.13	-9.99
20-Jan-21	**34**	<0.000050	<0.0000040	0.000012	<0.000050	<0.00020	0.0000503	<0.00020	0.0019	<0.000020	<0.20	0.10	0.09	3.26
24-Feb-21	**39**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000103	<0.00020	<0.0010	<0.000020	<0.20	0.14	0.13	2.52
31-Mar-21	**44**	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000104	0.00028	<0.0010	<0.000020	<0.20	0.20	0.21	-1.26
05-May-21	**49**	<0.000050	<0.0000040	<0.000010	<0.000050	0.00037	0.0000602	<0.00020	<0.0010	<0.000020	<0.20	0.10	0.12	-9.94
Replicate analysis:		<0.000050	<0.0000040	<0.000010	<0.000050	0.00027	0.0000604	<0.00020	<0.0010	<0.000020	<0.20	0.10	0.12	-9.52
09-Jun-21	**54**	<0.000050	<0.0000040	<0.000010	<0.000050	0.00051	0.0000271	<0.00020	<0.0010	<0.000020	<0.20	0.06	0.09	-18.78
14-Jul-21	**59**	<0.000050	<0.0000040	<0.000010	<0.000050	0.00063	0.0000204	<0.00020	<0.0010	0.000113	<0.20	0.07	0.08	-7.08
18-Aug-21	**64**	0.000058	<0.0000040	<0.000010	0.000101	<0.00020	0.0000245	<0.00020	<0.0010	0.000021	<0.20	0.10	0.10	-1.56

NOTES:
Continue testing until client says otherwise. Email from Randy Williams dated June 25, 2021.
Requested # of weeks of testing: 55 weeks (includes week-0)
RDL may be raised for some samples due to sample matrix interference.

Abbreviations:
RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
Calc: Calculation
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry

CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-2

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)/666768
SAMPLE ID: BH19-5M4L-02-SA2

Sampling Date	Week No.	Input Vol. (DI Water)	Output Vol. (Leachate)	pH	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Hardness (CaCO3)	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)
Instrument/Method:				pH Meter	EC Meter	Tiration/Calc.	Tiration/Calc.	Colourimetry	IC	SIE or IC	Gravimetry	Calc.	Dissolved Metals by ICP-MS						
Unit:		mL	mL	pH Units	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:		5	5	0.01	1	0.5	0.5	0.50	0.50	0.02	5	0.1	0.001	0.00005	0.00005	0.0001	0.00001	0.00001	0.002
27-May-20	0	750	638	6.60	66	3.5	7.5	14.1	1.72	<0.10	54	8.5	0.0042	0.000454	0.000829	0.0102	<0.000010	<0.000010	0.0055
03-Jun-20	1	500	472	6.02	100	4.0	3.5	33.0	0.88	<0.10	53	22.7	0.0019	0.000453	0.00165	0.0304	<0.000010	<0.000010	0.0118
10-Jun-20	2	500	473	6.34	73	12.0	3.0	25.7	0.22	<0.10	46	18.3	0.0021	0.000215	0.000733	0.0201	<0.000010	<0.000010	0.0078
17-Jun-20	3	500	469	5.83	66	17.0	2.0	21.7	<0.10	<0.10	38	15.9	0.002	0.000167	0.000604	0.0192	<0.000010	<0.000010	0.0071
24-Jun-20	4	500	467	5.74	61	5.0	2.0	20.8	0.11	<0.10	33	16.7	0.0027	0.000142	0.000714	0.0164	<0.000010	<0.000010	0.0067
01-Jul-20	5	500	471	5.75	56	4.5	1.5	17.7	<0.10	<0.10	38	13.6	0.0041	0.000163	0.000718	0.0152	<0.000010	<0.000010	0.0058
08-Jul-20	6	500	468	5.81	33	3.3	3.0	11	<0.10	<0.10	49	8.7	0.019	0.000155	0.000823	0.0097	<0.000010	<0.000010	0.0056
15-Jul-20	7	500	467	5.71	44	6.0	1.0	14.5	<0.10	<0.10	<15	13.5	0.0148	0.000169	0.000976	0.0172	<0.000010	<0.000010	0.006
											Replicate analysis:	13.5	0.0143	0.000175	0.000928	0.0166	<0.000010	<0.000010	0.0064
22-Jul-20	8	500	457	6.29	41	7.5	2.0	12.4	<0.10	<0.10	<16	11.0	0.0106	0.000224	0.00116	0.0171	<0.000010	<0.000010	0.0061
29-Jul-20	**9**	500	463	4.41	42	13.5	<0.5	12.2	<0.10	<0.10	15	10.4	0.0088	0.000107	0.000987	0.0133	<0.000010	<0.000010	0.0064
05-Aug-20	10	500	466																
12-Aug-20	11	500	473																
19-Aug-20	12	500	483																
26-Aug-20	13	500	477																
02-Sep-20	**14**	500	464	4.48	36	7.5	<0.5	12	<0.10	<0.10	23	11.0	0.0045	0.000054	0.000663	0.0169	0.00002	<0.000010	<0.0050
09-Sep-20	15	500	469																
16-Sep-20	16	500	475																
23-Sep-20	17	500	467																
30-Sep-20	18	500	479																
07-Oct-20	**19**	500	477	4.97	25	5.0	1.0	7.3	<0.10	<0.10	51	7.1	0.0054	0.000128	0.000531	0.0201	0.000016	<0.000010	<0.0050
14-Oct-20	20	500	476																
21-Oct-20	21	500	480																
28-Oct-20	22	500	479																
04-Nov-20	23	500	478																
11-Nov-20	**24**	500	480	5.22	26	7.0	0.5	8.1	<0.10	<0.10	<15	7.6	0.0095	<0.000050	0.000394	0.0260	0.000047	<0.000010	<0.0050
18-Nov-20	25	500	477																
25-Nov-20	26	500	483																
02-Dec-20	27	500	476																
09-Dec-20	28	500	477																
16-Dec-20	**29**	500	480	6.53	20	7.0	0.5	6.8	<0.10	<0.10	<16	5.0	0.0113	0.000067	0.000611	0.0304	0.000062	<0.000010	<0.0050
23-Dec-20	30	500	479																
30-Dec-20	31	500	479																
06-Jan-21	32	500	482																
13-Jan-21	33	500	476																
20-Jan-21	**34**	500	479	4.27	30	7.5	<0.5	9.6	<0.10	<0.10	40	6.2	0.0486	0.000077	0.000523	0.0381	0.000108	<0.000010	<0.0050
27-Jan-21	35	500	481																
03-Feb-21	36	500	476																
10-Feb-21	37	500	479																
17-Feb-21	38	500	475																
24-Feb-21	**39**	500	481	3.31	36	12.0	<0.5	7.7	<0.10	<0.10	<25	6.9	0.0745	<0.000050	0.000492	0.0306	0.000139	<0.000010	<0.0050
03-Mar-21	40	500	476																
10-Mar-21	41	500	478																
17-Mar-21	42	500	480																
24-Mar-21	43	500	477																
31-Mar-21	**44**	500	479	4.20	45	10.0	<0.5	10.9	<0.10	<0.10	24	5.9	0.0991	<0.000050	0.000631	0.0586	0.000219	<0.000010	<0.0050
07-Apr-21	45	500	472																
14-Apr-21	46	500	476																
21-Apr-21	47	500	475																
28-Apr-21	48	500	475																
05-May-21	**49**	500	477	4.36	31	7.0	<0.5	6.1	<0.10	<0.10	<15	2.7	0.106	0.000063	0.000467	0.0357	0.000146	<0.000010	<0.0050
12-May-21	50	500	476																
19-May-21	51	500	474																
26-May-21	52	500	480																
02-Jun-21	53	500	470																
09-Jun-21	**54**	500	474	4.49	37	10.0	<0.5	11.3	<0.10	<0.10	<15	2.8	0.167	0.000167	0.000505	0.0258	0.000175	<0.000010	<0.0050
16-Jun-21	55	500	470																
23-Jun-21	56	500	475																
30-Jun-21	57	500	476																
07-Jul-21	58	500	470																
14-Jul-21	**59**	500	475	4.26	36	11.8	<0.5	9.0	<0.10	<0.10	29	2.3	0.209	<0.000050	0.000483	0.0307	0.000172	<0.000010	<0.0050
											Replicate analysis:	2.2	0.210	<0.000050	0.000461	0.0310	0.000177	<0.000010	0.0033
21-Jul-21	60	500	465																
28-Jul-21	61	500	470																
04-Aug-21	62	500	477																
11-Aug-21	63	500	473																
18-Aug-21	**64**	500	468	4.84	36	17.7	<0.5	12.6	<0.10	<0.10	19	3.8	0.296	<0.000050	0.000511	0.0333	0.000144	<0.000010	<0.0050
25-Aug-21	65	500	474																
01-Sep-21	66	500																	
08-Sep-21	67	500																	
15-Sep-21	68	500																	

Sampling Date	Week No.	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:		0.000002	0.04	0.0001	0.000005	0.0001	0.002	0.00005	0.00005	0.005	0.00005	0.00002	0.00001	0.00004	0.01	0.01	0.0001	0.1	0.00001	0.02
27-May-20	0	0.0000121	2.56	<0.00010	0.000286	0.00061	<0.0020	<0.000050	0.00107	0.504	0.0055	<0.000020	0.000518	0.000714	<0.010	8.26	0.00218	1.22	<0.000010	1.03
03-Jun-20	1	0.0000178	6.99	<0.00010	0.000499	0.0017	<0.0020	<0.000050	0.00125	1.27	0.0155	<0.000020	0.00007	0.00166	<0.010	8.1	0.00266	3.1	<0.000010	0.86
10-Jun-20	2	0.0000123	5.79	<0.00010	0.00041	0.00096	<0.0020	<0.000050	0.000734	0.919	0.0114	<0.000020	0.000061	0.00135	<0.010	4.82	0.00116	2.17	<0.000010	0.33
17-Jun-20	3	0.0000129	5.04	<0.00010	0.000489	0.00065	0.0035	<0.000050	0.000608	0.795	0.0126	<0.000020	0.00005	0.00159	<0.010	3.33	0.00072	1.94	<0.000010	0.13
24-Jun-20	4	0.0000135	5.44	<0.00010	0.000582	0.00082	0.0025	<0.000050	0.000526	0.76	0.0157	<0.000020	0.000063	0.00188	<0.010	3.23	0.00058	2	<0.000010	0.08
01-Jul-20	5	0.0000092	4.41	<0.00010	0.000428	0.00013	0.0028	<0.000050	0.000425	0.626	0.0136	<0.000020	0.00005	0.00135	<0.010	2.18	0.00045	1.47	<0.000010	0.04
08-Jul-20	6	0.0000075	2.79	<0.00010	0.00031	0.00045	0.0041	<0.000050	0.000318	0.43	0.0113	<0.000020	0.000056	0.00104	<0.010	1.54	0.00032	1.57	<0.000010	0.05
15-Jul-20	7	0.0000076	4.44	<0.00010	0.000642	0.00026	0.0025	<0.000050	0.000251	0.58	0.0160	<0.000020	0.000055	0.00238	<0.010	1.57	0.00031	2.34	<0.000010	<0.020
Replicate analysis		0.000007	4.48	<0.00010	0.000633	0.00025	0.0023	<0.000050	0.000257	0.573	0.0157	<0.000020	0.000051	0.00195	<0.010	1.55	0.00029	2.24	<0.000010	<0.020
22-Jul-20	8	0.0000078	3.62	<0.00010	0.00045	0.0004	0.0033	<0.000050	0.00024	0.468	0.0112	<0.000020	0.000064	0.00114	<0.010	1.37	0.00029	1.07	<0.000010	0.06
29-Jul-20	9	0.0000095	3.48	<0.00010	0.000768	0.00058	0.009	<0.000050	0.000173	0.417	0.0152	<0.000020	0.000048	0.00208	<0.010	1.07	0.00028	1.42	<0.000010	0.03
02-Sep-20	14	0.0000195	3.83	<0.00010	0.00159	<0.00010	0.0348	<0.000050	0.000127	0.345	0.0216	<0.000020	<0.000010	0.00359	<0.010	0.699	0.00016	1.64	<0.000010	<0.020
07-Oct-20	19	0.0000185	2.54	<0.00010	0.0015	0.00053	0.0239	<0.000050	0.000097	0.19	0.0169	<0.000020	0.000088	0.00316	<0.010	0.682	0.00011	0.85	<0.000010	0.03
11-Nov-20	24	0.0000297	2.73	<0.00010	0.00246	0.0025	0.0732	<0.000050	0.000113	0.196	0.0205	<0.000020	<0.000010	0.00417	<0.010	0.535	0.00011	1.39	<0.000010	0.03
16-Dec-20	29	0.0000239	1.8	<0.00010	0.00199	0.00116	0.0287	<0.000050	0.000132	0.112	0.0141	<0.000020	<0.000010	0.00326	<0.010	0.602	<0.00010	0.75	<0.000010	0.02
20-Jan-21	34	0.0000458	2.21	0.00023	0.00419	0.00165	0.313	0.000123	0.000115	0.151	0.0271	<0.000020	<0.000010	0.00631	0.016	0.508	0.00011	2.65	<0.000010	<0.020
24-Feb-21	39	0.0000426	2.55	0.00013	0.00447	0.0018	0.453	0.000078	0.000113	0.126	0.0253	<0.000020	<0.000010	0.00839	<0.010	0.446	0.00015	1.54	<0.000010	0.03
31-Mar-21	44	0.0000442	2.15	0.00024	0.00487	0.00171	0.313	0.000108	0.000091	0.119	0.0226	<0.000020	<0.000010	0.00667	<0.010	0.585	0.00011	0.94	<0.000010	<0.020
05-May-21	49	0.0000251	1.01	0.00035	0.00306	0.00187	0.243	0.000086	0.000083	0.0497	0.0131	<0.000020	<0.000010	0.00427	<0.010	0.369	<0.00010	0.41	<0.000010	<0.020
09-Jun-21	54	0.0000254	1.04	0.00046	0.00355	0.00385	0.493	0.000137	0.000074	0.0414	0.0131	<0.000020	<0.000010	0.00487	<0.010	0.326	<0.00010	0.37	<0.000010	<0.020
14-Jul-21	59	0.0000146	0.861	0.00053	0.00259	0.00348	0.577	0.000108	0.000069	0.0338	0.0089	<0.000020	<0.000010	0.00352	<0.010	0.35	<0.00010	0.37	<0.000010	0.02
Replicate analysis		0.0000155	0.847	0.00055	0.00259	0.00348	0.582	0.000106	0.000068	0.0341	0.0089	<0.000020	<0.000010	0.0035	<0.010	0.353	0.00012	0.36	<0.000010	0.02
18-Aug-21	64	0.0000168	1.44	0.00067	0.00326	0.00171	1.12	0.00013	0.000068	0.0392	0.0090	0.0000	<0.000010	0.00417	<0.010	0.364	<0.00010	0.75	<0.000010	<0.020

Sampling Date	Week No.	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)	Tungsten (W)	Ion Balance: Anions	Ion Balance: Cations	Ion Balance: % Difference	Job No.
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	meq/L	meq/L	meq/L	
RDL:		0.0001	1	0.00005	0.000004	0.00001	0.00005	0.0002	0.000001	0.0002	0.001	0.00002	0.2				
27-May-20	0	0.0187	4.87	<0.000050	0.0000515	<0.000010	<0.000050	<0.00020	0.0000061	<0.00020	<0.0010	<0.000020	<0.20	0.49	0.43	6.96	0052568-02
03-Jun-20	1	0.0415	10.8	<0.000050	0.0000415	<0.000010	<0.000050	<0.00020	0.0000032	<0.00020	<0.0010	<0.000020	<0.20	0.78	0.70	5.31	0061004-02
10-Jun-20	2	0.0297	8.32	<0.000050	0.0000292	<0.000010	<0.000050	<0.00020	0.0000061	<0.00020	<0.0010	<0.000020	<0.20	0.60	0.51	8.63	0061385-02
17-Jun-20	3	0.0255	7.53	<0.000050	0.0000224	<0.000010	<0.000050	<0.00020	0.0000022	<0.00020	<0.0010	<0.000020	<0.20	0.49	0.41	8.91	0062011-02
24-Jun-20	4	0.0256	7.1	<0.000050	0.0000209	<0.000010	<0.000050	<0.00020	0.0000023	<0.00020	<0.0010	<0.000020	<0.20	0.48	0.42	5.85	0062680-02
01-Jul-20	5	0.0255	6.05	<0.000050	0.0000148	<0.000010	<0.000050	<0.00020	0.0000018	<0.00020	<0.0010	<0.000020	<0.20	0.40	0.33	9.03	0070520-02
08-Jul-20	6	0.0168	3.7	<0.000050	0.0000099	<0.000010	<0.000050	<0.00020	0.000008	<0.00020	<0.0010	<0.000020	<0.20	0.29	0.22	13.36	0070820-02
15-Jul-20	7	0.0236	5.06	<0.000050	0.0000084	<0.000010	<0.000050	<0.00020	<0.0000010	0.00315	<0.0010	<0.000020	<0.20	0.32	0.31	1.21	0071696-02
Replicate analysis		0.0231	4.9	<0.000050	0.0000076	<0.000010	<0.000050	<0.00020	0.000001	0.00271	<0.0010	<0.000020	<0.20	0.32	0.32	1.06	
22-Jul-20	8	0.0214	4.61	<0.000050	0.0000084	<0.000010	<0.000050	<0.00020	0.0000033	<0.00020	<0.0010	<0.000020	<0.20	0.30	0.26	6.70	0072338-02
29-Jul-20	9	0.0189	4.21	<0.000050	0.0000087	<0.000010	<0.000050	<0.00020	0.0000042	<0.00020	0.0012	<0.000020	<0.20	0.25	0.24	2.66	0073105-02
02-Sep-20	14	0.0198	3.96	<0.000050	0.0000078	<0.000010	<0.000050	<0.00020	0.0000102	<0.00020	0.0016	<0.000020	<0.20	0.25	0.24	1.84	0090630-02
07-Oct-20	19	0.0145	3.1	<0.000050	0.0000056	<0.000010	<0.000050	<0.00020	0.0000102	0.00084	0.0017	<0.000020	<0.20	0.17	0.16	2.39	20J1032-02
11-Nov-20	24	0.0148	2.9	<0.000050	0.0000058	<0.000010	<0.000050	<0.00020	0.0000241	0.00022	0.0033	<0.000020	<0.20	0.18	0.17	1.58	20K1497-02
16-Dec-20	29	0.0114	2.16	<0.000050	0.0000052	<0.000010	<0.000050	<0.00020	0.000023	0.00023	0.0023	<0.000020	<0.20	0.15	0.12	11.97	20L2199-02
20-Jan-21	34	0.0139	3.61	<0.000050	0.0000057	<0.000010	<0.000050	<0.00020	0.000081	<0.00020	0.0046	<0.000020	<0.20	0.20	0.15	12.70	21A1888-01
24-Feb-21	39	0.012	4.28	<0.000050	0.0000055	<0.000010	<0.000050	<0.00020	0.000114	0.00031	0.0049	<0.000020	<0.20	0.16	0.18	-5.00	21C0669-02
31-Mar-21	44	0.0109	3.46	<0.000050	0.0000085	<0.000010	<0.000050	<0.00020	0.00015	<0.00020	0.0037	<0.000020	<0.20	0.23	0.16	18.29	21D1371-02
05-May-21	49	0.00555	2.78	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000136	<0.00020	0.003	<0.000020	<0.20	0.13	0.09	19.23	21E0690-02
09-Jun-21	54	0.00451	3.29	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000163	<0.00020	0.0037	<0.000020	<0.20	0.24	0.13	27.50	21F1397-02
14-Jul-21	59	0.00365	2.67	<0.000050	<0.0000040	<0.000010	0.000054	<0.00020	0.000176	<0.00020	0.0027	<0.000020	<0.20	0.19	0.16	9.23	21G1983-02
Replicate analysis		0.00363	3.07	<0.000050	<0.0000040	<0.000010	0.000052	<0.00020	0.000174	<0.00020	0.0026	<0.000020	<0.20	0.19	0.16	9.02	
18-Aug-21	64	0.00544	5.36	<0.000050	<0.0000040	<0.000010	0.000108	<0.00020	0.00018	<0.00020	0.0027	<0.000020	<0.20	0.26	0.17	20.45	21H2244-02

NOTES:
Continue testing until client says otherwise. Email from Randy Williams dated June 25, 2021.
Requested # of weeks of testing: 55 weeks (includes week-0)
RDL may be raised for some samples due to sample matrix interference.
Abbreviations:
RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
Calc: Calculation
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry

CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-3

Global ARD Testing Services Inc.

PAGE: 5 of 10
GLOBAL PROJECT NO: 1964 (B2)
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)/666768
SAMPLE ID: BH19-39

Instrument/Method:				pH Meter	EC Meter	Tiration/Calc.	Tiration/Calc.	Colouri-metry	IC	SIE or IC	Gravimetry	Calc.
Sampling Date	Week No.	Input Vol. (DI Water)	Output Vol. (Leachate)	pH	EC	Acidity (to pH 8.3)	Alkalinity (to pH 4.5)	Sulphate	Chloride	Fluoride	Total Diss. Solids	Hardness (CaCO3)
	Unit:	mL	mL	pH Units	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L
	RDL:	5	5	0.01	1	0.5	0.5	0.50	0.50	0.02	5	0.1
27-May-20	**0**	750	613	7.76	113	2.5	35.5	5.0	1.42	<0.10	78	39.0
03-Jun-20	**1**	500	463	7.63	112	4.0	40.0	8.2	0.81	<0.10	60	42.7
10-Jun-20	**2**	500	465	7.13	85	17.0	32.5	7.2	0.31	0.11	44	32.5
17-Jun-20	**3**	500	477	7.63	84	5.5	29.5	5.5	0.10	<0.10	36	30.1
24-Jun-20	**4**	500	465	7.82	76	4.0	29.0	5.9	<0.10	<0.10	31	29.3
01-Jul-20	**5**	500	469	8.44	77	<0.5	28.3	5.1	<0.10	<0.10	37	27.2
08-Jul-20	**6**	500	461	8.04	73	2.0	32.5	3.3	<0.10	<0.10	55	28.8
											Replicate analysis:	28.5
15-Jul-20	**7**	500	471	7.67	69	7.0	30.0	2.4	<0.10	<0.10	35	28.1
22-Jul-20	**8**	500	462	7.67	63	4.0	25.5	2.3	<0.10	<0.10	<16	23.2
29-Jul-20	**9**	500	463	7.04	67	10.0	25.5	2.2	<0.10	<0.10	27	22.8
05-Aug-20	10	500	464									
12-Aug-20	11	500	467									
19-Aug-20	12	500	476									
26-Aug-20	13	500	474									
02-Sep-20	**14**	500	475	7.02	57	11.0	24.5	1.8	<0.10	<0.10	21	24.0
09-Sep-20	15	500	479									
16-Sep-20	16	500	476									
23-Sep-20	17	500	467									
30-Sep-20	18	500	481									
07-Oct-20	**19**	500	477	7.48	52	4.5	24.0	1	<0.10	<0.10	43	21.7
14-Oct-20	20	500	460									
21-Oct-20	21	500	474									
28-Oct-20	22	500	466									
04-Nov-20	23	500	467									
11-Nov-20	**24**	500	479	7.77	53	2.5	26.3	<1.0	<0.10	<0.10	24	25.2
18-Nov-20	25	500	473									
25-Nov-20	26	500	478									
02-Dec-20	27	500	476									
09-Dec-20	28	500	479									
16-Dec-20	**29**	500	481	7.33	52	7.5	24.4	<1.0	<0.10	<0.10	17	23.4
											Replicate analysis:	23.7
23-Dec-20	30	500	463									
30-Dec-20	31	500	486									
06-Jan-21	32	500	479									
13-Jan-21	33	500	471									
20-Jan-21	**34**	500	474	7.21	43	7.0	20.5	<1.0	<0.10	<0.10	38	21.2
27-Jan-21	35	500	476									
03-Feb-21	36	500	479									
10-Feb-21	37	500	478									
17-Feb-21	38	500	476									
24-Feb-21	**39**	500	477	6.07	51	11.0	23.0	<4.0	<0.10	<0.10	<28	21.8
03-Mar-21	40	500	478									
10-Mar-21	41	500	475									
17-Mar-21	42	500	473									
24-Mar-21	43	500	480									
31-Mar-21	**44**	500	476	7.88	88	2.0	47.5	<1.0	<0.10	<0.10	51	38.7
07-Apr-21	45	500	474									
14-Apr-21	46	500	479									
21-Apr-21	47	500	475									
28-Apr-21	48	500	477									
05-May-21	**49**	500	472	7.79	45	3.5	18.5	<1.0	<0.10	<0.10	15	19.0
12-May-21	50	500	474									
19-May-21	51	500	475									
26-May-21	52	500	473									
02-Jun-21	53	500	476									
09-Jun-21	**54**	500	478	7.66	47	4.0	20.0	1	<0.10	<0.10	<15	21.1
16-Jun-21	55	500	475									
23-Jun-21	56	500	470									
30-Jun-21	57	500	473									
07-Jul-21	58	500	470									
14-Jul-21	**59**	500	475	7.75	43	3.5	18.0	1.1	<0.10	<0.10	37	18.4
21-Jul-21	60	500	465									
28-Jul-21	61	500	460									
04-Aug-21	62	500	465									
11-Aug-21	63	500	475									
18-Aug-21	**64**	500	470	7.15	41.9	9.2	22.2	<1.0	<0.10	<0.10	30	20.1
25-Aug-21	65	500	478									
01-Sep-21	66	500										
08-Sep-21	67	500										
15-Sep-21	68	500										

Dissolved Metals by ICP-MS

Sampling Date	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)
Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:	0.001	0.00005	0.00005	0.0001	0.00001	0.00001	0.002	0.000002	0.04	0.0001	0.000005	0.0001	0.002	0.00005	0.00005	0.005
27-May-20	0.0569	0.000335	0.00145	0.0056	<0.000010	<0.000010	0.0061	<0.0000020	6.75	<0.00010	0.000041	0.00065	<0.0020	<0.000050	0.00527	5.37
03-Jun-20	0.0939	0.000388	0.00313	0.0069	<0.000010	<0.000010	0.0088	<0.0000020	6.55	<0.00010	0.0000489	0.00108	<0.0020	<0.000050	0.00594	6.39
10-Jun-20	0.0949	0.000233	0.00236	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	5.24	<0.00010	0.0000287	0.00068	0.0031	<0.000050	0.00399	4.71
17-Jun-20	0.0843	0.000193	0.00183	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	5.01	<0.00010	0.0000249	0.00044	0.0023	<0.000050	0.00369	4.27
24-Jun-20	0.0869	0.000188	0.00172	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	5.07	<0.00010	0.0000198	0.00025	0.0034	<0.000050	0.00338	4.04
01-Jul-20	0.109	0.000226	0.00157	0.0045	<0.000010	<0.000010	<0.0050	0.0000036	4.25	0.00012	0.0000298	0.00284	0.0185	<0.000050	0.00377	4.01
08-Jul-20	0.0799	0.000266	0.00142	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	4.48	<0.00010	0.0000212	0.0006	0.0058	<0.000050	0.00383	4.28
Replicate analysis:	0.0786	0.000259	0.00144	0.00479	<0.00001	<0.00001	0.0043	<0.000002	4.44	<0.0001	0.0000227	0.00061	0.0059	<0.00005	0.0038	4.23
15-Jul-20	0.133	0.000229	0.00136	0.0054	<0.000010	<0.000010	<0.0050	<0.0000020	5.1	<0.00010	0.0000306	0.00015	0.0244	<0.000050	0.00331	3.73
22-Jul-20	0.0907	0.000218	0.00109	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	3.97	0.00013	0.0000196	0.00025	0.0094	<0.000050	0.00316	3.23
29-Jul-20	0.0739	0.000136	0.000966	0.0038	<0.000010	<0.000010	<0.0050	0.0000022	4.04	0.0001	0.0000176	0.00029	0.0078	<0.000050	0.00245	3.08
02-Sep-20	0.0541	0.000135	0.000839	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	4.51	<0.00010	0.0000257	<0.00010	0.0053	<0.000050	0.00255	3.1
07-Oct-20	0.0558	0.000198	0.000546	0.0038	<0.000010	<0.000010	<0.0050	<0.0000020	4.32	<0.00010	0.0000131	0.00011	0.007	<0.000050	0.00161	2.65
11-Nov-20	0.0452	0.00018	0.000548	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	4.74	<0.00010	0.0000143	0.00014	0.0036	<0.000050	0.00226	3.24
16-Dec-20	0.0602	0.00024	0.000484	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	4.43	<0.00010	0.0000143	<0.00010	0.0066	<0.000050	0.00323	2.98
Replicate analysis:	0.058	0.000221	0.000498	0.0046	<0.000010	<0.000010	<0.0020	<0.0000020	4.54	<0.00010	0.0000156	<0.00010	0.007	<0.000050	0.00323	3.02
20-Jan-21	0.0542	0.00018	0.000506	0.0042	<0.000010	<0.000010	<0.0050	0.0000062	3.84	0.00013	0.0000255	0.00011	0.0079	<0.000050	0.00189	2.82
24-Feb-21	0.035	0.000098	0.000329	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	4.41	<0.00010	0.0000216	<0.00010	0.0057	<0.000050	0.00199	2.61
31-Mar-21	0.0326	0.000177	0.000546	0.0088	<0.000010	<0.000010	<0.0050	<0.0000020	8.08	0.00013	0.0000234	<0.00010	0.0079	<0.000050	0.00435	4.51
05-May-21	0.0674	0.000154	0.000292	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	4.23	0.00011	0.0000174	**0.00092**	0.0136	<0.000050	0.00199	2.04
09-Jun-21	0.127	0.000221	0.000217	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	5.14	0.00014	0.0000496	0.00058	0.0395	<0.000050	0.00156	2.02
14-Jul-21	0.0445	0.00006	0.000207	0.0041	<0.000010	<0.000010	<0.0050	<0.0000020	4.05	<0.00010	0.0000183	<0.00010	0.007	<0.000050	0.00131	2.01
18-Aug-21	0.0355	0.000061	0.000233	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	4.36	<0.00010	0.0000207	<0.00010	0.007	<0.000050	0.00131	2.23

Sampling Date	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)
Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:	0.00005	0.00002	0.00001	0.00004	0.01	0.01	0.0001	0.1	0.00001	0.02	0.0001	1
27-May-20	0.0071	<0.000020	0.000926	0.000197	<0.010	4.3	0.00012	1.84	<0.000010	1.30	0.0597	2.3
03-Jun-20	0.0114	<0.000020	0.000639	0.00023	<0.010	3.84	0.00011	2.5	<0.000010	1.20	0.0607	7.04
10-Jun-20	0.0073	<0.000020	0.000523	0.000113	<0.010	2.54	<0.00010	1.99	<0.000010	0.74	0.0433	3.66
17-Jun-20	0.0077	<0.000020	0.0004	0.000056	<0.010	2.2	<0.00010	1.5	<0.000010	0.54	0.0392	2.56
24-Jun-20	0.0068	<0.000020	0.000385	0.000056	<0.010	2.39	<0.00010	1.44	<0.000010	0.46	0.0375	1.97
01-Jul-20	0.0045	<0.000020	0.000372	0.000072	<0.010	2.26	<0.00010	1.53	<0.000010	0.39	0.0379	1.61
08-Jul-20	0.0073	<0.000020	0.000332	<0.000040	<0.010	2.2	<0.00010	1.42	<0.000010	0.31	0.0392	1.44
Replicate analysis:	0.00724	<0.00002	0.000336	<0.00004	<0.01	2.17	<0.0001	1.39	<0.00001	0.302	0.0392	1.35
15-Jul-20	0.0064	<0.000020	0.000233	<0.000040	<0.010	1.91	<0.00010	1.44	<0.000010	0.11	0.0371	<1.00
22-Jul-20	0.0046	<0.000020	0.000201	0.000051	<0.010	1.83	<0.00010	1.29	<0.000010	0.21	0.0315	<1.00
29-Jul-20	0.0049	<0.000020	0.00019	0.000045	<0.010	1.54	<0.00010	1.03	<0.000010	0.11	0.0292	<1.00
02-Sep-20	0.0060	<0.000020	0.000139	<0.000040	<0.010	1.31	<0.00010	1.03	<0.000010	0.08	0.0319	<1.00
07-Oct-20	0.0029	<0.000020	0.000114	0.000131	<0.010	1.14	<0.00010	0.88	<0.000010	0.06	0.0268	<1.00
11-Nov-20	0.0051	<0.000020	0.000071	<0.000040	<0.010	1.1	<0.00010	0.85	<0.000010	0.05	0.0295	<1.00
16-Dec-20	0.0039	<0.000020	0.000044	<0.000040	<0.010	1.17	<0.00010	0.79	<0.000010	0.05	0.0265	<1.00
Replicate analysis:	0.0039	<0.000020	0.000048	<0.000040	<0.010	1.19	<0.00010	0.84	<0.000010	0.05	0.0267	<1.00
20-Jan-21	0.0062	<0.000020	0.000083	<0.000040	0.016	0.946	<0.00010	1.67	<0.000010	0.04	0.0258	<1.00
24-Feb-21	0.0069	<0.000020	0.000052	0.000047	<0.010	0.882	<0.00010	0.81	<0.000010	0.04	0.0256	<1.00
31-Mar-21	0.0088	<0.000020	0.000053	<0.000040	<0.010	1.52	<0.00010	1.26	<0.000010	0.06	0.0432	<1.00
05-May-21	0.0064	<0.000020	0.000031	<0.000040	<0.010	0.89	<0.00010	0.76	<0.000010	0.04	0.0218	<1.00
09-Jun-21	0.0070	<0.000020	0.00004	0.000064	<0.010	0.747	<0.00010	0.91	<0.000010	0.04	0.0224	<1.00
14-Jul-21	0.0050	<0.000020	0.000055	<0.000040	<0.010	0.577	<0.00010	0.57	<0.000010	0.03	0.0188	<1.00
18-Aug-21	0.0064	<0.000020	0.000035	0.000044	<0.010	0.541	<0.00010	0.6	<0.000010	0.03	0.0213	<1.00

Sampling Date	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)	Tungsten (W)	Ion Balance: Anions	Cations	% Difference	Job No.
Unit:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	meq/L	meq/L	meq/L	
RDL:	0.00005	0.000004	0.00001	0.00005	0.0002	0.000001	0.0002	0.001	0.00002	0.2				
27-May-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000317	<0.00020	<0.0010	<0.000020	2.95	0.85	0.95	-5.57	0052568-03
03-Jun-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.00104	<0.00020	<0.0010	<0.000020	3.02	0.99	1.02	-1.21	0061004-03
10-Jun-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000722	<0.00020	<0.0010	<0.000020	1.98	0.81	0.76	3.58	0061385-03
17-Jun-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000711	<0.00020	<0.0010	<0.000020	1.39	0.71	0.69	1.11	0062011-03
24-Jun-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000645	<0.00020	<0.0010	<0.000020	1.36	0.70	0.68	1.83	0062680-03
01-Jul-20	<0.000050	<0.0000040	0.000014	<0.000050	0.00058	0.000713	<0.00020	<0.0010	0.000092	1.48	0.67	0.63	3.21	0070520-03
08-Jul-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000919	<0.00020	<0.0010	0.000052	1.33	0.72	0.66	4.59	0070820-03
Replicate analysis:	<0.00005	<0.000004	<0.00001	<0.00005	<0.0002	0.000928	<0.0002	<0.001	<0.00002	1.34	0.72	0.65	5.05	
15-Jul-20	<0.000050	<0.0000040	0.000011	<0.000050	0.00062	0.000788	0.00186	<0.0010	0.000147	1	0.65	0.63	1.43	0071696-03
22-Jul-20	<0.000050	<0.0000040	<0.000010	<0.000050	0.00036	0.000582	<0.00020	<0.0010	0.000125	1	0.56	0.53	2.47	0072338-03
29-Jul-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000663	<0.00020	<0.0010	<0.000020	0.8	0.56	0.51	4.42	0073105-03
02-Sep-20	<0.000050	<0.0000040	0.000011	<0.000050	<0.00020	0.000678	<0.00020	<0.0010	0.000094	0.57	0.53	0.52	0.32	0090630-03
07-Oct-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000435	0.00103	<0.0010	<0.000020	0.31	0.50	0.47	2.89	20J1032-03
11-Nov-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000643	<0.00020	<0.0010	0.000252	0.28	0.53	0.54	-1.25	20K1497-03
16-Dec-20	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000572	<0.00020	<0.0010	<0.000020	0.24	0.49	0.51	-1.82	20L2199-03
Replicate analysis:	<0.000050	<0.0000040	<0.000010	<0.000050	0.00024	0.000584	<0.00020	<0.0010	<0.000020	0.24	0.49	0.52	-2.72	
20-Jan-21	<0.000050	<0.0000040	<0.000010	<0.000050	0.00026	0.000467	<0.00020	<0.0010	<0.000020	0.23	0.41	0.46	-5.37	21A1888-01
24-Feb-21	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000549	<0.00020	<0.0010	<0.000020	<0.20	0.46	0.46	-0.42	21C0669-03
31-Mar-21	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000907	<0.00020	<0.0010	<0.000020	0.25	0.95	0.82	7.29	21D1371-03
05-May-21	<0.000050	<0.0000040	<0.000010	<0.000050	0.00051	0.000396	<0.00020	<0.0010	0.000074	<0.20	0.37	0.41	-5.39	21E0690-03
09-Jun-21	<0.000050	<0.0000040	0.000011	<0.000050	0.00077	0.000321	<0.00020	<0.0010	0.000102	<0.20	0.42	0.46	-4.46	21F1397-03
14-Jul-21	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000246	<0.00020	<0.0010	<0.000020	<0.20	0.38	0.39	-0.84	21G1983-03
18-Aug-21	<0.000050	<0.0000040	<0.000010	0.000069	0.00081	0.000308	0.00021	<0.0010	<0.000020	<0.20	0.44	0.42	2.66	21H2244-03

NOTES:
Continue testing until client says otherwise. Email from Randy Williams dated June 25, 2021.
Requested # of weeks of testing: 55 weeks (includes week-0)
RDL may be raised for some samples due to sample matrix interference.

Abbreviations:
RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
Calc: Calculation
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry

CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL TESTING RESULTS OF HC-4

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)/666768
SAMPLE ID: Mix: 90% BH19-39 + 10% DH-MD-01

Sampling Date	Week No.	Input Vol. (DI Water)	Output Vol. (Leachate)	pH (pH Meter)	EC (EC Meter)	Acidity (to pH 8.3) (Tiration/Calc.)	Alkalinity (to pH 4.5) (Tiration/Calc.)	Sulphate (Colourimetry)	Chloride (IC)	Fluoride (SIE or IC)	Total Diss. Solids (Gravimetry)	Hardness (CaCO3) (Calc.)
Unit:		mL	mL	pH Units	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:		5	5	0.01	1	0.5	0.5	0.50	0.50	0.02	5	0.1
27-May-20	**0**	750	594	7.79	116	2.5	36.0	5.7	1.54	<0.10	88	39.8
03-Jun-20	**1**	500	463	7.81	118	5.0	41.0	9.2	1.34	0.22	58	44.7
10-Jun-20	**2**	500	467	6.82	85	17.0	34.5	5.3	0.49	<0.10	74	34.1
							Replicate analysis:	6.1				31.2
17-Jun-20	**3**	500	473	7.31	97	9.5	35.0	4.7	0.28	0.10	35	35.6
											Replicate analysis:	35.7
24-Jun-20	**4**	500	476	7.89	81	3.0	33.5	5.1	0.31	<0.10	45	32.5
01-Jul-20	**5**	500	475	8.41	79	<0.5	30.0	6.7	0.14	<0.10	<37	29.5
											Replicate analysis:	29.8
08-Jul-20	**6**	500	470	7.52	69	6.0	31.0	3.3	<0.10	<0.10	52	27.4
15-Jul-20	**7**	500	463	7.7	80	3.0	33.0	2.7	<0.10	<0.10	37	32.9
22-Jul-20	**8**	500	459	7.6	68	4.0	29.0	2.1	<0.10	<0.10	<16	25.8
29-Jul-20	**9**	500	460	6.88	83	12.5	31.0	2.4	<0.10	<0.10	36	28.2
05-Aug-20	10	500	468									
12-Aug-20	11	500	474									
19-Aug-20	12	500	481									
26-Aug-20	13	500	476									
02-Sep-20	**14**	500	475	7.15	65	7.0	30.0	1.7	<0.10	<0.10	33	28.1
09-Sep-20	15	500	477									
16-Sep-20	16	500	480									
23-Sep-20	17	500	476									
30-Sep-20	18	500	482									
07-Oct-20	**19**	500	478	7.89	63	2.0	28.0	1.2	<0.10	<0.10	44	25.8
14-Oct-20	20	500	479									
21-Oct-20	21	500	481									
28-Oct-20	22	500	469									
04-Nov-20	23	500	470									
11-Nov-20	**24**	500	481	7.89	56	3.0	27.7	<1.0	<0.10	<0.10	17	27.5
18-Nov-20	25	500	479									
25-Nov-20	26	500	481									
02-Dec-20	27	500	475									
09-Dec-20	28	500	480									
16-Dec-20	**29**	500	482	7.39	60	6.5	29.0	<1.0	<0.10	<0.10	31	27.2
23-Dec-20	30	500	476									
30-Dec-20	31	500	487									
06-Jan-21	32	500	476									
13-Jan-21	33	500	478									
20-Jan-21	**34**	500	469	7.54	52	3.5	25.0	<1.0	<0.10	<0.10	45	24.7
27-Jan-21	35	500	477									
03-Feb-21	36	500	471									
10-Feb-21	37	500	475									
17-Feb-21	38	500	482									
24-Feb-21	**39**	500	478	6.57	57	8.0	26.0	<4.0	<0.10	<0.10	<27	24.1
03-Mar-21	40	500	480									
10-Mar-21	41	500	479									
17-Mar-21	42	500	472									
24-Mar-21	43	500	480									
31-Mar-21	**44**	500	477	7.87	95	2.5	42.5	<1.0	<0.10	<0.10	47	42.3
07-Apr-21	45	500	474									
14-Apr-21	46	500	469									
21-Apr-21	47	500	470									
28-Apr-21	48	500	472									
05-May-21	**49**	500	478	7.84	46	**2.0**	19.0	<1.0	<0.10	<0.10	33	19.3
12-May-21	50	500	472									
19-May-21	51	500	475									
26-May-21	52	500	477									
02-Jun-21	53	500	485									
09-Jun-21	**54**	500	480	7.42	51	9.0	21.5	<1.0	<0.10	<0.10	<15	22.9
16-Jun-21	55	500	475									
23-Jun-21	56	500	470									
30-Jun-21	57	500	474									
07-Jul-21	58	500	470									
14-Jul-21	**59**	500	475	7.76	48	3.0	19.6	<1.0	<0.10	<0.10	49	20.8
21-Jul-21	60	500	475									
28-Jul-21	61	500	470									
04-Aug-21	62	500	473									
11-Aug-21	63	500	470									
18-Aug-21	**64**	500	468	7.33	40.4	9.3	27.8	<1.0	<0.10	<0.10	25	22.5
25-Aug-21	65	500	475									
01-Sep-21	66	500										
08-Sep-21	67	500										
15-Sep-21	68	500										

Dissolved Metals by ICP-MS

Sampling Date	Week No.	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:		0.001	0.00005	0.00005	0.0001	0.00001	0.00001	0.002	0.000002	0.04	0.0001	0.000005	0.0001	0.002	0.00005	0.00005	0.005	0.00005	0.00002
27-May-20	0	0.0698	0.000959	0.000807	0.0063	<0.000010	<0.000010	0.0051	0.0000028	7.36	<0.00010	0.0000477	0.00065	<0.0020	<0.000050	0.00531	5.2	0.0039	<0.000020
03-Jun-20	1	0.0932	0.00117	0.00194	0.0077	<0.000010	<0.000010	0.0089	0.000002	7.56	<0.00010	0.0000483	0.00083	<0.0020	<0.000050	0.00745	6.25	0.0064	<0.000020
10-Jun-20	2	0.102	0.000646	0.00128	0.0053	<0.000010	<0.000010	<0.0050	<0.0000020	6.08	<0.00010	0.0000314	0.00077	<0.0020	<0.000050	0.00504	4.6	0.0047	<0.000020
Replicate analysis:		0.1	0.000288	0.00117	0.0048	<0.000010	<0.000010	0.0044	<0.0000020	5.94	<0.00010	0.0000276	0.00072	<0.0020	<0.000050	0.00415	3.98	0.0043	<0.000010
17-Jun-20	3	0.0766	0.000633	0.00108	0.0058	<0.000010	<0.000010	<0.0050	<0.0000020	6.3	<0.00010	0.0000245	0.00029	<0.0020	<0.000050	0.0053	4.83	0.0054	<0.000020
Replicate analysis:		0.0762	0.000626	0.00107	0.00579	<0.00001	<0.00001	0.0051	<0.000002	6.4	<0.0001	0.0000239	0.00018	<0.002	<0.00005	0.00541	4.8	0.00536	<0.00002
24-Jun-20	4	0.0888	0.000522	0.000915	0.0052	<0.000010	<0.000010	<0.0050	0.0000053	6.03	<0.00010	0.0000176	0.00021	0.0028	<0.000050	0.00444	4.23	0.0041	<0.000020
01-Jul-20	5	0.0797	0.000491	0.000891	0.0045	<0.000010	<0.000010	<0.0050	0.0000022	5.2	0.00212	0.0000455	0.00055	0.0136	<0.000050	0.00464	4	0.0019	<0.000020
Replicate analysis:		0.083	0.000495	0.000906	0.0045	0.00001	0.00001	0.0031	0.000002	5.17	0.00214	0.0000502	0.00057	0.0138	0.00005	0.00466	4.11	0.0020	0.0000
08-Jul-20	6	0.0954	0.00041	0.000687	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	4.93	<0.00010	0.0000197	0.00018	0.0094	<0.000050	0.00397	3.67	0.0039	<0.000020
15-Jul-20	7	0.0836	0.000514	0.00068	0.0061	<0.000010	<0.000010	<0.0050	<0.0000020	6.53	<0.00010	0.0000159	0.00013	0.0074	<0.000050	0.0044	4.02	0.0045	<0.000020
22-Jul-20	8	0.0839	0.000297	0.000576	0.0048	<0.000010	<0.000010	<0.0050	<0.0000020	5.13	<0.00010	0.0000146	0.00015	0.006	<0.000050	0.00342	3.14	0.0033	<0.000020
29-Jul-20	9	0.0711	0.000379	0.000506	0.0051	<0.000010	<0.000010	<0.0050	<0.0000020	5.42	<0.00010	0.0000168	0.00018	0.0071	<0.000050	0.00341	3.55	0.0032	<0.000020
02-Sep-20	14	0.0655	0.000309	0.000427	0.0056	<0.000010	<0.000010	<0.0050	<0.0000020	5.84	<0.00010	0.0000138	<0.00010	0.0051	<0.000050	0.0033	3.27	0.0020	<0.000020
07-Oct-20	19	0.055	0.000294	0.000395	0.0049	<0.000010	<0.000010	<0.0050	<0.0000020	5.58	<0.00010	0.0000137	0.00016	0.0054	<0.000050	0.0021	2.88	0.0024	<0.000020
11-Nov-20	24	0.0465	0.000287	0.000217	0.0050	<0.000010	<0.000010	<0.0050	<0.0000020	5.89	<0.00010	0.0000114	0.00021	<0.0020	<0.000050	0.00275	3.1	0.0028	<0.000020
16-Dec-20	29	0.0505	0.000387	0.000259	0.0050	<0.000010	<0.000010	<0.0050	<0.0000020	5.83	<0.00010	0.0000122	<0.00010	0.0043	<0.000050	0.00408	3.05	0.0042	<0.000020
20-Jan-21	34	0.0589	0.000258	0.000272	0.0050	<0.000010	<0.000010	<0.0050	0.0000027	5.31	0.00014	0.0000138	0.00031	0.0073	<0.000050	0.00234	2.76	0.0044	<0.000020
24-Feb-21	39	0.0499	0.000182	0.000226	0.0052	<0.000010	<0.000010	<0.0050	0.0000024	5.76	<0.00010	0.0000288	0.00011	0.009	<0.000050	0.00234	2.36	0.0049	<0.000020
31-Mar-21	44	0.0293	0.000293	0.000387	0.0094	<0.000010	<0.000010	<0.0050	<0.0000020	9.65	0.00011	0.0000167	<0.00010	0.0044	<0.000050	0.00547	4.4	0.0062	<0.000020
05-May-21	49	0.0454	0.000195	0.00015	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	4.77	<0.00010	0.0000274	0.00019	0.008	<0.000050	0.00209	1.8	0.0048	<0.000020
09-Jun-21	54	0.0616	0.000272	0.000157	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	6.23	0.00011	0.0000495	0.00018	0.0134	<0.000050	0.00233	1.78	0.0042	<0.000020
14-Jul-21	59	0.0522	0.000082	0.000114	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	5.35	<0.00010	0.0000173	<0.00010	0.0087	<0.000050	0.00157	1.81	0.0042	<0.000020
18-Aug-21	64	0.041	0.000078	0.000107	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	5.6	<0.00010	0.0000159	0.00011	0.0049	<0.000050	0.00155	2.07	0.0030	<0.000020

Sampling Date	Week No.	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL:		0.00001	0.00004	0.01	0.01	0.0001	0.1	0.00001	0.02	0.0001	1
27-May-20	0	0.00248	0.000262	<0.010	3.84	0.00016	1.62	<0.000010	1.21	0.0684	2.58
03-Jun-20	1	0.0027	0.000417	<0.010	3.57	0.00014	2.41	<0.000010	1.28	0.0715	4.13
10-Jun-20	2	0.00199	0.000208	<0.010	2.4	0.0001	1.91	<0.000010	0.76	0.0517	2.5
Replicate analysis:		0.000421	0.00008	<0.010	2.18	<0.00010	1.36	<0.000010	2.66	0.0478	1.85
17-Jun-20	3	0.00202	0.000139	<0.010	2.42	<0.00010	1.58	<0.000010	0.67	0.0548	2.46
Replicate analysis:		0.00207	0.000143	<0.01	2.37	0.0001	1.57	<0.00001	0.673	0.0547	2.49
24-Jun-20	4	0.00183	0.000087	<0.010	2.42	<0.00010	1.42	0.00001	0.53	0.0483	1.76
01-Jul-20	5	0.0017	0.00137	<0.010	2.21	<0.00010	1.28	<0.000010	0.40	0.0436	1.99
Replicate analysis:		0.0017	0.00133	0.01	2.25	0.0001	1.3	0.00001	0.40	0.0437	2.16
08-Jul-20	6	0.00132	0.000053	<0.010	1.89	<0.00010	1.11	<0.000010	0.29	0.0443	1.44
15-Jul-20	7	0.0013	<0.000040	<0.010	2.03	<0.00010	1.29	<0.000010	0.16	0.0511	1.19
22-Jul-20	8	0.000894	<0.000040	<0.010	1.62	<0.00010	1	<0.000010	0.19	0.041	<1.00
29-Jul-20	9	0.00101	<0.000040	<0.010	1.61	<0.00010	0.97	<0.000010	0.15	0.0432	<1.00
02-Sep-20	14	0.000648	<0.000040	<0.010	1.27	<0.00010	0.98	<0.000010	0.07	0.0449	<1.00
07-Oct-20	19	0.000523	0.000176	<0.010	1.18	<0.00010	0.83	<0.000010	0.06	0.04	<1.00
11-Nov-20	24	0.000391	<0.000040	<0.010	1.04	<0.00010	0.71	<0.000010	0.04	0.0389	<1.00
16-Dec-20	29	0.000289	0.000069	<0.010	1.16	<0.00010	0.75	<0.000010	0.05	0.0379	<1.00
20-Jan-21	34	0.000391	0.000047	0.014	0.939	<0.00010	1.57	<0.000010	0.03	0.0376	<1.00
24-Feb-21	39	0.00028	0.00018	<0.010	0.887	<0.00010	0.78	0.000012	0.04	0.0351	<1.00
31-Mar-21	44	0.000335	<0.000040	<0.010	1.61	<0.00010	1.11	<0.000010	0.05	0.0592	<1.00
05-May-21	49	0.000177	0.000384	<0.010	0.8	<0.00010	0.59	<0.000010	0.03	0.0276	<1.00
09-Jun-21	54	0.000147	0.00104	<0.010	0.787	<0.00010	0.62	<0.000010	0.03	0.0304	<1.00
14-Jul-21	59	0.000103	<0.000040	<0.010	0.686	<0.00010	0.53	<0.000010	0.03	0.0272	<1.00
18-Aug-21	64	0.000052	<0.000040	<0.010	0.616	<0.00010	0.49	<0.000010	0.03	0.0312	<1.00

Sampling Date	Week No.	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)	Tungsten (W)	Ion Balance: Anions	Ion Balance: Cations	Ion Balance: % Difference	Job No.
Unit:		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	meq/L	meq/L	meq/L	
RDL:		0.00005	0.000004	0.00001	0.00005	0.0002	0.000001	0.0002	0.001	0.00002	0.2				
27-May-20	0	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000288	<0.00020	<0.0010	<0.000020	3.19	0.88	0.96	-4.07	0052568-04
03-Jun-20	1	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000796	<0.00020	<0.0010	<0.000020	3.23	1.06	1.05	0.36	0061004-04
10-Jun-20	2	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000474	<0.00020	<0.0010	<0.000020	1.94	0.81	0.79	1.56	0061385-04
Replicate analysis:		<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000631	<0.00020	<0.0010	<0.000020	1.19	0.83	0.81	1.34	
17-Jun-20	3	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.00061	<0.00020	<0.0010	<0.000020	1.77	0.81	0.81	-0.12	0062011-04
Replicate analysis:		<0.000050	<0.0000040	<0.000010	<0.00005	<0.00020	0.000613	<0.00020	<0.0010	<0.00002	1.79	0.81	0.81	-0.19	
24-Jun-20	4	<0.000050	<0.0000040	<0.000010	0.00207	<0.00020	0.000483	<0.00020	<0.0010	0.000023	1.47	0.78	0.75	2.60	0062680-04
01-Jul-20	5	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000481	<0.00020	<0.0010	<0.000020	1.66	0.74	0.67	4.97	0070520-04
Replicate analysis:		0.00005	0.0000040	0.000010	0.000050	0.00020	0.000485	0.00020	0.0010	0.000026	1.64	0.74	0.68	4.25	
08-Jul-20	6	<0.000050	<0.0000040	0.000015	<0.000050	0.00027	0.000465	<0.00020	<0.0010	0.000031	1.16	0.69	0.62	5.17	0070820-04
15-Jul-20	7	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000615	0.0013	<0.0010	0.000033	1.19	0.72	0.73	-0.72	0071696-04
22-Jul-20	8	<0.000050	<0.0000040	<0.000010	<0.000050	0.00021	0.00046	<0.00020	<0.0010	<0.000020	0.87	0.62	0.57	4.10	0072338-04
29-Jul-20	9	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000653	<0.00020	0.0019	0.000041	0.89	0.67	0.62	3.92	0073105-04
02-Sep-20	14	<0.000050	<0.0000040	0.000011	<0.000050	<0.00020	0.000581	<0.00020	<0.0010	<0.000020	0.55	0.64	0.60	2.49	0090630-04
07-Oct-20	19	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000404	0.00103	<0.0010	<0.000020	0.38	0.59	0.56	2.57	20J1032-04
11-Nov-20	24	<0.000050	<0.0000040	<0.000010	0.000505	<0.00020	0.00045	<0.00020	<0.0010	<0.000020	0.31	0.55	0.58	-2.61	20K1497-04
16-Dec-20	29	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000431	<0.00020	<0.0010	<0.000020	0.3	0.58	0.58	-0.06	20L2199-04
20-Jan-21	34	<0.000050	<0.0000040	<0.000010	<0.000050	0.00021	0.000359	<0.00020	<0.0010	0.000077	0.28	0.50	0.53	-2.48	21A1888-01
24-Feb-21	39	<0.000050	<0.0000040	<0.000010	0.00583	0.0003	0.000363	<0.00020	0.0164	<0.000020	0.22	0.52	0.51	0.65	21C0669-04
31-Mar-21	44	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000646	<0.00020	<0.0010	0.000024	0.27	0.85	0.89	-2.42	21D1371-04
05-May-21	49	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000266	<0.00020	<0.0010	0.000035	<0.20	0.38	0.41	-4.27	21E0690-04
09-Jun-21	54	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000253	<0.00020	<0.0010	0.000309	<0.20	0.43	0.49	-6.21	21F1397-04
14-Jul-21	59	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.0002	<0.00020	<0.0010	0.000038	<0.20	0.39	0.44	-5.98	21G1983-04
18-Aug-21	64	<0.000050	<0.0000040	<0.000010	0.000058	<0.00020	0.000247	0.00024	<0.0010	<0.000020	<0.20	0.56	0.47	8.14	21H2244-04

NOTES:

Continue testing until client says otherwise. Email from Randy Williams dated June 25, 2021.
Requested # of weeks of testing: 55 weeks (includes week-0)
RDL may be raised for some samples due to sample matrix interference.

Abbreviations:

RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
Calc: Calculation
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry

CERTIFICATE OF ANALYSIS • HUMIDITY CELL TESTING RESULTS OF HC-5

Global
ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
PROJECT NAME: MDT/ Selkirk Mtn. 4-Laning (B2)/1666768
SAMPLE ID: Mix: 70% BH19-39 + 30% DH-MD-02

Sampling Date	Week No.	Input Vol. (DI Water) mL	Output Vol. (Leachate) mL	Instrument/Method: pH Meter pH	EC Meter EC	Titration/Calc. Acidity (to pH 8.3) mg CaCO3/L	Titration/Calc. Alkalinity (to pH 4.5) mg CaCO3/L	Colourimetry Sulphate	IC Chloride	IC Fluoride	SIE or IC Total Diss. Solids	Gravimetry Total Diss. Solids	Calc. Hardness (CaCO3)	Dissolved Metals by ICP-MS: Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulphur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)	Tungsten (W)	Ion Balance: Anions	Cations	% Difference	Job No.
	Unit	mL	mL	pH Units	µS/cm	mg CaCO3/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	meq/L	
	RDL:	5	5	0.01	1	0.5	0.5	0.50	0.50	0.02	5	0.1	0.001	0.00005	0.00005	0.0001	0.00001	0.00001	0.002	0.000002	0.04	0.0001	0.000005	0.0001	0.002	0.00005	0.00005	0.005	0.00005	0.00002	0.00001	0.00004	0.01	0.01	0.0001	0.1	0.00001	0.02	0.0001	1	0.00005	0.000004	0.00001	0.00005	0.0002	0.000001	0.0002	0.001	0.00002	0.2				
27-May-20	0	750	623	8.16	137	1.0	33.0	3.8	11.8	<0.10	88	37.9	0.0675	0.000098	0.000743	0.0057	<0.000010	<0.000010	0.006	<0.0000020	7.71	<0.00010	0.0000411	0.00125	<0.0020	<0.000050	0.00452	4.53	0.0040	<0.000020	0.000015	0.000162	<0.010	3.37	<0.00010	1.22	<0.000010	4.27	0.07	1.79	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000236	<0.00020	<0.0010	<0.000020	1.93	1.07	1.04	1.27	0052568-05
03-Jun-20	1	500	479	7.93	120	2.5	35.0	5.9	7.94	0.1	55	38.2	0.123	0.000473	0.00147	0.0064	<0.000010	<0.000010	0.0088	<0.0000020	7.03	<0.00010	0.000036	0.000372	<0.0020	<0.000050	0.00583	5	0.0060	<0.000020	0.000469	0.00019	<0.010	2.98	<0.00010	1.78	<0.000010	3.88	0.0839	2.75	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000889	<0.00020	<0.0010	<0.000020	1.61	1.05	1.03	1.29	0061004-05
10-Jun-20	2	500	473	7.41	90	13.0	32.5	4.9	3.19	<0.10	41	31.6	0.101	0.000288	0.00118	0.0047	<0.000010	<0.000010	<0.0050	<0.0000020	6.03	<0.00010	0.0000282	0.000272	<0.0020	<0.000050	0.00432	4.02	0.0044	<0.000020	0.000429	0.00038	<0.010	2.22	<0.00010	1.42	<0.000010	2.69	0.0483	2.95	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000845	<0.00020	<0.0010	<0.000020	1.22	0.94	0.82	1.44	0061385-05
17-Jun-20	3	500	474	7.76	83	5.0	33.5	7.9	0.61	<0.10	30	29.7	0.0718	0.000269	0.000966	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.03	<0.00010	0.0000311	0.00037	0.0025	<0.000050	0.00387	3.56	0.0056	<0.000020	0.000393	0.00054	<0.010	1.88	<0.00010	1.1	<0.000010	1.56	0.0445	1.54	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.00071	<0.00020	0.0010	<0.000020	0.92	0.85	0.72	8.44	0062311-05
24-Jun-20	4	500	480	8.37	74	<0.5	32.5	4.3	0.23	<0.10	<30	29.8	0.076	0.000261	0.000899	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.12	0.00011	0.0000157	0.00029	0.0023	<0.000050	0.00355	3.52	0.0044	<0.000020	0.000363	<0.000040	<0.010	2.03	<0.00010	1.06	<0.000010	1.16	0.0442	1.19	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000705	<0.00020	<0.0010	<0.000020	0.83	0.75	0.71	2.66	0062680-05
01-Jul-20	5	500	476	8.63	68	<0.5	28.5	3.3	0.11	<0.10	26	24.1	0.0664	0.000248	0.000862	0.0036	<0.000010	<0.000010	<0.0050	<0.0000020	4.62	<0.00010	0.0000184	0.00077	0.0035	<0.000050	0.00357	3.05	0.0018	<0.000020	0.000289	0.000041	<0.010	1.6	<0.00010	0.91	<0.000010	0.76	0.0352	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000653	<0.00020	<0.0010	<0.000020	0.8	0.64	0.56	6.45	0070532-05
08-Jul-20	6	500	475	8.45	71	<0.5	32.5	3.0	<0.10	<0.10	46	26.9	0.0699	0.000288	0.00074	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	5.36	<0.00010	0.0000191	0.00031	0.0075	<0.000050	0.00379	3.26	0.0043	<0.000020	0.000262	<0.000040	<0.010	1.51	<0.00010	0.95	<0.000010	0.52	0.043	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000753	<0.00020	<0.0010	0.000059	0.68	0.71	0.61	8.06	0070830-05
15-Jul-20	7	500	460	7.91	68	2.0	30.0	1.1	<0.10	<0.10	22	28.6	0.059	0.000242	0.000728	0.0041	<0.000010	<0.000010	<0.0050	<0.0000020	6.53	<0.00010	0.0000313	0.00038	<0.0020	<0.000050	0.00319	2.99	0.0042	<0.000020	0.000168	<0.000040	<0.010	1.45	<0.00010	0.94	<0.000010	0.25	0.0418	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000648	<0.00020	<0.0010	<0.000020	0.52	0.62	0.63	-0.36	0071896-05
22-Jul-20	8	500	466	7.93	77	2.0	32.0	1.5	<0.10	<0.10	21	29.0	0.0649	0.000345	0.00082	0.0046	<0.000010	<0.000010	<0.0050	<0.0000020	6.08	<0.00010	0.0000211	0.00044	0.0045	<0.000050	0.00508	3.35	0.0039	<0.000020	0.000224	0.000044	<0.010	1.72	<0.00010	0.98	<0.000010	0.35	0.045	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.00079	<0.00020	<0.0010	<0.000020	0.6	0.67	0.65	1.85	0072338-05
29-Jul-20	9	500	466	7.26	67	8.0	27.0	<1.0	<0.10	<0.10	25	22.6	0.0601	0.000167	0.00066	0.0035	<0.000010	<0.000010	<0.0050	<0.0000020	4.84	0.00012	0.0000155	0.00024	0.0055	<0.000050	0.00248	2.55	0.0022	<0.000020	0.000167	<0.000040	<0.010	1.27	<0.00010	0.69	<0.000010	0.15	0.0338	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000576	<0.00020	<0.0010	<0.000020	0.43	0.54	0.50	4.02	0073105-05
05-Aug-20	10	500	470																																																				
12-Aug-20	11	500	472																																																			
19-Aug-20	12	500	473																																																		
26-Aug-20	13	500	469																																																		
				7.13	58	7.5	26.0	1.0	<0.10	<0.10	31	25.4	0.0444	0.000128	0.000538	0.0040	<0.000010	<0.000010	<0.0050	<0.0000020	5.86	<0.00010	0.0000599	<0.00010	0.0041	<0.000050	0.00231	2.61	0.0019	<0.000020	0.000112	<0.000040	<0.010	0.994	<0.00010	0.65	<0.000010	0.07	0.0365	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000528	<0.00020	<0.0010	<0.000020	0.26	0.54	0.54	-0.05	
							Replicate analysis	1.0				25.4	0.0442	0.000129	0.000523	0.0039	<0.000010	<0.000010	0.0024	<0.0000020	5.9	<0.00010	0.0000141	<0.00010	0.0041	<0.000050	0.00231	2.61	0.0019	<0.000020	0.000114	<0.000040	<0.010	0.973	<0.00010	0.66	<0.000010	0.07	0.0363	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000534	<0.00020	<0.0010	<0.000020	0.26	0.54	0.54	-0.26	0080630-05
09-Sep-20	15	500	483																																																			
16-Sep-20	16	500	481																																																			
23-Sep-20	17	500	482																																																		
30-Sep-20	18	500	483																																																		
07-Oct-20	19	500	480	7.95	66	2.5	30.0	<1.0	<0.10	<0.10	43	27.9	0.0443	0.000333	0.000932	0.0045	<0.000010	<0.000010	<0.0050	<0.0000020	6.09	0.00028	0.0000139	0.0002	0.0073	<0.000050	0.00275	3.06	0.0019	<0.000020	0.000103	0.000729	<0.010	1.29	<0.00010	0.9	<0.000010	0.06	0.0431	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000658	0.00103	<0.0010	<0.000020	0.28	0.60	0.60	0.19	20J1032-05
14-Oct-20	20	500	474																																																		
21-Oct-20	21	500	480																																																		
28-Oct-20	22	500	476																																																		
04-Nov-20	23	500	480																																																		
11-Nov-20	24	500	474	7.66	57	2.5	27.0	<1.0	<0.10	<0.10	26	27.0	0.032	0.0002	0.000337	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	6.39	<0.00010	0.0000118	0.00088	0.0074	0.000054	0.00214	2.69	0.0019	<0.000020	0.000154	0.00035	<0.010	0.862	<0.00010	0.62	<0.000010	0.04	0.0389	<1.00	<0.000050	<0.0000040	<0.000010	0.000351	<0.00020	0.000441	<0.00020	0.0017	0.000386	<0.20	0.54	0.57	-2.59	20K1497-05
18-Nov-20	25	500	479																																																		
25-Nov-20	26	500	474																																																		
02-Dec-20	27	500	475																																																		
09-Dec-20	28	500	482																																																		
15-Dec-20	29	500	476	7.62	60	6.5	30.0	<1.0	<0.10	<0.10	25	28.3	0.0422	0.00021	0.000312	0.0042	<0.000010	<0.000010	<0.0050	<0.0000020	6.51	<0.00010	0.0000113	0.00022	0.0037	<0.000050	0.00305	2.92	0.0032	<0.000020	0.000044	0.00461	<0.010	0.956	<0.00010	0.65	<0.000010	0.04	0.0391	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000516	<0.00020	<0.0010	<0.000020	<0.20	0.60	0.60	0.21	20L2199-05
23-Dec-20	30	500	479																																																		
30-Dec-20	31	500	478																																																		
06-Jan-21	32	500	482																																																		
13-Jan-21	33	500	474																																																		
20-Jan-21	34	500	479	7.52	55	5.0	27.0	<1.0	<0.10	<0.10	40	26.0	0.0443	0.000148	0.000371	0.0039	<0.000010	<0.000010	<0.0050	<0.0000020	6.65	0.00016	0.0000162	0.00012	0.0064	<0.000050	0.00623	2.27	0.0048	<0.000020	0.00064	0.000082	0.017	0.679	<0.00010	1.32	<0.000010	0.03	0.0389	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000311	<0.00020	<0.0010	<0.000020	1.48	0.54	0.54	-0.33	21A1888-01
27-Jan-21	35	500	481																																																		
03-Feb-21	36	500	473																																																		
10-Feb-21	37	500	480																																																	
17-Feb-21	38	500	476																																																	
24-Feb-21	39	500	479	7.28	64	9.0	29.5	<4.0	<0.10	<0.10	<43	26.6	0.0312	0.000118	0.000263	0.0043	<0.000010	<0.000010	<0.0050	<0.0000020	6.98	<0.00010	0.0000147	<0.00010	0.0044	<0.000050	0.00185	2.23	0.0038	<0.000020	0.000049	<0.000040	<0.010	0.693	<0.00010	0.67	<0.000010	0.03	0.0375	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000364	<0.00020	<0.0010	<0.000020	<0.20	0.59	0.56	3.01	21C0669-05
03-Mar-21	40	500	480																																																		
10-Mar-21	41	500	473																																																		
17-Mar-21	42	500	471																																																	
24-Mar-21	43	500	476																																																	
31-Mar-21	44	500	478	7.75	83	12.0	33.7	<1.0	<0.10	<0.10	56	38.5	0.0255	0.000133	0.000335	0.0065	<0.000010	<0.000010	<0.0050	<0.0000020	9.69	0.00011	0.0000143	0.00013	0.0031	<0.000050	0.00359	3.46	0.0032	<0.000020	0.000053	<0.000040	<0.010	1.1	<0.00010	0.92	<0.000010	0.04	0.0527	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000506	<0.00020	<0.0010	<0.000020	<0.20	0.67	0.80	-8.71	21D1371-05
07-Apr-21	45	500	476																																																		
14-Apr-21	46	500	477																																																		
21-Apr-21	47	500	467																																																		
28-Apr-21	48	500	476																																																		
05-May-21	49	500	480	8.20	50	0.5	21.0	<1.0	<0.10	<0.10	24	21.4	0.0382	0.000128	0.000185	0.0045	<0.000010	<0.000010	<0.0050	0.0000402	6.24	<0.00010	0.000111	**0.00108**	0.0066	0.000106	0.00122	1.41	0.0052	<0.000020	0.000027	0.000602	<0.010	0.533	<0.00010	0.48	0.000013	0.03	0.0288	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000208	<0.00020	0.0025	<0.000020	<0.20	0.42	0.45	-3.20	21E0990-05
12-May-21	50	500	475																																																		
19-May-21	51	500	480																																																		
26-May-21	52	500	476																																																		
02-Jun-21	53	500	475																																																		
09-Jun-21	54	500	479	8.00	55	0.5	22.5	<1.0	<0.10	<0.10	<15	24.9	0.0405	0.000213	0.000215	0.0034	<0.000010	<0.000010	<0.0050	<0.0000020	7.83	<0.00010	0.0000098	<0.00010	0.0056	<0.000050	0.000989	1.29	0.0035	<0.000020	0.000033	0.00004	<0.010	0.422	<0.00010	0.38	<0.000010	0.02	0.031	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.000171	<0.00020	<0.0010	<0.000020	<0.20	0.45	0.51	-6.65	21F1397-05
16-Jun-21	55	500	475																																																		
23-Jun-21	56	500	480																																																		
30-Jun-21	57	500	479																																																		
07-Jul-21	58	500	470																																																		
14-Jul-21	59	500	475	7.81	55	3.0	23.5	<1.0	<0.10	<0.10	47	23.6	0.0268	0.000054	0.000164	0.0033	<0.000010	<0.000010	<0.0050	<0.0000020	6.79	<0.00010	0.0000075	<0.00010	<0.0020	<0.000050	0.00108	1.61	0.0016	<0.000020	0.000031	<0.000040	<0.010	0.412	<0.00010	0.44	<0.000010	<0.020	0.0301	<1.00	<0.000050	<0.0000040	<0.000010	<0.000050	<0.00020	0.00021	<0.00020	<0.0010	<0.000020	<0.20	0.47	0.49	-1.63	21G1983-05
21-Jul-21	60	500	465																																																		
28-Jul-21	61	500	470																																																	
04-Aug-21	62	500	475																																																	
11-Aug-21	63	500	480																																																	
18-Aug-21	64	500	482	7.46	47.1	7.7	26.4	<1.0	<0.10	<0.10	27	24.7	0.0253	0.000055	0.000159	0.0039	<0.000010	<0.000010	<0.0050	<0.0000020	6.9	<0.00010	0.0000091	<0.00010	0.0021	<0.000050	0.00111	1.8	0.0019	<0.000020	0.000033	0.000082	<0.010	0.398	<0.00010	0.45	<0.000010	0.03	0.0329	<1.00	<0.000050	<0.0000040	<0.000010	0.000957	<0.00020	0.000223	<0.00020	<0.0010	<0.000020	<0.20	0.53	0.51	1.97	21H2244-05
25-Aug-21	65	500	478																																																		
01-Sep-21	66	500																																																		
08-Sep-21	67	500																																																		
15-Sep-21	68	500																																																		

NOTES:
Continue testing until client says otherwise. Email from Randy Williams dated June 25, 2021.
Requested # of weeks of testing: 55 weeks (includes week-0)
RDL may be raised for some samples due to sample matrix interference.
Abbreviations:
RDL: Reportable Detection Limits
EC: Electric Conductivity
IC: Ion Chromatograph
SIE: Selective Ion Electrode
Calc: Calculation
ICP-MS: Inductively Coupled Plasma - Mass Spectrometry

CERTIFICATE OF ANALYSIS ▪ pH & EC OF DI WATER AND HCT ROOM TEMPERATURE READINGS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. ·
PROJECT NO: 666768

Sampling Date	Week No.	Deionized Water		Temperature °C
		pH (pH Units) RDL: 0.01	EC (µS/cm) RDL: 0.01	
27-May-20	0	5.64	0.80	24.5
03-Jun-20	1	5.63	0.79	24.5
10-Jun-20	2	5.44	0.28	24.0
17-Jun-20	3	5.70	0.75	24.0
24-Jun-20	4	5.46	0.24	24.5
1-Jul-20	5	5.72	0.66	24.5
8-Jul-20	6	5.48	0.29	25.0
15-Jul-20	7	5.66	0.38	24.5
22-Jul-20	8	5.71	0.83	25.0
29-Jul-20	9	5.49	0.53	24.4
5-Aug-20	10	5.58	0.48	25.0
12-Aug-20	11	5.71	0.50	25.0
19-Aug-20	12	5.66	0.80	24.5
26-Aug-20	13	5.54	0.81	24.5
2-Sep-20	14	5.49	1.00	24.5
9-Sep-20	15	5.66	0.87	24.0
16-Sep-20	16	5.70	0.48	24.5
23-Sep-20	17	5.63	0.26	24.0
30-Sep-20	18	5.49	0.21	24.5
7-Oct-20	19	5.52	0.16	24.0
14-Oct-20	20	5.59	0.70	24.5
21-Oct-20	21	5.62	0.44	24.0
28-Oct-20	22	5.57	0.18	24.0
4-Nov-20	23	5.70	0.21	23.5
11-Nov-20	24	5.80	0.13	24.0
18-Nov-20	25	5.48	0.87	24.5
25-Nov-20	26	5.59	0.61	24.5
2-Dec-20	27	5.60	0.17	24.0
9-Dec-20	28	5.48	0.41	24.5
16-Dec-20	29	5.46	0.65	24.0

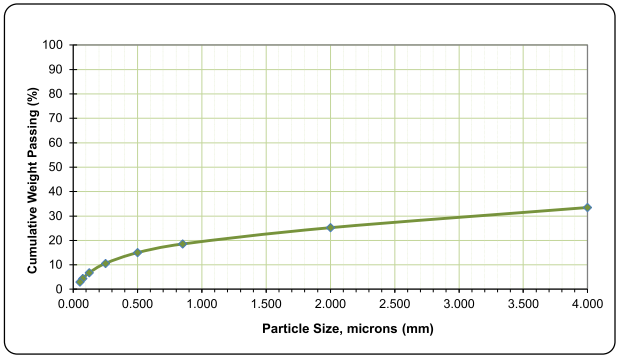
CERTIFICATE OF ANALYSIS ▪ PARTICLE SIZE ANALYSIS RESULTS

Global
ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)
PROJECT NO: 666768

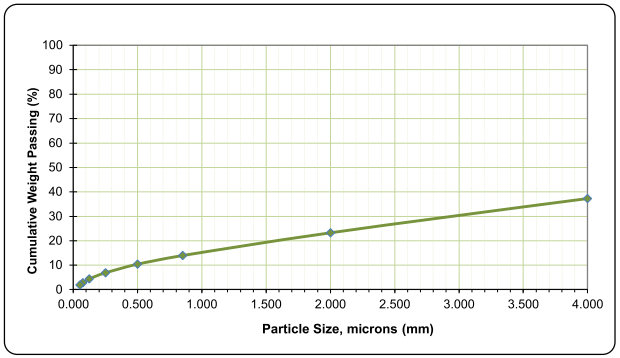
HC-1; Sample ID: BH19-5M4L-01-SA2

Tyler Mesh	U.S Mesh	Opening (mm)	Screen (inches)	Mass (g)	% Retained		% Passing
					Interval	Cumulative	
5	5	4.000	0.157	162.95	66.6	66.6	33.4
9	10	2.000	0.079	20.05	8.2	74.8	25.2
20	20	0.850	0.0331	16.40	6.7	81.5	18.5
35	40	0.500	0.0197	8.50	3.5	85.0	15.0
60	60	0.250	0.0098	10.95	4.5	89.5	10.5
115	120	0.125	0.0049	9.30	3.8	93.3	6.7
200	200	0.075	0.0029	5.70	2.3	95.6	4.4
270	270	0.053	0.0021	3.65	1.5	97.1	2.9
<270	<270 (Pan)	<0.053	<0.0021	7.15	2.9	100.0	0.0
Used: 245.0 g and ro-tapped for 10 minutes:				**244.7**	100.0		



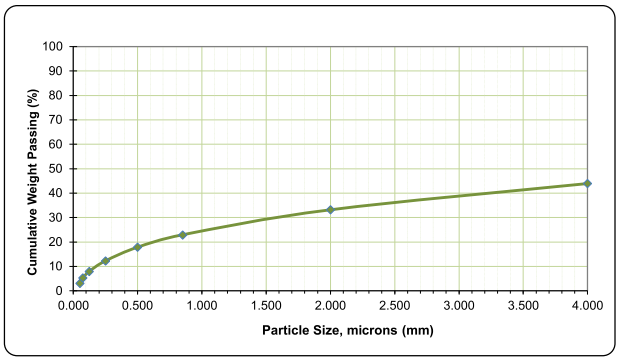
HC-2; Sample ID: BH19-5M4L-02-SA2

Tyler Mesh	U.S Mesh	Opening (mm)	Screen (inches)	Mass (g)	% Retained		% Passing
					Interval	Cumulative	
5	5	4.000	0.157	153.35	62.7	62.7	37.3
9	10	2.000	0.079	34.40	14.1	76.8	23.2
20	20	0.850	0.0331	22.90	9.4	86.1	13.9
35	40	0.500	0.0197	8.50	3.5	89.6	10.4
60	60	0.250	0.0098	8.80	3.6	93.2	6.8
115	120	0.125	0.0049	5.95	2.4	95.6	4.4
200	200	0.075	0.0029	3.80	1.6	97.2	2.8
270	270	0.053	0.0021	2.40	1.0	98.2	1.8
<270	<270 (Pan)	<0.053	<0.0021	4.50	1.8	100.0	0.0
Used: 245.0 g and ro-tapped for 10 minutes:				**244.6**	100.0		



HC-3; Sample ID: BH19-39

Tyler Mesh	U.S Mesh	Opening (mm)	Screen (inches)	Mass (g)	% Retained		% Passing
					Interval	Cumulative	
5	5	4.000	0.157	136.95	56.0	56.0	44.0
9	10	2.000	0.079	26.25	10.7	66.8	33.2
20	20	0.850	0.0331	25.25	10.3	77.1	22.9
35	40	0.500	0.0197	12.25	5.0	82.1	17.9
60	60	0.250	0.0098	13.70	5.6	87.7	12.3
115	120	0.125	0.0049	10.55	4.3	92.0	8.0
200	200	0.075	0.0029	6.60	2.7	94.7	5.3
270	270	0.053	0.0021	5.55	2.3	97.0	3.0
<270	<270 (Pan)	<0.053	<0.0021	7.35	3.0	100.0	0.0
Used: 245.0 g and ro-tapped for 10 minutes:				**244.5**	100.0		



CERTIFICATE OF ANALYSIS ▪ PARTICLE SIZE ANALYSIS RESULTS

Global
ARD Testing Services Inc.

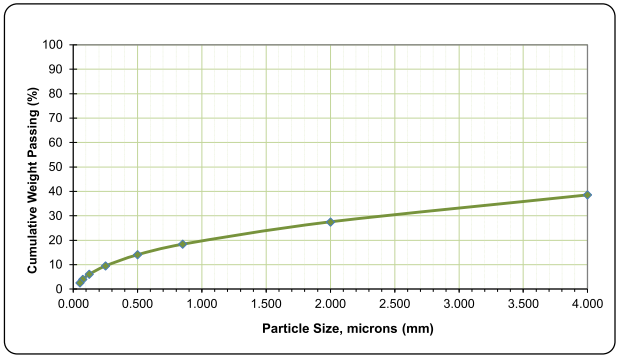
GLOBAL PROJECT NO: 1964 (B2)

CLIENT: SNC-Lavalin Inc.

PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)

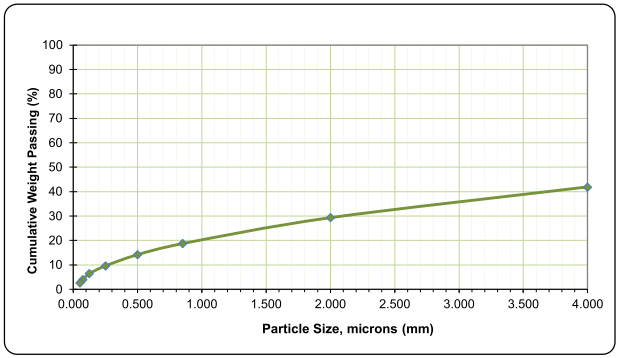
HC-4; Sample ID: Mix: 90% BH19-39 + 10% DH-MD-01

Tyler Mesh	U.S Mesh	Opening (mm)	Screen (inches)	Mass (g)	% Retained		% Passing
					Interval	Cumulative	
5	5	4.000	0.157	91.85	61.4	61.4	38.6
9	10	2.000	0.079	16.55	11.1	72.5	27.5
20	20	0.850	0.0331	13.70	9.2	81.7	18.3
35	40	0.500	0.0197	6.30	4.2	85.9	14.1
60	60	0.250	0.0098	7.00	4.7	90.6	9.4
115	120	0.125	0.0049	5.00	3.3	93.9	6.1
200	200	0.075	0.0029	3.05	2.0	96.0	4.0
270	270	0.053	0.0021	2.20	1.5	97.4	2.6
<270	<270 (Pan)	<0.053	<0.0021	3.85	2.6	100.0	0.0
Used: 150.0 g and ro-tapped for 10 minutes:				**149.5**	100.0		



HC-5; Sample ID: Mix: 70% BH19-39 + 30% DH-MD-02

Tyler Mesh	U.S Mesh	Opening (mm)	Screen (inches)	Mass (g)	% Retained		% Passing
					Interval	Cumulative	
5	5	4.000	0.157	86.80	58.1	58.1	41.9
9	10	2.000	0.079	18.75	12.6	70.6	29.4
20	20	0.850	0.0331	15.85	10.6	81.3	18.7
35	40	0.500	0.0197	6.70	4.5	85.7	14.3
60	60	0.250	0.0098	6.90	4.6	90.4	9.6
115	120	0.125	0.0049	4.70	3.1	93.5	6.5
200	200	0.075	0.0029	3.75	2.5	96.0	4.0
270	270	0.053	0.0021	1.90	1.3	97.3	2.7
<270	<270 (Pan)	<0.053	<0.0021	4.05	2.7	100.0	0.0
Used: 150.0 g and ro-tapped for 10 minutes:				**149.4**	100.0		



CERTIFICATE OF ANALYSIS ▪ HUMIDITY CELL SET-UP DETAILS

Global
ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (B2)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning (B2)
PROJECT NO: 666768

HCT ID	Sample Type	Humidity Cell Dimensions (inches)			Dry Wt. of Sample (g)	Particle Size	Other Materials Used (x2 Layers)	Column Material	Total Volume of Initial Flushings (mL)	Weekly Flushing Volume (mL)	Sampling Frequency	Sampling Day	Water Addition to Drain Time (h)	Start-up Date	Termination Date (Proposed)	Total No. of Weeks Proposed	Operation Procedure
		Inner Diameter	Column Height	Cell Wall Thickness													
HC-1	Rock	4	8	1/4"	1000.0	85% passing 1/4 inch (6.3 mm)	200 Nylon Mesh	Clear Cast Acrylic	750	500	Weekly	Wed.	2	27-May-20	9-Jun-21	55 (includes Wk-0)	Flood Leach
HC-2	Rock	4	8	1/4"	1000.0	85% passing 1/4 inch (6.3 mm)	200 Nylon Mesh	Clear Cast Acrylic	750	500	Weekly	Wed.	2	27-May-20	9-Jun-21	55 (includes Wk-0)	Flood Leach
HC-3	Rock	4	8	1/4"	1000.0	85% passing 1/4 inch (6.3 mm)	200 Nylon Mesh	Clear Cast Acrylic	750	500	Weekly	Wed.	2	27-May-20	9-Jun-21	55 (includes Wk-0)	Flood Leach
HC-4	Rock	4	8	1/4"	1000.0	85% passing 1/4 inch (6.3 mm)	200 Nylon Mesh	Clear Cast Acrylic	750	500	Weekly	Wed.	2	27-May-20	9-Jun-21	55 (includes Wk-0)	Flood Leach
HC-5	Rock	4	8	1/4"	1000.0	85% passing 1/4 inch (6.3 mm)	200 Nylon Mesh	Clear Cast Acrylic	750	500	Weekly	Wed.	2	27-May-20	9-Jun-21	55 (includes Wk-0)	Flood Leach

Method Reference: MEND Method.

HCT Testing Schedule:

Version-2

Week No.	Sampling	pH	EC	Acidity	Alkalinity	Anion Pkg			TDS	Diss. Metals by ICP-MS
						Sulphate	Chloride	Fluoride		
0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10	✓									
11	✓									
12	✓									
13	✓									
14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15	✓									
16	✓									
17	✓									
18	✓									
19	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	✓									
21	✓									
22	✓									
23	✓									
24	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
25	✓									
26	✓									
27	✓									
28	✓									
29	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	✓									
31	✓									
32	✓									
33	✓									
34	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
35	✓									
36	✓									
37	✓									
38	✓									
39	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
40	✓									
41	✓									
42	✓									
43	✓									
44	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	✓									
46	✓									
47	✓									
48	✓									
49	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
50	✓									
51	✓									
52	✓									
53	✓									
54	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Units:	***55***	***55***	***19***	***19***	***19***	***19***	***19***	***19***	***19***	***19***	***19***

CERTIFICATE OF ANALYSIS ▪ COVER PAGE

Global ARD Testing Services Inc.

CLIENT INFORMATION	
Company:	SNC-Lavalin Inc.
Project Manager:	Randy S. Williams, P.Geo., Geoscientist/Project Manager, Environment & Geoscience, Infrastructure.
Contact Person:	Randy S. Williams
Email Address:	Randy.Williams@snclavalin.com
Mailing Address:	520 Lake Street,
	Nelson, BC V1L 4C6.
Contact No:	Off: (250) 505-3772; D: (250) 354-1664 x 53204
Fax No:	

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue, Burnaby, BC, Canada V5J 4M5.
Contact No:	Main: (604) 428-2730
	Alternate: (604) 603-1359

PROJECT INFORMATION	
Project Name:	MOTI Selkirk Mtn. 4-Laning
Project Number:	666768

RESULTS		
Reported To:	**1**	Harbey Bains (Harbey.Bains@snclavalin.com)
	2	Matt Andersen (Matt.Andersen@snclavalin.com)
cc:		Craig Pinnell (Craig.Pinnell@snclavalin.com)
Reporting Date:	**V1:**	November 24, 2021 (ABA)
	V2:	December 2, 2021 (Metals)
	V3:	January 17, 2022 (HC-1 NP)

INVOICE	
Submitted To:	Accounts Payable Processing Centre (payables@snclavalin.com)
Address:	SNC-Lavalin Inc.
	520 Lake Street, Nelson, BC V1L 4C6.
Contact No:	(250) 354-1664 x 53204
Client PO No:	N/A
Global Invoice No:	ARD1964-1221A
Date Submitted:	December 2, 2021

REPORTING	
Global Project No:	1964 (HCT-Closedown)
Report Version:	3
Pages (Including Cover):	4
Report Title:	COA 5 MOTI-Selkirk Mtn 4-Laning HCT Closedown (rec'd 8-May20)
Analysis Reviewed By:	Prab Bhatia (PBhatia@globalARDtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	

NOTES
All samples are stored at no charge for 90 days past reporting date.
HCT, column, custom leach columns (Lysimeters) & SAD column samples will
be stored free for 90 days past kinetic testing program or Closedown.
Please contact the lab if you require additional sample storage time.
Storage charges will apply.

CERTIFICATE OF ANALYSIS ▪ SAMPLE DETAILS

Global ARD Testing Services Inc.

GLOBAL PROJECT NO: 1964 (HCT-Closedown)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning
PROJECT NO: 666768
REPORT VERSION: 3

S. No.	Sample ID	Sample Description	Wt. of Sample Rec'd (kg)	Condition (Wet/Dry)	Global Notes (if any)
HC-1	BH19-5M4L-01-SA2	Rock	Dry		
HC-2	BH19-5M4L-02-SA2	Rock	Dry		
HC-3	BH19-39	Rock	Dry		
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01	Composite	Dry		
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02	Composite	Dry		

Sample Receipt Info:	
Date Samples Received:	May 8, 2020
No. of Samples Received:	5
Samples Received By:	Savanah

Analytical Instructions:	
From:	Randy Williams (Randy.Williams@snclavalin.com)
Date:	as per COC confirmation. September 23, 2021

Sieving - % Passing (Pulverizing) QAQC:	
Analyte:	**Pass %**
Unit:	**%**
RDL:	**0.01**
	N/A

Global
ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ ABA RESULTS

GLOBAL PROJECT NO: 1964 (HCT-Closedown)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning
PROJECT NO: 666768
REPORT VERSION: 3

S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	$CaCO_3$ Equivalents*1	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur*1	AP*2	Mod. ABA NP	NNP*3	NPR*4
	Units:	**pH Units**		**wt %**	**kg CaCO3/tonne**	**wt %**	**wt %**	**wt %**		**kg CaCO3/tonne**		
	Reported Detection Limit:	***0.1***		***0.02***	***1.7***	***0.01***	***0.01***	***0.01***	**0.3**	***0.5***		
HCT Residue - Head Analysis (Reported: June 5, 2020)												
HC-1	BH19-5M4L-01-SA2											
HC-2	BH19-5M4L-02-SA2											
HC-3	BH19-39											
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01	8.9	Strong	1.17	97.5	0.13	<0.01	0.13	4.1	81.0	76.9	19.6
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02	8.9	Strong	3.37	280.8	0.14	<0.01	0.14	4.3	278.0	273.8	65.4
HCT Residue - Closedown												
HC-1	BH19-5M4L-01-SA2	8.1	None	<0.02	<1.7	0.05	<0.01	0.05	1.6	0.1	-1.5	0.1
HC-2	BH19-5M4L-02-SA2	7.0	None	<0.02	<1.7	0.36	0.03	0.33	10.5	3.5	-7.0	0.3
HC-3	BH19-39	8.3	Moderate	0.18	15.0	0.16	<0.01	0.16	5.0	15.3	10.3	3.1
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01	8.3	Strong	1.03	85.8	0.11	<0.01	0.11	3.4	78.9	75.5	23.0
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02	8.3	Strong	3.23	269.2	0.08	<0.01	0.08	2.5	271.7	269.2	108.7
Replicate Analysis:												
HC-1	BH19-5M4L-01-SA2			<0.02	<1.7	0.05				-0.6		
HC-1R	BH19-5M4L-01-SA2 (Rep)			<0.02	<1.7	0.05				0.1		
HC-1RR	BH19-5M4L-01-SA2 (Rep)									0.0		
Reference Material Analysis:												
Reference Material		KZK-1		Calcium Carbonate		STD KZK-1	RTS-3a			1) KZK-1 (Slight) 2) KZK-1 (Moderate)		
Ref. Material Certified Value		**8.80**		**0.84**		**0.80**	**1.10**			**1) 58.9** **2) 61.6**		
Reference Material Results		8.86		0.70		0.78	1.03			1) 59.1, 58.7 2) N/A		
Tolerance (+/-) or Acceptance Range		***0.09***		***90% - 110%***		***90% - 110%***	***0.99 - 1.21***			***1) 1.1 (+/-)*** ***2) 3.4 (+/-)***		
Method Blank Analysis:												
Method Blank Results				<0.01		<0.01	<0.01					
GLOBAL SOP NO./METHOD:		*ARD-004*	*ARD-007*	*HCl leach/ CO2-Coulometer*	*Calc.*	*LECO*	*ARD-013 (HCl Leach)*	*Calc.*	*Calc.*	*ARD-005*	*Calc.*	*Calc.*

NOTES:
Job No: 21V815906
Date of Analysis: May 25/26, 2020**;** January 10, 2022 (HC-1 NP)
pH of DI water used (pH units): 5.70
EC of DI water used (µS/cm): 1.02

METHODS:
Total sulphur by Leco.
Total Inorganic Carbon (TIC): HCl leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:
R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample.
A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:
*1 Sulphide-Sulphur: Total-sulphur - sulphate-sulphur
*2 AP (Acid Potential): Sulphide-sulphur x 31.25
*3 NNP (Net Neutralization Potential): NP - AP
*4 NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:
Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)
ABA: Air-dried, jaw-crushed, split by riffling and pulverized to 85% passing 200 mesh (75 µm).
Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual, MEND Project 1.16.1b (pages 6.2-11 to 17), March 1991.
Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.R. and Smith, R.M.; US EPA-600/2-78-054 (1978).
Sulphate Sulphur: Based on MEND method. The S extracted is determined by analysing the extract for SO4 using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

Global
ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY 4-ACID DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 1964 (HCT-Closedown)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning
PROJECT NO: 666768
REPORT VERSION: 3

S. No.	Sample ID	Method	IMS-230																							
		Analyte	Silver (Ag)	Aluminum (Al)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Calcium (Ca)	Cadmium (Cd)	Cerium (Ce)	Cobalt (Co)	Chromium (Cr)	Cesium (Cs)	Copper (Cu)	Iron (Fe)	Gallium (Ga)	Germanium (Ge)	Hafnium (Hf)	Indium (In)	Potassium (K)	Lanthanum (La)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)
		Unit	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm
		MDL	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.02	0.1	1	0.05	0.2	0.01	0.05	0.05	0.1	0.005	0.01	0.5	0.2	0.01	5	0.05
		Sample Type																								
HC-1	BH19-5M4L-01-SA2	Pulp	0.04	3.67	12.8	559	0.49	0.10	0.05	<0.02	38.58	1.5	177	1.12	2.4	0.69	8.13	<0.05	0.50	0.011	2.73	15.3	2.9	0.10	33	0.67
HC-2	BH19-5M4L-02-SA2	Pulp	0.03	2.58	17.4	251	0.48	0.16	0.02	<0.02	27.99	1.9	190	1.05	2.2	0.87	6.38	<0.05	0.40	0.011	1.38	11.2	1.9	0.09	16	0.70
HC-3	BH19-39	Pulp	0.10	6.08	2.8	701	1.75	0.03	0.63	<0.02	70.61	5.6	158	4.40	1.6	1.58	15.95	0.05	1.40	0.032	3.04	29.6	13.7	0.57	171	0.50
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01	Pulp	0.02	6.42	2.7	777	1.85	0.06	3.10	<0.02	90.47	8.8	136	4.80	1.6	1.91	16.16	0.10	1.80	0.043	3.31	37.4	14.9	0.87	317	0.50
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02	Pulp	0.02	5.02	2.9	583	1.35	0.04	10.33	<0.02	72.77	6.6	95	3.68	2.1	1.60	12.08	0.07	1.50	0.035	2.59	30.3	10.4	0.64	587	0.39
Pulp Replicates																										
Certified Reference Material:																										
STD OREAS 601			49.48	6.15	313.1	1451	2.09	20.99	1.31	8.01	63.8	5.20	44	6.82	1018	2.45	20.88	0.09	4.30	1.72	1.96	30.2	21.5	0.390	474.000	3.87
True Value STD OREAS 601			**49.18**	**6.30**	**307.0**		**2.07**	**20.90**	**1.31**	**7.86**	**63.0**	**5.14**	**42**	**6.72**	**1010**	**2.48**	**20.40**		**4.52**	**1.73**	**2.10**	**30.9**	**20.5**	**0.389**	**480**	**3.87**
% Difference			0.6	-2.4	2.0		1.0	0.4	0.0	1.9	1.2	1.2	4.8	1.5	0.8	-1.2	2.4		-4.9	-0.6	-6.7	-2.3	4.9	0.3	-1.3	0.0
Tolerance (%)			***1.75***	***0.24***	***22.0***	***NR***	***0.15***	***1.4***	***0.04***	***0.48***	***4.0***	***0.54***	***5.8***	***0.52***	***0.003***	***0.14***	***0.50***	***NR***	***0.35***	***0.21***	***0.07***	***2.60***	***1.6***	***0.02***	***0.002***	***0.44***
Method Blank:																										
Method Blank			<0.01	<0.01	<0.2	<10	<0.05	<0.01	<0.01	<0.02	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.1	<0.005	<0.01	<0.5	<0.2	<0.01	<5	<0.05

NOTES:
Job No: YVR2111051

Analytical Methods (IMS-230):
Analytical Method: A 0.25 g of pulp sample is digested with HClO4, HNO3, HCl, HF to 10 mL. (>) Concentration exceeds upper limits.
REE's may not be totally soluble in this method.
While multi-acid digestion is considered to be near total digestion this digestion is only partial for some Cr and Ba minerals and oxides of Al, Fe, Hf, Mn, Sn, Ta and Zr.
Additionally volatilization during fuming may result in some loss of As, S and Sb.
Abbreviations:
R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)
D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)
MDL = Measurable Detection Limit
IND = Indeterminate
NR = Not Requested
On Cerfified Reference Material and Tolerance:
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.
As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.
NR = Not Reported (in the Certificate Of Analysis).
On Tolerance:
Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.

Global
ARD Testing Services Inc.

CERTIFICATE OF ANALYSIS ▪ METALS RESULTS BY 4-ACID DIGEST & ICP-MS ANALYSIS ON SOLIDS

GLOBAL PROJECT NO: 1964 (HCT-Closedown)
CLIENT: SNC-Lavalin Inc.
PROJECT NAME: MOTI Selkirk Mtn. 4-Laning
PROJECT NO: 666768
REPORT VERSION: 3

S. No.	Sample ID	Method	IMS-230																								
		Analyte	Sodium (Na)	Niobium (Nb)	Nickel (Ni)	Phosphorous (P)	Lead (Pb)	Rubidium (Rb)	Rhenium (Re)	Sulphur (S)	Antimony (Sb)	Scandium (Sc)	Selenium (Se)	Tin (Sn)	Stronium (Sr)	Tantalum (Ta)	Tellurium (Te)	Thorium (Th)	Titanium (Ti)	Thallium (Tl)	Uranium (U)	Vandium (V)	Tungsten (W)	Yttrium (Y)	Zinc (Zn)	Zirconium (Zr)
		Unit	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
		MDL	0.01	0.1	0.2	10	0.5	0.1	0.002	0.01	0.5	0.1	1	0.2	0.2	0.05	0.05	0.2	0.01	0.02	0.1	1	0.1	0.1	2	0.5
		Sample Ty																								
HC-1	BH19-5M4L-01-SA2	Pulp	0.33	1.90	6.4	117	7.2	76.6	<0.002	0.07	<0.5	1.5	<1	0.5	26.9	0.15	<0.05	5.2	0.06	0.41	0.60	12	0.2	2.10	3	16.6
HC-2	BH19-5M4L-02-SA2	Pulp	0.03	2.00	6.1	64	5.3	45.6	<0.002	0.40	1	1.6	<1	0.5	7.1	0.15	<0.05	3.6	0.07	0.23	0.40	16	0.2	1.60	2	13.1
HC-3	BH19-39	Pulp	0.27	6.20	18.0	194	2.0	106.5	<0.002	0.20	1.2	7.3	<1	1.5	32.7	0.47	<0.05	12.6	0.21	0.48	3.20	46	0.5	6.40	10	46.6
HC-4	Mix: 90% BH19-39 + 10% DH-MD-01	Pulp	0.27	8.30	21.6	202	3.2	114.6	<0.002	0.16	1.5	8.5	<1	1.7	135.3	0.61	<0.05	16.2	0.28	0.51	3.80	52	0.6	8.40	15	57.3
HC-5	Mix: 70% BH19-39 + 30% DH-MD-02	Pulp	0.23	5.70	15.9	302	3.3	84.8	<0.002	0.11	1.1	6.3	<1	1.2	297.2	0.41	<0.05	12.0	0.19	0.38	2.90	38	0.4	8.70	9	46.6
Pulp Replicates																										
Certified Reference Material:																										
STD OREAS 601			1.48	12.4	24.9	477	335.8	97.9	<0.002	1.05	30.90	4.80	12.0	4.50	236	1.02	16.5	11.4	0.18	1.23	4.0	26.0	5.9	11.0	1360	159.1
True Value STD OREAS 601			**1.45**	**12.6**	**24.3**	**470**	**329.0**	**97.0**		**1.07**	**30.4**	**4.85**	**12.0**	**4.16**	**230**	**1.04**	**16.0**	**11.7**	**0.18**	**1.21**	**4.0**	**25.6**	**5.8**	**11.2**	**1330**	**155.0**
% Difference			2.1	-1.6	2.5	1.49	2.07	0.9		-1.9	1.6	-1.0	0.0	8.2	2.6	-1.9	3.1	-2.6	0.0	1.7	0.0	1.6	1.7	-1.8	2.3	2.6
Tolerance (%)			***0.07***	***1.1***	***1.3***	***0.002***	***18.0***	***4.0***	***NR***	***0.04***	***2.1***	***0.35***	***2.9***	***0.47***	***10***	***0.39***	***5.3***	***1.10***	***0.01***	***0.05***	***0.51***	***1.1***	***1.17***	***1.0***	***55***	***8***
Method Blank:																										
Method Blank			<0.01	<0.1	<0.2	<10	<0.5	<0.1	<0.002	<0.01	<0.5	<0.1	<1	<0.2	<0.2	<0.05	<0.05	<0.2	<0.01	<0.02	<0.1	<1	<0.1	<0.1	<2	<0.5

CERTIFICATE OF ANALYSIS

REPORTED TO	SNC-Lavalin Inc. (Nelson) #3-520 Lake Street Nelson, BC V1L 4C6		
ATTENTION	Randy Williams	**WORK ORDER**	N001171
PO NUMBER	666768	**RECEIVED / TEMP**	2019-11-05 09:30 / 1°C
PROJECT	666768	**REPORTED**	2019-11-28 15:46
PROJECT INFO	Selkirk Mountain Hwy	**COC NUMBER**	B37561

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

Work Order Comments: Custody Seals Intact: YES

If you have any questions or concerns, please contact me at bshaw@caro.ca

Authorized By:

Bryan Shaw, Ph.D., P.Chem.
Client Service Coordinator

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
CRUS-20191104 (N001171-01) | Matrix: Water | Sampled: 2019-11-04 10:30					
Anions					
Chloride	**0.86**	0.10	mg/L	2019-11-07	
Fluoride	**0.10**	0.10	mg/L	2019-11-07	
Nitrate (as N)	**0.102**	0.010	mg/L	2019-11-07	
Nitrite (as N)	< 0.010	0.010	mg/L	2019-11-07	
Sulfate	**36.8**	1.0	mg/L	2019-11-07	
Calculated Parameters					
Hardness, Total (as CaCO3)	**147**	0.500	mg/L	N/A	
Nitrogen, Total	**0.100**	0.0500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.00202**	0.00010	mg/L	2019-11-12	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, dissolved	**0.0436**	0.0050	mg/L	2019-11-12	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, dissolved	**0.0100**	0.0050	mg/L	2019-11-12	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, dissolved	**32.8**	0.20	mg/L	2019-11-12	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Iron, dissolved	**0.022**	0.010	mg/L	2019-11-12	
Lead, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Magnesium, dissolved	**15.7**	0.010	mg/L	2019-11-12	
Manganese, dissolved	**0.00521**	0.00020	mg/L	2019-11-12	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2019-11-14	
Molybdenum, dissolved	**0.00067**	0.00010	mg/L	2019-11-12	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2019-11-12	
Potassium, dissolved	**0.49**	0.10	mg/L	2019-11-12	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, dissolved	**2.4**	1.0	mg/L	2019-11-12	
Silver, dissolved	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, dissolved	**2.12**	0.10	mg/L	2019-11-12	
Strontium, dissolved	**0.287**	0.0010	mg/L	2019-11-12	
Sulfur, dissolved	**12.7**	3.0	mg/L	2019-11-12	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
CRUS-20191104 (N001171-01) | Matrix: Water | Sampled: 2019-11-04 10:30, Continued					
Dissolved Metals, Continued					
Titanium, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, dissolved	**0.000963**	0.000020	mg/L	2019-11-12	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
General Parameters					
Alkalinity, Total (as CaCO3)	**122**	1.0	mg/L	2019-11-13	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Bicarbonate (as CaCO3)	**122**	1.0	mg/L	2019-11-13	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Carbon, Dissolved Organic	**0.68**	0.50	mg/L	2019-11-08	
Nitrogen, Total Kjeldahl	**0.100**	0.050	mg/L	2019-11-13	
Solids, Total Dissolved	**178**	15	mg/L	2019-11-09	
Solids, Total Suspended	**3.4**	2.0	mg/L	2019-11-08	
Total Metals					
Aluminum, total	**0.0250**	0.0050	mg/L	2019-11-12	
Antimony, total	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, total	**0.00057**	0.00050	mg/L	2019-11-12	
Barium, total	**0.0455**	0.0050	mg/L	2019-11-12	
Beryllium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, total	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, total	**0.0169**	0.0050	mg/L	2019-11-12	
Cadmium, total	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, total	**35.5**	0.20	mg/L	2019-11-12	
Chromium, total	**0.00074**	0.00050	mg/L	2019-11-12	
Cobalt, total	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, total	**0.00048**	0.00040	mg/L	2019-11-12	
Iron, total	**0.129**	0.010	mg/L	2019-11-12	
Lead, total	**0.00022**	0.00020	mg/L	2019-11-12	
Lithium, total	**0.00213**	0.00010	mg/L	2019-11-12	
Magnesium, total	**16.0**	0.010	mg/L	2019-11-12	
Manganese, total	**0.00872**	0.00020	mg/L	2019-11-12	
Mercury, total	< 0.000010	0.000010	mg/L	2019-11-13	
Molybdenum, total	**0.00073**	0.00010	mg/L	2019-11-12	
Nickel, total	**0.00063**	0.00040	mg/L	2019-11-12	
Phosphorus, total	< 0.050	0.050	mg/L	2019-11-12	
Potassium, total	**0.52**	0.10	mg/L	2019-11-12	
Selenium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, total	**2.6**	1.0	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
CRUS-20191104 (N001171-01) | Matrix: Water | Sampled: 2019-11-04 10:30, Continued					
Total Metals, Continued					
Silver, total	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, total	**2.13**	0.10	mg/L	2019-11-12	
Strontium, total	**0.291**	0.0010	mg/L	2019-11-12	
Sulfur, total	**12.8**	3.0	mg/L	2019-11-12	
Tellurium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, total	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, total	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, total	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, total	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, total	**0.000954**	0.000020	mg/L	2019-11-12	
Vanadium, total	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, total	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, total	< 0.00010	0.00010	mg/L	2019-11-12	
CRDS-20191104 (N001171-02) | Matrix: Water | Sampled: 2019-11-04 09:30					
Anions					
Chloride	**0.85**	0.10	mg/L	2019-11-07	
Fluoride	< 0.10	0.10	mg/L	2019-11-07	
Nitrate (as N)	**0.105**	0.010	mg/L	2019-11-07	
Nitrite (as N)	< 0.010	0.010	mg/L	2019-11-07	
Sulfate	**36.8**	1.0	mg/L	2019-11-07	
Calculated Parameters					
Hardness, Total (as CaCO3)	**150**	0.500	mg/L	N/A	
Nitrogen, Total	**0.0550**	0.0500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.00208**	0.00010	mg/L	2019-11-12	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, dissolved	**0.0446**	0.0050	mg/L	2019-11-12	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, dissolved	**0.0077**	0.0050	mg/L	2019-11-12	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, dissolved	**33.8**	0.20	mg/L	2019-11-12	
Chromium, dissolved	**0.00102**	0.00050	mg/L	2019-11-12	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Iron, dissolved	**0.028**	0.010	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
CRDS-20191104 (N001171-02) | Matrix: Water | Sampled: 2019-11-04 09:30, Continued					
Dissolved Metals, Continued					
Lead, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Magnesium, dissolved	**15.9**	0.010	mg/L	2019-11-12	
Manganese, dissolved	**0.00532**	0.00020	mg/L	2019-11-12	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2019-11-14	
Molybdenum, dissolved	**0.00068**	0.00010	mg/L	2019-11-12	
Nickel, dissolved	**0.00055**	0.00040	mg/L	2019-11-12	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2019-11-12	
Potassium, dissolved	**0.50**	0.10	mg/L	2019-11-12	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, dissolved	**2.5**	1.0	mg/L	2019-11-12	
Silver, dissolved	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, dissolved	**2.12**	0.10	mg/L	2019-11-12	
Strontium, dissolved	**0.291**	0.0010	mg/L	2019-11-12	
Sulfur, dissolved	**12.9**	3.0	mg/L	2019-11-12	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, dissolved	**0.000979**	0.000020	mg/L	2019-11-12	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
General Parameters					
Alkalinity, Total (as CaCO3)	**122**	1.0	mg/L	2019-11-13	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Bicarbonate (as CaCO3)	**122**	1.0	mg/L	2019-11-13	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Carbon, Dissolved Organic	**0.61**	0.50	mg/L	2019-11-08	
Nitrogen, Total Kjeldahl	**0.055**	0.050	mg/L	2019-11-13	
Solids, Total Dissolved	**170**	15	mg/L	2019-11-09	
Solids, Total Suspended	**3.4**	2.0	mg/L	2019-11-08	
Total Metals					
Aluminum, total	**0.0323**	0.0050	mg/L	2019-11-12	
Antimony, total	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, total	**0.00061**	0.00050	mg/L	2019-11-12	
Barium, total	**0.0465**	0.0050	mg/L	2019-11-12	
Beryllium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, total	< 0.00010	0.00010	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
CRDS-20191104 (N001171-02) | Matrix: Water | Sampled: 2019-11-04 09:30, Continued					
Total Metals, Continued					
Boron, total	**0.0131**	0.0050	mg/L	2019-11-12	
Cadmium, total	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, total	**36.1**	0.20	mg/L	2019-11-12	
Chromium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, total	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, total	**0.00110**	0.00040	mg/L	2019-11-12	
Iron, total	**0.158**	0.010	mg/L	2019-11-12	
Lead, total	**0.00030**	0.00020	mg/L	2019-11-12	
Lithium, total	**0.00225**	0.00010	mg/L	2019-11-12	
Magnesium, total	**16.4**	0.010	mg/L	2019-11-12	
Manganese, total	**0.00945**	0.00020	mg/L	2019-11-12	
Mercury, total	< 0.000010	0.000010	mg/L	2019-11-13	
Molybdenum, total	**0.00069**	0.00010	mg/L	2019-11-12	
Nickel, total	< 0.00040	0.00040	mg/L	2019-11-12	
Phosphorus, total	< 0.050	0.050	mg/L	2019-11-12	
Potassium, total	**0.54**	0.10	mg/L	2019-11-12	
Selenium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, total	**2.6**	1.0	mg/L	2019-11-12	
Silver, total	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, total	**2.18**	0.10	mg/L	2019-11-12	
Strontium, total	**0.293**	0.0010	mg/L	2019-11-12	
Sulfur, total	**12.7**	3.0	mg/L	2019-11-12	
Tellurium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, total	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, total	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, total	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, total	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, total	**0.000991**	0.000020	mg/L	2019-11-12	
Vanadium, total	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, total	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, total	< 0.00010	0.00010	mg/L	2019-11-12	
SWMP-20191104 (N001171-03) | Matrix: Water | Sampled: 2019-11-04 13:15					
Anions					
Chloride	**8.38**	0.10	mg/L	2019-11-07	
Fluoride	< 0.10	0.10	mg/L	2019-11-07	
Nitrate (as N)	**0.016**	0.010	mg/L	2019-11-07	
Nitrite (as N)	< 0.010	0.010	mg/L	2019-11-07	
Sulfate	**21.1**	1.0	mg/L	2019-11-07	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO SNC-Lavalin Inc. (Nelson)
PROJECT 666768

WORK ORDER N001171
REPORTED 2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
SWMP-20191104 (N001171-03) | Matrix: Water | Sampled: 2019-11-04 13:15, Continued					
Calculated Parameters					
Hardness, Total (as CaCO3)	**115**	0.500	mg/L	N/A	
Nitrogen, Total	**0.0640**	0.0500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.00075**	0.00010	mg/L	2019-11-12	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, dissolved	**0.0625**	0.0050	mg/L	2019-11-12	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, dissolved	**28.6**	0.20	mg/L	2019-11-12	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Iron, dissolved	**0.050**	0.010	mg/L	2019-11-12	
Lead, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Magnesium, dissolved	**10.5**	0.010	mg/L	2019-11-12	
Manganese, dissolved	**0.00854**	0.00020	mg/L	2019-11-12	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2019-11-14	
Molybdenum, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2019-11-12	
Potassium, dissolved	**0.55**	0.10	mg/L	2019-11-12	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, dissolved	**5.1**	1.0	mg/L	2019-11-12	
Silver, dissolved	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, dissolved	**8.06**	0.10	mg/L	2019-11-12	
Strontium, dissolved	**0.229**	0.0010	mg/L	2019-11-12	
Sulfur, dissolved	**7.2**	3.0	mg/L	2019-11-12	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, dissolved	**0.000209**	0.000020	mg/L	2019-11-12	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
SWMP-20191104 (N001171-03) | Matrix: Water | Sampled: 2019-11-04 13:15, Continued					
General Parameters					
Alkalinity, Total (as CaCO3)	**99.3**	1.0	mg/L	2019-11-13	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Bicarbonate (as CaCO3)	**99.3**	1.0	mg/L	2019-11-13	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Carbon, Dissolved Organic	**2.27**	0.50	mg/L	2019-11-08	
Nitrogen, Total Kjeldahl	**0.064**	0.050	mg/L	2019-11-13	
Solids, Total Dissolved	**149**	15	mg/L	2019-11-09	
Solids, Total Suspended	**4.2**	2.0	mg/L	2019-11-08	
Total Metals					
Aluminum, total	**0.0075**	0.0050	mg/L	2019-11-12	
Antimony, total	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, total	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, total	**0.0612**	0.0050	mg/L	2019-11-12	
Beryllium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, total	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, total	**0.0088**	0.0050	mg/L	2019-11-12	
Cadmium, total	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, total	**28.7**	0.20	mg/L	2019-11-12	
Chromium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, total	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, total	**0.00075**	0.00040	mg/L	2019-11-12	
Iron, total	**0.109**	0.010	mg/L	2019-11-12	
Lead, total	< 0.00020	0.00020	mg/L	2019-11-12	
Lithium, total	**0.00077**	0.00010	mg/L	2019-11-12	
Magnesium, total	**9.87**	0.010	mg/L	2019-11-12	
Manganese, total	**0.00844**	0.00020	mg/L	2019-11-12	
Mercury, total	< 0.000010	0.000010	mg/L	2019-11-13	
Molybdenum, total	< 0.00010	0.00010	mg/L	2019-11-12	
Nickel, total	**0.00043**	0.00040	mg/L	2019-11-12	
Phosphorus, total	< 0.050	0.050	mg/L	2019-11-12	
Potassium, total	**0.55**	0.10	mg/L	2019-11-12	
Selenium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, total	**4.9**	1.0	mg/L	2019-11-12	
Silver, total	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, total	**8.07**	0.10	mg/L	2019-11-12	
Strontium, total	**0.220**	0.0010	mg/L	2019-11-12	
Sulfur, total	**7.4**	3.0	mg/L	2019-11-12	
Tellurium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, total	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, total	< 0.00020	0.00020	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
SWMP-20191104 (N001171-03) | Matrix: Water | Sampled: 2019-11-04 13:15, Continued					
Total Metals, Continued					
Titanium, total	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, total	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, total	**0.000202**	0.000020	mg/L	2019-11-12	
Vanadium, total	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, total	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, total	< 0.00010	0.00010	mg/L	2019-11-12	
SM-DUPA-20191104 (N001171-04) | Matrix: Water | Sampled: 2019-11-04 13:15					
Anions					
Chloride	**7.51**	0.10	mg/L	2019-11-07	
Fluoride	< 0.10	0.10	mg/L	2019-11-07	
Nitrate (as N)	**0.014**	0.010	mg/L	2019-11-07	
Nitrite (as N)	< 0.010	0.010	mg/L	2019-11-07	
Sulfate	**21.4**	1.0	mg/L	2019-11-07	
Calculated Parameters					
Hardness, Total (as CaCO3)	**109**	0.500	mg/L	N/A	
Nitrogen, Total	**0.142**	0.0500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.00068**	0.00010	mg/L	2019-11-12	
Aluminum, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, dissolved	**0.0615**	0.0050	mg/L	2019-11-12	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, dissolved	**27.3**	0.20	mg/L	2019-11-12	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Iron, dissolved	**0.098**	0.010	mg/L	2019-11-12	
Lead, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Magnesium, dissolved	**9.93**	0.010	mg/L	2019-11-12	
Manganese, dissolved	**0.00903**	0.00020	mg/L	2019-11-12	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2019-11-14	
Molybdenum, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2019-11-12	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2019-11-12	
Potassium, dissolved	**0.52**	0.10	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
SM-DUPA-20191104 (N001171-04) | Matrix: Water | Sampled: 2019-11-04 13:15, Continued					
Dissolved Metals, Continued					
Selenium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, dissolved	**5.0**	1.0	mg/L	2019-11-12	
Silver, dissolved	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, dissolved	**6.78**	0.10	mg/L	2019-11-12	
Strontium, dissolved	**0.218**	0.0010	mg/L	2019-11-12	
Sulfur, dissolved	**7.5**	3.0	mg/L	2019-11-12	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, dissolved	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, dissolved	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, dissolved	**0.000197**	0.000020	mg/L	2019-11-12	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, dissolved	< 0.00010	0.00010	mg/L	2019-11-12	
General Parameters					
Alkalinity, Total (as CaCO3)	**95.5**	1.0	mg/L	2019-11-13	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Bicarbonate (as CaCO3)	**95.5**	1.0	mg/L	2019-11-13	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2019-11-13	
Carbon, Dissolved Organic	**2.46**	0.50	mg/L	2019-11-08	
Nitrogen, Total Kjeldahl	**0.142**	0.050	mg/L	2019-11-13	
Solids, Total Dissolved	**143**	15	mg/L	2019-11-09	
Solids, Total Suspended	< 2.0	2.0	mg/L	2019-11-08	
Total Metals					
Aluminum, total	**0.0102**	0.0050	mg/L	2019-11-12	
Antimony, total	< 0.00020	0.00020	mg/L	2019-11-12	
Arsenic, total	< 0.00050	0.00050	mg/L	2019-11-12	
Barium, total	**0.0643**	0.0050	mg/L	2019-11-12	
Beryllium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Bismuth, total	< 0.00010	0.00010	mg/L	2019-11-12	
Boron, total	**0.0072**	0.0050	mg/L	2019-11-12	
Cadmium, total	< 0.000010	0.000010	mg/L	2019-11-12	
Calcium, total	**30.3**	0.20	mg/L	2019-11-12	
Chromium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Cobalt, total	< 0.00010	0.00010	mg/L	2019-11-12	
Copper, total	**0.00066**	0.00040	mg/L	2019-11-12	
Iron, total	**0.134**	0.010	mg/L	2019-11-12	
Lead, total	< 0.00020	0.00020	mg/L	2019-11-12	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Analyzed	Qualifier
SM-DUPA-20191104 (N001171-04) | Matrix: Water | Sampled: 2019-11-04 13:15, Continued					
Total Metals, Continued					
Lithium, total	**0.00082**	0.00010	mg/L	2019-11-12	
Magnesium, total	**10.6**	0.010	mg/L	2019-11-12	
Manganese, total	**0.00904**	0.00020	mg/L	2019-11-12	
Mercury, total	< 0.000010	0.000010	mg/L	2019-11-13	
Molybdenum, total	< 0.00010	0.00010	mg/L	2019-11-12	
Nickel, total	< 0.00040	0.00040	mg/L	2019-11-12	
Phosphorus, total	< 0.050	0.050	mg/L	2019-11-12	
Potassium, total	**0.58**	0.10	mg/L	2019-11-12	
Selenium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Silicon, total	**5.2**	1.0	mg/L	2019-11-12	
Silver, total	< 0.000050	0.000050	mg/L	2019-11-12	
Sodium, total	**8.34**	0.10	mg/L	2019-11-12	
Strontium, total	**0.231**	0.0010	mg/L	2019-11-12	
Sulfur, total	**7.3**	3.0	mg/L	2019-11-12	
Tellurium, total	< 0.00050	0.00050	mg/L	2019-11-12	
Thallium, total	< 0.000020	0.000020	mg/L	2019-11-12	
Thorium, total	< 0.00010	0.00010	mg/L	2019-11-12	
Tin, total	< 0.00020	0.00020	mg/L	2019-11-12	
Titanium, total	< 0.0050	0.0050	mg/L	2019-11-12	
Tungsten, total	< 0.0010	0.0010	mg/L	2019-11-12	
Uranium, total	**0.000240**	0.000020	mg/L	2019-11-12	
Vanadium, total	< 0.0010	0.0010	mg/L	2019-11-12	
Zinc, total	< 0.0040	0.0040	mg/L	2019-11-12	
Zirconium, total	< 0.00010	0.00010	mg/L	2019-11-12	

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analysis Description	Method Ref.	Technique	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2017)	Combustion, Infrared CO2 Detection	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond
Hardness in Water	SM 2340 B (2017)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	Kelowna
Solids, Total Dissolved in Water	SM 2540 C* (2017)	Gravimetry (Dried at 103-105C)	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	Kelowna
Total Metals in Water	EPA 200.2* / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bshaw@caro.ca

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in “batches” and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B9K0914										
Blank (B9K0914-BLK1)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK2)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK3)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK4)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK5)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK6)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B9K0914, Continued										
Blank (B9K0914-BLK6), Continued				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B9K0914-BS1)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.08	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS2)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		102	90-110			
Fluoride	4.06	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.00	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	1.99	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS3)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.01	0.10	mg/L	4.00		100	88-108			
Nitrate (as N)	4.00	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B9K0914-BS4)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.1	0.10	mg/L	16.0		101	90-110			
Fluoride	4.00	0.10	mg/L	4.00		100	88-108			
Nitrate (as N)	3.99	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B9K0914-BS5)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.14	0.10	mg/L	4.00		103	88-108			
Nitrate (as N)	4.11	0.010	mg/L	4.00		103	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS6)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.09	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.08	0.010	mg/L	4.00		102	90-110			
Nitrite (as N)	2.00	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		99	90-110			
Dissolved Metals, Batch B9K1127										
Blank (B9K1127-BLK1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Lithium, dissolved	< 0.00010	0.00010	mg/L							
Aluminum, dissolved	< 0.0050	0.0050	mg/L							
Antimony, dissolved	< 0.00020	0.00020	mg/L							
Arsenic, dissolved	< 0.00050	0.00050	mg/L							
Barium, dissolved	< 0.0050	0.0050	mg/L							
Beryllium, dissolved	< 0.00010	0.00010	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1127, Continued										
Blank (B9K1127-BLK1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0050	0.0050	mg/L							
Cadmium, dissolved	< 0.000010	0.000010	mg/L							
Calcium, dissolved	< 0.20	0.20	mg/L							
Chromium, dissolved	< 0.00050	0.00050	mg/L							
Cobalt, dissolved	< 0.00010	0.00010	mg/L							
Copper, dissolved	< 0.00040	0.00040	mg/L							
Iron, dissolved	< 0.010	0.010	mg/L							
Lead, dissolved	< 0.00020	0.00020	mg/L							
Magnesium, dissolved	< 0.010	0.010	mg/L							
Manganese, dissolved	< 0.00020	0.00020	mg/L							
Molybdenum, dissolved	< 0.00010	0.00010	mg/L							
Nickel, dissolved	< 0.00040	0.00040	mg/L							
Phosphorus, dissolved	< 0.050	0.050	mg/L							
Potassium, dissolved	< 0.10	0.10	mg/L							
Selenium, dissolved	< 0.00050	0.00050	mg/L							
Silicon, dissolved	< 1.0	1.0	mg/L							
Silver, dissolved	< 0.000050	0.000050	mg/L							
Sodium, dissolved	< 0.10	0.10	mg/L							
Strontium, dissolved	< 0.0010	0.0010	mg/L							
Sulfur, dissolved	< 3.0	3.0	mg/L							
Tellurium, dissolved	< 0.00050	0.00050	mg/L							
Thallium, dissolved	< 0.000020	0.000020	mg/L							
Thorium, dissolved	< 0.00010	0.00010	mg/L							
Tin, dissolved	< 0.00020	0.00020	mg/L							
Titanium, dissolved	< 0.0050	0.0050	mg/L							
Tungsten, dissolved	< 0.0010	0.0010	mg/L							
Uranium, dissolved	< 0.000020	0.000020	mg/L							
Vanadium, dissolved	< 0.0010	0.0010	mg/L							
Zinc, dissolved	< 0.0040	0.0040	mg/L							
Zirconium, dissolved	< 0.00010	0.00010	mg/L							
LCS (B9K1127-BS1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Lithium, dissolved	0.0209	0.00010	mg/L	0.0200		104	80-120			
Aluminum, dissolved	0.0218	0.0050	mg/L	0.0199		110	80-120			
Antimony, dissolved	0.0206	0.00020	mg/L	0.0200		103	80-120			
Arsenic, dissolved	0.0204	0.00050	mg/L	0.0200		102	80-120			
Barium, dissolved	0.0205	0.0050	mg/L	0.0198		104	80-120			
Beryllium, dissolved	0.0207	0.00010	mg/L	0.0198		105	80-120			
Bismuth, dissolved	0.0217	0.00010	mg/L	0.0200		109	80-120			
Boron, dissolved	0.0203	0.0050	mg/L	0.0200		101	80-120			
Cadmium, dissolved	0.0210	0.000010	mg/L	0.0199		105	80-120			
Calcium, dissolved	1.91	0.20	mg/L	2.02		94	80-120			
Chromium, dissolved	0.0203	0.00050	mg/L	0.0198		103	80-120			
Cobalt, dissolved	0.0206	0.00010	mg/L	0.0199		103	80-120			
Copper, dissolved	0.0214	0.00040	mg/L	0.0200		107	80-120			
Iron, dissolved	1.95	0.010	mg/L	2.02		97	80-120			
Lead, dissolved	0.0214	0.00020	mg/L	0.0199		107	80-120			
Magnesium, dissolved	2.04	0.010	mg/L	2.02		101	80-120			
Manganese, dissolved	0.0200	0.00020	mg/L	0.0199		101	80-120			
Molybdenum, dissolved	0.0208	0.00010	mg/L	0.0200		104	80-120			
Nickel, dissolved	0.0200	0.00040	mg/L	0.0200		100	80-120			
Phosphorus, dissolved	1.95	0.050	mg/L	2.00		98	80-120			
Potassium, dissolved	1.99	0.10	mg/L	2.02		99	80-120			
Selenium, dissolved	0.0197	0.00050	mg/L	0.0200		98	80-120			
Silicon, dissolved	2.1	1.0	mg/L	2.00		104	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1127, Continued										
LCS (B9K1127-BS1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Silver, dissolved	0.0207	0.000050	mg/L	0.0200		103	80-120			
Sodium, dissolved	2.01	0.10	mg/L	2.02		99	80-120			
Strontium, dissolved	0.0205	0.0010	mg/L	0.0200		103	80-120			
Sulfur, dissolved	4.7	3.0	mg/L	5.00		94	80-120			
Tellurium, dissolved	0.0204	0.00050	mg/L	0.0200		102	80-120			
Thallium, dissolved	0.0215	0.000020	mg/L	0.0199		108	80-120			
Thorium, dissolved	0.0200	0.00010	mg/L	0.0200		100	80-120			
Tin, dissolved	0.0219	0.00020	mg/L	0.0200		110	80-120			
Titanium, dissolved	0.0211	0.0050	mg/L	0.0200		106	80-120			
Tungsten, dissolved	0.0213	0.0010	mg/L	0.0200		106	80-120			
Uranium, dissolved	0.0204	0.000020	mg/L	0.0200		102	80-120			
Vanadium, dissolved	0.0200	0.0010	mg/L	0.0200		100	80-120			
Zinc, dissolved	0.0231	0.0040	mg/L	0.0200		115	80-120			
Zirconium, dissolved	0.0208	0.00010	mg/L	0.0200		104	80-120			
Duplicate (B9K1127-DUP1)			**Source: N001171-04**	Prepared: 2019-11-12, Analyzed: 2019-11-12						
Lithium, dissolved	0.00067	0.00010	mg/L		0.00068			1	14	
Aluminum, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				11	
Antimony, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Arsenic, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				8	
Barium, dissolved	0.0614	0.0050	mg/L		0.0615			< 1	7	
Beryllium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				14	
Bismuth, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Boron, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				13	
Cadmium, dissolved	< 0.000010	0.000010	mg/L		< 0.000010				20	
Calcium, dissolved	26.8	0.20	mg/L		27.3			2	8	
Chromium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				14	
Cobalt, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				10	
Copper, dissolved	0.00046	0.00040	mg/L		< 0.00040				20	
Iron, dissolved	0.100	0.010	mg/L		0.098			1	14	
Lead, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Magnesium, dissolved	9.92	0.010	mg/L		9.93			< 1	6	
Manganese, dissolved	0.00909	0.00020	mg/L		0.00903			< 1	9	
Molybdenum, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				19	
Nickel, dissolved	< 0.00040	0.00040	mg/L		< 0.00040				20	
Phosphorus, dissolved	< 0.050	0.050	mg/L		< 0.050				14	
Potassium, dissolved	0.52	0.10	mg/L		0.52			< 1	8	
Selenium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Silicon, dissolved	5.0	1.0	mg/L		5.0			< 1	12	
Silver, dissolved	< 0.000050	0.000050	mg/L		< 0.000050				20	
Sodium, dissolved	6.72	0.10	mg/L		6.78			< 1	6	
Strontium, dissolved	0.219	0.0010	mg/L		0.218			< 1	6	
Sulfur, dissolved	7.3	3.0	mg/L		7.5				20	
Tellurium, dissolved	< 0.00050	0.00050	mg/L		< 0.00050				20	
Thallium, dissolved	< 0.000020	0.000020	mg/L		< 0.000020				13	
Thorium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Tin, dissolved	< 0.00020	0.00020	mg/L		< 0.00020				20	
Titanium, dissolved	< 0.0050	0.0050	mg/L		< 0.0050				20	
Tungsten, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Uranium, dissolved	0.000206	0.000020	mg/L		0.000197			5	14	
Vanadium, dissolved	< 0.0010	0.0010	mg/L		< 0.0010				20	
Zinc, dissolved	< 0.0040	0.0040	mg/L		< 0.0040				11	
Zirconium, dissolved	< 0.00010	0.00010	mg/L		< 0.00010				20	
Reference (B9K1127-SRM1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Lithium, dissolved	0.107	0.00010	mg/L	0.100		107	77-127			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1127, Continued										
Reference (B9K1127-SRM1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Aluminum, dissolved	0.226	0.0050	mg/L	0.235		96	79-114			
Antimony, dissolved	0.0480	0.00020	mg/L	0.0431		111	89-123			
Arsenic, dissolved	0.450	0.00050	mg/L	0.423		106	87-113			
Barium, dissolved	3.18	0.0050	mg/L	3.30		96	85-114			
Beryllium, dissolved	0.215	0.00010	mg/L	0.209		103	79-122			
Boron, dissolved	1.66	0.0050	mg/L	1.65		101	79-117			
Cadmium, dissolved	0.232	0.000010	mg/L	0.221		105	89-112			
Calcium, dissolved	7.40	0.20	mg/L	7.72		96	85-120			
Chromium, dissolved	0.450	0.00050	mg/L	0.434		104	87-113			
Cobalt, dissolved	0.133	0.00010	mg/L	0.124		107	90-117			
Copper, dissolved	0.864	0.00040	mg/L	0.815		106	90-115			
Iron, dissolved	1.26	0.010	mg/L	1.27		99	86-112			
Lead, dissolved	0.116	0.00020	mg/L	0.110		105	90-113			
Magnesium, dissolved	6.69	0.010	mg/L	6.59		102	84-116			
Manganese, dissolved	0.343	0.00020	mg/L	0.342		100	85-113			
Molybdenum, dissolved	0.443	0.00010	mg/L	0.404		110	87-112			
Nickel, dissolved	0.837	0.00040	mg/L	0.835		100	90-114			
Phosphorus, dissolved	0.466	0.050	mg/L	0.499		93	74-119			
Potassium, dissolved	2.99	0.10	mg/L	2.88		104	78-119			
Selenium, dissolved	0.0321	0.00050	mg/L	0.0324		99	89-123			
Sodium, dissolved	18.1	0.10	mg/L	18.0		101	81-117			
Strontium, dissolved	0.949	0.0010	mg/L	0.935		101	82-111			
Thallium, dissolved	0.0414	0.000020	mg/L	0.0385		107	90-113			
Uranium, dissolved	0.256	0.000020	mg/L	0.258		99	87-113			
Vanadium, dissolved	0.867	0.0010	mg/L	0.873		99	85-110			
Zinc, dissolved	0.902	0.0040	mg/L	0.848		106	88-114			
Dissolved Metals, Batch B9K1450										
Blank (B9K1450-BLK1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B9K1450-BLK2)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Reference (B9K1450-SRM1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Mercury, dissolved	0.00470	0.000010	mg/L	0.00489		96	80-120			
Reference (B9K1450-SRM2)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Mercury, dissolved	0.00481	0.000010	mg/L	0.00489		98	80-120			
General Parameters, Batch B9K0795										
Blank (B9K0795-BLK1)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
Blank (B9K0795-BLK2)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
Blank (B9K0795-BLK3)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
Blank (B9K0795-BLK4)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B9K0795, Continued										
LCS (B9K0795-BS1)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	10.4	0.50	mg/L	10.0		104	78-116			
LCS (B9K0795-BS2)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	10.3	0.50	mg/L	10.0		103	78-116			
LCS (B9K0795-BS3)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	10.1	0.50	mg/L	10.0		101	78-116			
LCS (B9K0795-BS4)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Carbon, Dissolved Organic	9.99	0.50	mg/L	10.0		100	78-116			
General Parameters, Batch B9K0985										
Blank (B9K0985-BLK1)				Prepared: 2019-11-09, Analyzed: 2019-11-09						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B9K0985-BS1)				Prepared: 2019-11-09, Analyzed: 2019-11-09						
Solids, Total Dissolved	241	15	mg/L	240		100	85-115			
General Parameters, Batch B9K1067										
Blank (B9K1067-BLK1)				Prepared: 2019-11-11, Analyzed: 2019-11-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B9K1067-BLK2)				Prepared: 2019-11-11, Analyzed: 2019-11-13						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B9K1067-BS1)				Prepared: 2019-11-11, Analyzed: 2019-11-13						
Nitrogen, Total Kjeldahl	1.09	0.050	mg/L	1.00		109	85-115			
LCS (B9K1067-BS2)				Prepared: 2019-11-11, Analyzed: 2019-11-13						
Nitrogen, Total Kjeldahl	1.08	0.050	mg/L	1.00		108	85-115			
General Parameters, Batch B9K1236										
Blank (B9K1236-BLK1)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Solids, Total Suspended	< 1.0	1.0	mg/L							
Blank (B9K1236-BLK2)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Solids, Total Suspended	< 1.0	1.0	mg/L							
LCS (B9K1236-BS1)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Solids, Total Suspended	102	10.0	mg/L	100		102	85-115			
LCS (B9K1236-BS2)				Prepared: 2019-11-08, Analyzed: 2019-11-08						
Solids, Total Suspended	106	10.0	mg/L	100		106	85-115			
General Parameters, Batch B9K1326										
Blank (B9K1326-BLK1)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B9K1326, Continued										
Blank (B9K1326-BLK2)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B9K1326-BLK3)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B9K1326-BS1)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	94.5	1.0	mg/L	100		94	80-120			
LCS (B9K1326-BS2)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	96.3	1.0	mg/L	100		96	80-120			
LCS (B9K1326-BS3)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Alkalinity, Total (as CaCO3)	96.7	1.0	mg/L	100		97	80-120			
Total Metals, Batch B9K1131										
Blank (B9K1131-BLK1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Beryllium, total	< 0.00010	0.00010	mg/L							
Bismuth, total	< 0.00010	0.00010	mg/L							
Boron, total	< 0.0050	0.0050	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Lithium, total	< 0.00010	0.00010	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Phosphorus, total	< 0.050	0.050	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Silicon, total	< 1.0	1.0	mg/L							
Silver, total	< 0.000050	0.000050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Sulfur, total	< 3.0	3.0	mg/L							
Tellurium, total	< 0.00050	0.00050	mg/L							
Thallium, total	< 0.000020	0.000020	mg/L							
Thorium, total	< 0.00010	0.00010	mg/L							
Tin, total	< 0.00020	0.00020	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9K1131, Continued										
Blank (B9K1131-BLK1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Titanium, total	< 0.0050	0.0050	mg/L							
Tungsten, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Vanadium, total	< 0.0010	0.0010	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
Zirconium, total	< 0.00010	0.00010	mg/L							
Blank (B9K1131-BLK3)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Beryllium, total	< 0.00010	0.00010	mg/L							
Bismuth, total	< 0.00010	0.00010	mg/L							
Boron, total	< 0.0050	0.0050	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Lithium, total	< 0.00010	0.00010	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Phosphorus, total	< 0.050	0.050	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Silicon, total	< 1.0	1.0	mg/L							
Silver, total	< 0.000050	0.000050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Sulfur, total	< 3.0	3.0	mg/L							
Tellurium, total	< 0.00050	0.00050	mg/L							
Thallium, total	< 0.000020	0.000020	mg/L							
Thorium, total	< 0.00010	0.00010	mg/L							
Tin, total	< 0.00020	0.00020	mg/L							
Titanium, total	< 0.0050	0.0050	mg/L							
Tungsten, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Vanadium, total	< 0.0010	0.0010	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
Zirconium, total	< 0.00010	0.00010	mg/L							
LCS (B9K1131-BS1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Aluminum, total	0.0226	0.0050	mg/L	0.0199		114	80-120			
Antimony, total	0.0208	0.00020	mg/L	0.0200		104	80-120			
Arsenic, total	0.0209	0.00050	mg/L	0.0200		104	80-120			
Barium, total	0.0207	0.0050	mg/L	0.0198		104	80-120			
Beryllium, total	0.0205	0.00010	mg/L	0.0198		103	80-120			
Bismuth, total	0.0206	0.00010	mg/L	0.0200		103	80-120			
Boron, total	0.0218	0.0050	mg/L	0.0200		109	80-120			
Cadmium, total	0.0211	0.000010	mg/L	0.0199		106	80-120			
Calcium, total	2.09	0.20	mg/L	2.02		104	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9K1131, Continued										
LCS (B9K1131-BS1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Chromium, total	0.0211	0.00050	mg/L	0.0198		107	80-120			
Cobalt, total	0.0214	0.00010	mg/L	0.0199		108	80-120			
Copper, total	0.0225	0.00040	mg/L	0.0200		112	80-120			
Iron, total	2.01	0.010	mg/L	2.02		100	80-120			
Lead, total	0.0204	0.00020	mg/L	0.0199		103	80-120			
Lithium, total	0.0210	0.00010	mg/L	0.0200		105	80-120			
Magnesium, total	2.08	0.010	mg/L	2.02		103	80-120			
Manganese, total	0.0209	0.00020	mg/L	0.0199		105	80-120			
Molybdenum, total	0.0207	0.00010	mg/L	0.0200		104	80-120			
Nickel, total	0.0219	0.00040	mg/L	0.0200		110	80-120			
Phosphorus, total	2.06	0.050	mg/L	2.00		103	80-120			
Potassium, total	2.09	0.10	mg/L	2.02		103	80-120			
Selenium, total	0.0211	0.00050	mg/L	0.0200		105	80-120			
Silicon, total	2.3	1.0	mg/L	2.00		114	80-120			
Silver, total	0.0212	0.000050	mg/L	0.0200		106	80-120			
Sodium, total	2.05	0.10	mg/L	2.02		102	80-120			
Strontium, total	0.0207	0.0010	mg/L	0.0200		103	80-120			
Sulfur, total	4.6	3.0	mg/L	5.00		93	80-120			
Tellurium, total	0.0198	0.00050	mg/L	0.0200		99	80-120			
Thallium, total	0.0204	0.000020	mg/L	0.0199		103	80-120			
Thorium, total	0.0197	0.00010	mg/L	0.0200		99	80-120			
Tin, total	0.0211	0.00020	mg/L	0.0200		105	80-120			
Titanium, total	0.0205	0.0050	mg/L	0.0200		102	80-120			
Tungsten, total	0.0212	0.0010	mg/L	0.0200		106	80-120			
Uranium, total	0.0201	0.000020	mg/L	0.0200		100	80-120			
Vanadium, total	0.0214	0.0010	mg/L	0.0200		107	80-120			
Zinc, total	0.0224	0.0040	mg/L	0.0200		112	80-120			
Zirconium, total	0.0204	0.00010	mg/L	0.0200		102	80-120			
Reference (B9K1131-SRM1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Aluminum, total	0.281	0.0050	mg/L	0.303		93	82-114			
Antimony, total	0.0498	0.00020	mg/L	0.0511		97	88-115			
Arsenic, total	0.117	0.00050	mg/L	0.118		99	88-111			
Barium, total	0.764	0.0050	mg/L	0.823		93	83-110			
Beryllium, total	0.0471	0.00010	mg/L	0.0496		95	80-119			
Boron, total	3.27	0.0050	mg/L	3.45		95	80-118			
Cadmium, total	0.0479	0.000010	mg/L	0.0495		97	90-110			
Calcium, total	10.7	0.20	mg/L	11.6		93	85-113			
Chromium, total	0.250	0.00050	mg/L	0.250		100	88-111			
Cobalt, total	0.0392	0.00010	mg/L	0.0377		104	90-114			
Copper, total	0.512	0.00040	mg/L	0.486		105	90-117			
Iron, total	0.476	0.010	mg/L	0.488		98	90-116			
Lead, total	0.193	0.00020	mg/L	0.204		95	90-110			
Lithium, total	0.390	0.00010	mg/L	0.403		97	79-118			
Magnesium, total	3.62	0.010	mg/L	3.79		96	88-116			
Manganese, total	0.105	0.00020	mg/L	0.109		96	88-108			
Molybdenum, total	0.194	0.00010	mg/L	0.198		98	88-110			
Nickel, total	0.251	0.00040	mg/L	0.249		101	90-112			
Phosphorus, total	0.209	0.050	mg/L	0.227		92	72-118			
Potassium, total	6.97	0.10	mg/L	7.21		97	87-116			
Selenium, total	0.119	0.00050	mg/L	0.121		98	90-122			
Sodium, total	7.09	0.10	mg/L	7.54		94	86-118			
Strontium, total	0.372	0.0010	mg/L	0.375		99	86-110			
Thallium, total	0.0782	0.000020	mg/L	0.0805		97	90-113			
Uranium, total	0.0288	0.000020	mg/L	0.0306		94	88-112			
Vanadium, total	0.384	0.0010	mg/L	0.386		99	87-110			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001171
PROJECT	666768	**REPORTED**	2019-11-28 15:46

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9K1131, Continued										
Reference (B9K1131-SRM1), Continued				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Zinc, total	2.51	0.0040	mg/L	2.49		101	90-113			
Total Metals, Batch B9K1327										
Blank (B9K1327-BLK1)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B9K1327-BLK2)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Mercury, total	< 0.000010	0.000010	mg/L							
Matrix Spike (B9K1327-MS2)			**Source: N001171-01**	Prepared: 2019-11-13, Analyzed: 2019-11-13						
Mercury, total	0.000281	0.000010	mg/L	0.000250	< 0.000010	112	70-130			
Reference (B9K1327-SRM1)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Mercury, total	0.00579	0.000010	mg/L	0.00489		118	80-120			
Reference (B9K1327-SRM2)				Prepared: 2019-11-13, Analyzed: 2019-11-13						
Mercury, total	0.00533	0.000010	mg/L	0.00489		109	80-120			

CERTIFICATE OF ANALYSIS

REPORTED TO	SNC-Lavalin Inc. (Nelson) #3-520 Lake Street Nelson, BC V1L 4C6		
ATTENTION	Randy Williams	**WORK ORDER**	N001350
PO NUMBER	666768	**RECEIVED / TEMP**	2019-11-08 09:20 / 2°C
PROJECT	666768	**REPORTED**	2019-11-28 15:49
PROJECT INFO	Selkirk Mountain Hwy	**COC NUMBER**	B48483

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO 17025:2005 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

Work Order Comments: Custody Seals Intact: YES

If you have any questions or concerns, please contact me at bshaw@caro.ca

Authorized By:

Bryan Shaw, Ph.D., P.Chem.
Client Service Coordinator

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Analyzed	Qualifier
GULY-20191107 (N001350-01) | Matrix: Water | Sampled: 2019-11-07 13:00					
Anions					
Chloride	**0.20**	0.10	mg/L	2019-11-08	
Fluoride	< 0.10	0.10	mg/L	2019-11-08	
Nitrate (as N)	**0.036**	0.010	mg/L	2019-11-08	
Nitrite (as N)	< 0.010	0.010	mg/L	2019-11-08	
Sulfate	**10.3**	1.0	mg/L	2019-11-08	
Calculated Parameters					
Hardness, Total (as CaCO3)	**54.9**	0.500	mg/L	N/A	
Nitrogen, Total	< 0.0500	0.0500	mg/L	N/A	
Dissolved Metals					
Lithium, dissolved	**0.00651**	0.00010	mg/L	2019-11-18	
Aluminum, dissolved	**0.0091**	0.0050	mg/L	2019-11-18	
Antimony, dissolved	< 0.00020	0.00020	mg/L	2019-11-18	
Arsenic, dissolved	< 0.00050	0.00050	mg/L	2019-11-18	
Barium, dissolved	**0.128**	0.0050	mg/L	2019-11-18	
Beryllium, dissolved	< 0.00010	0.00010	mg/L	2019-11-18	
Bismuth, dissolved	< 0.00010	0.00010	mg/L	2019-11-18	
Boron, dissolved	**0.0140**	0.0050	mg/L	2019-11-18	
Cadmium, dissolved	< 0.000010	0.000010	mg/L	2019-11-18	
Calcium, dissolved	**11.4**	0.20	mg/L	2019-11-18	
Chromium, dissolved	< 0.00050	0.00050	mg/L	2019-11-18	
Cobalt, dissolved	< 0.00010	0.00010	mg/L	2019-11-18	
Copper, dissolved	< 0.00040	0.00040	mg/L	2019-11-18	
Iron, dissolved	**0.011**	0.010	mg/L	2019-11-18	
Lead, dissolved	< 0.00020	0.00020	mg/L	2019-11-18	
Magnesium, dissolved	**6.40**	0.010	mg/L	2019-11-18	
Manganese, dissolved	**0.00952**	0.00020	mg/L	2019-11-18	
Mercury, dissolved	< 0.000010	0.000010	mg/L	2019-11-19	
Molybdenum, dissolved	< 0.00010	0.00010	mg/L	2019-11-18	
Nickel, dissolved	< 0.00040	0.00040	mg/L	2019-11-18	
Phosphorus, dissolved	< 0.050	0.050	mg/L	2019-11-18	
Potassium, dissolved	**0.95**	0.10	mg/L	2019-11-18	
Selenium, dissolved	< 0.00050	0.00050	mg/L	2019-11-18	
Silicon, dissolved	**4.3**	1.0	mg/L	2019-11-18	
Silver, dissolved	< 0.000050	0.000050	mg/L	2019-11-18	
Sodium, dissolved	**2.24**	0.10	mg/L	2019-11-18	
Strontium, dissolved	**0.281**	0.0010	mg/L	2019-11-18	
Sulfur, dissolved	**3.3**	3.0	mg/L	2019-11-18	
Tellurium, dissolved	< 0.00050	0.00050	mg/L	2019-11-18	
Thallium, dissolved	< 0.000020	0.000020	mg/L	2019-11-18	
Thorium, dissolved	< 0.00010	0.00010	mg/L	2019-11-18	
Tin, dissolved	< 0.00020	0.00020	mg/L	2019-11-18	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Analyzed	Qualifier
GULY-20191107 (N001350-01) | Matrix: Water | Sampled: 2019-11-07 13:00, Continued					
Dissolved Metals, Continued					
Titanium, dissolved	< 0.0050	0.0050	mg/L	2019-11-18	
Tungsten, dissolved	< 0.0010	0.0010	mg/L	2019-11-18	
Uranium, dissolved	**0.000052**	0.000020	mg/L	2019-11-18	
Vanadium, dissolved	< 0.0010	0.0010	mg/L	2019-11-18	
Zinc, dissolved	< 0.0040	0.0040	mg/L	2019-11-18	
Zirconium, dissolved	**0.00015**	0.00010	mg/L	2019-11-18	
General Parameters					
Alkalinity, Total (as CaCO3)	**55.6**	1.0	mg/L	2019-11-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L	2019-11-15	
Alkalinity, Bicarbonate (as CaCO3)	**55.6**	1.0	mg/L	2019-11-15	
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L	2019-11-15	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L	2019-11-15	
Carbon, Dissolved Organic	**1.64**	0.50	mg/L	2019-11-12	
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L	2019-11-14	
pH	**7.50**	0.10	pH units	2019-11-15	HT2
Solids, Total Dissolved	**75**	15	mg/L	2019-11-14	*
Solids, Total Suspended	< 2.0	2.0	mg/L	2019-11-14	
Total Metals					
Aluminum, total	**0.0150**	0.0050	mg/L	2019-11-18	
Antimony, total	< 0.00020	0.00020	mg/L	2019-11-18	
Arsenic, total	< 0.00050	0.00050	mg/L	2019-11-18	
Barium, total	**0.136**	0.0050	mg/L	2019-11-18	
Beryllium, total	< 0.00010	0.00010	mg/L	2019-11-18	
Bismuth, total	< 0.00010	0.00010	mg/L	2019-11-18	
Boron, total	**0.0166**	0.0050	mg/L	2019-11-18	
Cadmium, total	< 0.000010	0.000010	mg/L	2019-11-18	
Calcium, total	**12.3**	0.20	mg/L	2019-11-18	
Chromium, total	< 0.00050	0.00050	mg/L	2019-11-18	
Cobalt, total	< 0.00010	0.00010	mg/L	2019-11-18	
Copper, total	**0.00079**	0.00040	mg/L	2019-11-18	
Iron, total	**0.020**	0.010	mg/L	2019-11-18	
Lead, total	< 0.00020	0.00020	mg/L	2019-11-18	
Lithium, total	**0.00688**	0.00010	mg/L	2019-11-18	
Magnesium, total	**6.88**	0.010	mg/L	2019-11-18	
Manganese, total	**0.0115**	0.00020	mg/L	2019-11-18	
Mercury, total	< 0.000010	0.000010	mg/L	2019-11-18	
Molybdenum, total	< 0.00010	0.00010	mg/L	2019-11-18	
Nickel, total	< 0.00040	0.00040	mg/L	2019-11-18	
Phosphorus, total	< 0.050	0.050	mg/L	2019-11-18	
Potassium, total	**1.02**	0.10	mg/L	2019-11-18	
Selenium, total	< 0.00050	0.00050	mg/L	2019-11-18	

TEST RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Analyzed	Qualifier
GULY-20191107 (N001350-01) | Matrix: Water | Sampled: 2019-11-07 13:00, Continued					
Total Metals, Continued					
Silicon, total	**4.8**	1.0	mg/L	2019-11-18	
Silver, total	< 0.000050	0.000050	mg/L	2019-11-18	
Sodium, total	**2.44**	0.10	mg/L	2019-11-18	
Strontium, total	**0.298**	0.0010	mg/L	2019-11-18	
Sulfur, total	**3.3**	3.0	mg/L	2019-11-18	
Tellurium, total	< 0.00050	0.00050	mg/L	2019-11-18	
Thallium, total	< 0.000020	0.000020	mg/L	2019-11-18	
Thorium, total	< 0.00010	0.00010	mg/L	2019-11-18	
Tin, total	< 0.00020	0.00020	mg/L	2019-11-18	
Titanium, total	< 0.0050	0.0050	mg/L	2019-11-18	
Tungsten, total	< 0.0010	0.0010	mg/L	2019-11-18	
Uranium, total	**0.000060**	0.000020	mg/L	2019-11-18	
Vanadium, total	< 0.0010	0.0010	mg/L	2019-11-18	
Zinc, total	< 0.0040	0.0040	mg/L	2019-11-18	
Zirconium, total	< 0.00010	0.00010	mg/L	2019-11-18	

Sample Qualifiers:

*	See Notes
HT2	The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analysis Description	Method Ref.	Technique	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2017)	Combustion, Infrared CO2 Detection	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond
Hardness in Water	SM 2340 B (2017)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2017)	Block Digestion and Flow Injection Analysis	Kelowna
pH in Water	SM 4500-H+ B (2017)	Electrometry	Kelowna
Solids, Total Dissolved in Water	SM 2540 C* (2017)	Gravimetry (Dried at 103-105C)	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2017)	Gravimetry (Dried at 103-105C)	Kelowna
Total Metals in Water	EPA 200.2* / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
mg/L	Milligrams per litre
pH units	pH < 7 = acidic, ph > 7 = basic
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:bshaw@caro.ca

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in “batches” and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B9K0914										
Blank (B9K0914-BLK1)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK2)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK3)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK4)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK5)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B9K0914-BLK6)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	< 0.10	0.10	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B9K0914, Continued										
Blank (B9K0914-BLK6), Continued				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B9K0914-BS1)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.08	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS2)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		102	90-110			
Fluoride	4.06	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.00	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	1.99	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS3)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.01	0.10	mg/L	4.00		100	88-108			
Nitrate (as N)	4.00	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B9K0914-BS4)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.1	0.10	mg/L	16.0		101	90-110			
Fluoride	4.00	0.10	mg/L	4.00		100	88-108			
Nitrate (as N)	3.99	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B9K0914-BS5)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.14	0.10	mg/L	4.00		103	88-108			
Nitrate (as N)	4.11	0.010	mg/L	4.00		103	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B9K0914-BS6)				Prepared: 2019-11-07, Analyzed: 2019-11-07						
Chloride	16.2	0.10	mg/L	16.0		101	90-110			
Fluoride	4.09	0.10	mg/L	4.00		102	88-108			
Nitrate (as N)	4.08	0.010	mg/L	4.00		102	90-110			
Nitrite (as N)	2.00	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		99	90-110			
Dissolved Metals, Batch B9K1679										
Blank (B9K1679-BLK1)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Lithium, dissolved	< 0.00010	0.00010	mg/L							
Aluminum, dissolved	< 0.0050	0.0050	mg/L							
Antimony, dissolved	< 0.00020	0.00020	mg/L							
Arsenic, dissolved	< 0.00050	0.00050	mg/L							
Barium, dissolved	< 0.0050	0.0050	mg/L							
Beryllium, dissolved	< 0.00010	0.00010	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1679, Continued										
Blank (B9K1679-BLK1), Continued				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Bismuth, dissolved	< 0.00010	0.00010	mg/L							
Boron, dissolved	< 0.0050	0.0050	mg/L							
Cadmium, dissolved	< 0.000010	0.000010	mg/L							
Calcium, dissolved	< 0.20	0.20	mg/L							
Chromium, dissolved	< 0.00050	0.00050	mg/L							
Cobalt, dissolved	< 0.00010	0.00010	mg/L							
Copper, dissolved	< 0.00040	0.00040	mg/L							
Iron, dissolved	< 0.010	0.010	mg/L							
Lead, dissolved	< 0.00020	0.00020	mg/L							
Magnesium, dissolved	< 0.010	0.010	mg/L							
Manganese, dissolved	< 0.00020	0.00020	mg/L							
Molybdenum, dissolved	< 0.00010	0.00010	mg/L							
Nickel, dissolved	< 0.00040	0.00040	mg/L							
Phosphorus, dissolved	< 0.050	0.050	mg/L							
Potassium, dissolved	< 0.10	0.10	mg/L							
Selenium, dissolved	< 0.00050	0.00050	mg/L							
Silicon, dissolved	< 1.0	1.0	mg/L							
Silver, dissolved	< 0.000050	0.000050	mg/L							
Sodium, dissolved	< 0.10	0.10	mg/L							
Strontium, dissolved	< 0.0010	0.0010	mg/L							
Sulfur, dissolved	< 3.0	3.0	mg/L							
Tellurium, dissolved	< 0.00050	0.00050	mg/L							
Thallium, dissolved	< 0.000020	0.000020	mg/L							
Thorium, dissolved	< 0.00010	0.00010	mg/L							
Tin, dissolved	< 0.00020	0.00020	mg/L							
Titanium, dissolved	< 0.0050	0.0050	mg/L							
Tungsten, dissolved	< 0.0010	0.0010	mg/L							
Uranium, dissolved	< 0.000020	0.000020	mg/L							
Vanadium, dissolved	< 0.0010	0.0010	mg/L							
Zinc, dissolved	< 0.0040	0.0040	mg/L							
Zirconium, dissolved	< 0.00010	0.00010	mg/L							
LCS (B9K1679-BS1)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Lithium, dissolved	0.0202	0.00010	mg/L	0.0200		101	80-120			
Aluminum, dissolved	0.0224	0.0050	mg/L	0.0199		112	80-120			
Antimony, dissolved	0.0195	0.00020	mg/L	0.0200		97	80-120			
Arsenic, dissolved	0.0201	0.00050	mg/L	0.0200		100	80-120			
Barium, dissolved	0.0195	0.0050	mg/L	0.0198		99	80-120			
Beryllium, dissolved	0.0206	0.00010	mg/L	0.0198		104	80-120			
Bismuth, dissolved	0.0203	0.00010	mg/L	0.0200		102	80-120			
Boron, dissolved	0.0197	0.0050	mg/L	0.0200		98	80-120			
Cadmium, dissolved	0.0196	0.000010	mg/L	0.0199		98	80-120			
Calcium, dissolved	2.13	0.20	mg/L	2.02		106	80-120			
Chromium, dissolved	0.0194	0.00050	mg/L	0.0198		98	80-120			
Cobalt, dissolved	0.0196	0.00010	mg/L	0.0199		99	80-120			
Copper, dissolved	0.0204	0.00040	mg/L	0.0200		102	80-120			
Iron, dissolved	1.86	0.010	mg/L	2.02		92	80-120			
Lead, dissolved	0.0203	0.00020	mg/L	0.0199		102	80-120			
Magnesium, dissolved	1.86	0.010	mg/L	2.02		92	80-120			
Manganese, dissolved	0.0192	0.00020	mg/L	0.0199		96	80-120			
Molybdenum, dissolved	0.0193	0.00010	mg/L	0.0200		97	80-120			
Nickel, dissolved	0.0201	0.00040	mg/L	0.0200		101	80-120			
Phosphorus, dissolved	1.88	0.050	mg/L	2.00		94	80-120			
Potassium, dissolved	1.80	0.10	mg/L	2.02		89	80-120			
Selenium, dissolved	0.0200	0.00050	mg/L	0.0200		100	80-120			
Silicon, dissolved	1.8	1.0	mg/L	2.00		92	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1679, Continued										
LCS (B9K1679-BS1), Continued				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Silver, dissolved	0.0193	0.000050	mg/L	0.0200		96	80-120			
Sodium, dissolved	1.87	0.10	mg/L	2.02		93	80-120			
Strontium, dissolved	0.0197	0.0010	mg/L	0.0200		98	80-120			
Sulfur, dissolved	4.0	3.0	mg/L	5.00		81	80-120			
Tellurium, dissolved	0.0197	0.00050	mg/L	0.0200		98	80-120			
Thallium, dissolved	0.0203	0.000020	mg/L	0.0199		102	80-120			
Thorium, dissolved	0.0196	0.00010	mg/L	0.0200		98	80-120			
Tin, dissolved	0.0199	0.00020	mg/L	0.0200		99	80-120			
Titanium, dissolved	0.0195	0.0050	mg/L	0.0200		98	80-120			
Tungsten, dissolved	0.0196	0.0010	mg/L	0.0200		98	80-120			
Uranium, dissolved	0.0198	0.000020	mg/L	0.0200		99	80-120			
Vanadium, dissolved	0.0195	0.0010	mg/L	0.0200		98	80-120			
Zinc, dissolved	0.0217	0.0040	mg/L	0.0200		109	80-120			
Zirconium, dissolved	0.0193	0.00010	mg/L	0.0200		97	80-120			
Reference (B9K1679-SRM1)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Lithium, dissolved	0.100	0.00010	mg/L	0.100		100	77-127			
Aluminum, dissolved	0.210	0.0050	mg/L	0.235		89	79-114			
Antimony, dissolved	0.0453	0.00020	mg/L	0.0431		105	89-123			
Arsenic, dissolved	0.435	0.00050	mg/L	0.423		103	87-113			
Barium, dissolved	2.95	0.0050	mg/L	3.30		89	85-114			
Beryllium, dissolved	0.218	0.00010	mg/L	0.209		104	79-122			
Boron, dissolved	1.40	0.0050	mg/L	1.65		85	79-117			
Cadmium, dissolved	0.216	0.000010	mg/L	0.221		98	89-112			
Calcium, dissolved	6.96	0.20	mg/L	7.72		90	85-120			
Chromium, dissolved	0.419	0.00050	mg/L	0.434		96	87-113			
Cobalt, dissolved	0.121	0.00010	mg/L	0.124		98	90-117			
Copper, dissolved	0.811	0.00040	mg/L	0.815		99	90-115			
Iron, dissolved	1.19	0.010	mg/L	1.27		94	86-112			
Lead, dissolved	0.110	0.00020	mg/L	0.110		100	90-113			
Magnesium, dissolved	6.13	0.010	mg/L	6.59		93	84-116			
Manganese, dissolved	0.319	0.00020	mg/L	0.342		93	85-113			
Molybdenum, dissolved	0.398	0.00010	mg/L	0.404		99	87-112			
Nickel, dissolved	0.824	0.00040	mg/L	0.835		99	90-114			
Phosphorus, dissolved	0.476	0.050	mg/L	0.499		95	74-119			
Potassium, dissolved	2.66	0.10	mg/L	2.88		92	78-119			
Selenium, dissolved	0.0336	0.00050	mg/L	0.0324		104	89-123			
Sodium, dissolved	16.4	0.10	mg/L	18.0		91	81-117			
Strontium, dissolved	0.877	0.0010	mg/L	0.935		94	82-111			
Thallium, dissolved	0.0393	0.000020	mg/L	0.0385		102	90-113			
Uranium, dissolved	0.246	0.000020	mg/L	0.258		95	87-113			
Vanadium, dissolved	0.824	0.0010	mg/L	0.873		94	85-110			
Zinc, dissolved	0.883	0.0040	mg/L	0.848		104	88-114			
Dissolved Metals, Batch B9K1873										
Blank (B9K1873-BLK1)				Prepared: 2019-11-18, Analyzed: 2019-11-19						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Blank (B9K1873-BLK2)				Prepared: 2019-11-18, Analyzed: 2019-11-19						
Mercury, dissolved	< 0.000010	0.000010	mg/L							
Reference (B9K1873-SRM1)				Prepared: 2019-11-18, Analyzed: 2019-11-19						
Mercury, dissolved	0.00496	0.000010	mg/L	0.00489		101	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO SNC-Lavalin Inc. (Nelson)
PROJECT 666768

WORK ORDER N001350
REPORTED 2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B9K1873, Continued										
Reference (B9K1873-SRM2)				Prepared: 2019-11-18, Analyzed: 2019-11-19						
Mercury, dissolved	0.00458	0.000010	mg/L	0.00489		94	80-120			
General Parameters, Batch B9K0963										
Blank (B9K0963-BLK1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
Blank (B9K0963-BLK2)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
Blank (B9K0963-BLK3)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	< 0.50	0.50	mg/L							
LCS (B9K0963-BS1)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	10.5	0.50	mg/L	10.0		105	78-116			
LCS (B9K0963-BS2)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	10.3	0.50	mg/L	10.0		103	78-116			
LCS (B9K0963-BS3)				Prepared: 2019-11-12, Analyzed: 2019-11-12						
Carbon, Dissolved Organic	10.1	0.50	mg/L	10.0		101	78-116			
General Parameters, Batch B9K1238										
Blank (B9K1238-BLK1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Suspended	< 2.0	2.0	mg/L							
Blank (B9K1238-BLK2)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Suspended	< 2.0	2.0	mg/L							
LCS (B9K1238-BS1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Suspended	85.0	10.0	mg/L	100		85	85-115			
LCS (B9K1238-BS2)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Suspended	101	10.0	mg/L	100		101	85-115			
General Parameters, Batch B9K1274										
Blank (B9K1274-BLK1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Dissolved	< 15	15	mg/L							
LCS (B9K1274-BS1)				Prepared: 2019-11-14, Analyzed: 2019-11-14						
Solids, Total Dissolved	243	15	mg/L	240		101	85-115			
General Parameters, Batch B9K1313										
Blank (B9K1313-BLK1)				Prepared: 2019-11-13, Analyzed: 2019-11-14						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
Blank (B9K1313-BLK2)				Prepared: 2019-11-13, Analyzed: 2019-11-14						
Nitrogen, Total Kjeldahl	< 0.050	0.050	mg/L							
LCS (B9K1313-BS1)				Prepared: 2019-11-13, Analyzed: 2019-11-14						
Nitrogen, Total Kjeldahl	1.07	0.050	mg/L	1.00		107	85-115			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B9K1313, Continued										
LCS (B9K1313-BS2)				Prepared: 2019-11-13, Analyzed: 2019-11-14						
Nitrogen, Total Kjeldahl	1.02	0.050	mg/L	1.00		102	85-115			
General Parameters, Batch B9K1503										
Blank (B9K1503-BLK1)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B9K1503-BLK2)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Blank (B9K1503-BLK3)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
LCS (B9K1503-BS1)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	98.8	1.0	mg/L	100		99	80-120			
LCS (B9K1503-BS2)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	95.0	1.0	mg/L	100		95	80-120			
LCS (B9K1503-BS3)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
Alkalinity, Total (as CaCO3)	94.9	1.0	mg/L	100		95	80-120			
Reference (B9K1503-SRM1)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
pH	7.01	0.10	pH units	7.01		100	98-102			
Reference (B9K1503-SRM2)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
pH	7.01	0.10	pH units	7.01		100	98-102			
Reference (B9K1503-SRM3)				Prepared: 2019-11-15, Analyzed: 2019-11-15						
pH	6.99	0.10	pH units	7.01		100	98-102			
Total Metals, Batch B9K1678										
Blank (B9K1678-BLK1)				Prepared: 2019-11-16, Analyzed: 2019-11-18						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Beryllium, total	< 0.00010	0.00010	mg/L							
Bismuth, total	< 0.00010	0.00010	mg/L							
Boron, total	< 0.0050	0.0050	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9K1678, Continued										
Blank (B9K1678-BLK1), Continued				Prepared: 2019-11-16, Analyzed: 2019-11-18						
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Lithium, total	< 0.00010	0.00010	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Phosphorus, total	< 0.050	0.050	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Silicon, total	< 1.0	1.0	mg/L							
Silver, total	< 0.000050	0.000050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Sulfur, total	< 3.0	3.0	mg/L							
Tellurium, total	< 0.00050	0.00050	mg/L							
Thallium, total	< 0.000020	0.000020	mg/L							
Thorium, total	< 0.00010	0.00010	mg/L							
Tin, total	< 0.00020	0.00020	mg/L							
Titanium, total	< 0.0050	0.0050	mg/L							
Tungsten, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Vanadium, total	< 0.0010	0.0010	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
Zirconium, total	< 0.00010	0.00010	mg/L							
LCS (B9K1678-BS1)				Prepared: 2019-11-16, Analyzed: 2019-11-18						
Aluminum, total	0.0217	0.0050	mg/L	0.0199		109	80-120			
Antimony, total	0.0218	0.00020	mg/L	0.0200		109	80-120			
Arsenic, total	0.0217	0.00050	mg/L	0.0200		109	80-120			
Barium, total	0.0205	0.0050	mg/L	0.0198		104	80-120			
Beryllium, total	0.0225	0.00010	mg/L	0.0198		113	80-120			
Bismuth, total	0.0229	0.00010	mg/L	0.0200		114	80-120			
Boron, total	0.0217	0.0050	mg/L	0.0200		108	80-120			
Cadmium, total	0.0213	0.000010	mg/L	0.0199		107	80-120			
Calcium, total	2.29	0.20	mg/L	2.02		113	80-120			
Chromium, total	0.0210	0.00050	mg/L	0.0198		106	80-120			
Cobalt, total	0.0212	0.00010	mg/L	0.0199		106	80-120			
Copper, total	0.0219	0.00040	mg/L	0.0200		110	80-120			
Iron, total	2.01	0.010	mg/L	2.02		100	80-120			
Lead, total	0.0226	0.00020	mg/L	0.0199		113	80-120			
Lithium, total	0.0224	0.00010	mg/L	0.0200		112	80-120			
Magnesium, total	2.07	0.010	mg/L	2.02		102	80-120			
Manganese, total	0.0208	0.00020	mg/L	0.0199		105	80-120			
Molybdenum, total	0.0208	0.00010	mg/L	0.0200		104	80-120			
Nickel, total	0.0218	0.00040	mg/L	0.0200		109	80-120			
Phosphorus, total	2.08	0.050	mg/L	2.00		104	80-120			
Potassium, total	1.98	0.10	mg/L	2.02		98	80-120			
Selenium, total	0.0214	0.00050	mg/L	0.0200		107	80-120			
Silicon, total	2.1	1.0	mg/L	2.00		104	80-120			
Silver, total	0.0211	0.000050	mg/L	0.0200		105	80-120			
Sodium, total	2.09	0.10	mg/L	2.02		103	80-120			
Strontium, total	0.0207	0.0010	mg/L	0.0200		104	80-120			
Sulfur, total	4.4	3.0	mg/L	5.00		88	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	SNC-Lavalin Inc. (Nelson)	**WORK ORDER**	N001350
PROJECT	666768	**REPORTED**	2019-11-28 15:49

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B9K1678, Continued										
LCS (B9K1678-BS1), Continued				Prepared: 2019-11-16, Analyzed: 2019-11-18						
Tellurium, total	0.0213	0.00050	mg/L	0.0200		106	80-120			
Thallium, total	0.0229	0.000020	mg/L	0.0199		115	80-120			
Thorium, total	0.0223	0.00010	mg/L	0.0200		112	80-120			
Tin, total	0.0215	0.00020	mg/L	0.0200		108	80-120			
Titanium, total	0.0218	0.0050	mg/L	0.0200		109	80-120			
Tungsten, total	0.0212	0.0010	mg/L	0.0200		106	80-120			
Uranium, total	0.0224	0.000020	mg/L	0.0200		112	80-120			
Vanadium, total	0.0216	0.0010	mg/L	0.0200		108	80-120			
Zinc, total	0.0233	0.0040	mg/L	0.0200		116	80-120			
Zirconium, total	0.0205	0.00010	mg/L	0.0200		102	80-120			
Reference (B9K1678-SRM1)				Prepared: 2019-11-16, Analyzed: 2019-11-18						
Aluminum, total	0.300	0.0050	mg/L	0.303		99	82-114			
Antimony, total	0.0567	0.00020	mg/L	0.0511		111	88-115			
Arsenic, total	0.131	0.00050	mg/L	0.118		111	88-111			
Barium, total	0.844	0.0050	mg/L	0.823		103	83-110			
Beryllium, total	0.0554	0.00010	mg/L	0.0496		112	80-119			
Boron, total	3.14	0.0050	mg/L	3.45		91	80-118			
Cadmium, total	0.0528	0.000010	mg/L	0.0495		107	90-110			
Calcium, total	10.9	0.20	mg/L	11.6		94	85-113			
Chromium, total	0.266	0.00050	mg/L	0.250		107	88-111			
Cobalt, total	0.0418	0.00010	mg/L	0.0377		111	90-114			
Copper, total	0.553	0.00040	mg/L	0.486		114	90-117			
Iron, total	0.516	0.010	mg/L	0.488		106	90-116			
Lead, total	0.218	0.00020	mg/L	0.204		107	90-110			
Lithium, total	0.441	0.00010	mg/L	0.403		109	79-118			
Magnesium, total	3.95	0.010	mg/L	3.79		104	88-116			
Manganese, total	0.113	0.00020	mg/L	0.109		103	88-108			
Molybdenum, total	0.211	0.00010	mg/L	0.198		107	88-110			
Nickel, total	0.273	0.00040	mg/L	0.249		110	90-112			
Phosphorus, total	0.246	0.050	mg/L	0.227		108	72-118			
Potassium, total	7.35	0.10	mg/L	7.21		102	87-116			
Selenium, total	0.133	0.00050	mg/L	0.121		110	90-122			
Sodium, total	7.66	0.10	mg/L	7.54		102	86-118			
Strontium, total	0.400	0.0010	mg/L	0.375		107	86-110			
Thallium, total	0.0883	0.000020	mg/L	0.0805		110	90-113			
Uranium, total	0.0324	0.000020	mg/L	0.0306		106	88-112			
Vanadium, total	0.410	0.0010	mg/L	0.386		106	87-110			
Zinc, total	2.74	0.0040	mg/L	2.49		110	90-113			
Total Metals, Batch B9K1818										
Blank (B9K1818-BLK1)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B9K1818-BLK2)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Mercury, total	< 0.000010	0.000010	mg/L							
Reference (B9K1818-SRM1)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Mercury, total	0.00475	0.000010	mg/L	0.00489		97	80-120			
Reference (B9K1818-SRM2)				Prepared: 2019-11-18, Analyzed: 2019-11-18						
Mercury, total	0.00450	0.000010	mg/L	0.00489		92	80-120			

CERTIFICATE OF ANALYSIS

Work Order	: **VA20A6078**	Page	: 1 of 6
Client	: **SNC-Lavalin Inc.**	Laboratory	: Vancouver - Environmental
Contact	: Randy Williams	Account Manager	: Selam Worku
Address	: # 3 - 520 Lake Street Nelson BC Canada V1L 4C6	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 250 354 1664	Telephone	: +1 604 253 4188
Project	: 666768	Date Samples Received	: 08-May-2020 08:20
PO	: ----	Date Analysis Commenced	: 08-May-2020
C-O-C number	: 17-843694	Issue Date	: 19-May-2020 11:08
Sampler	: CP/ RW		
Site	: ----		
Quote number	: Q77702		
No. of samples received	: 5		
No. of samples analysed	: 5		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Aaron Yu	Laboratory Analyst	Metals, Burnaby, British Columbia
Bruna Botti	Analyst	Inorganics - Water Quality, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Evan Ben-Oliel	Metal Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Team Leader - Inorganics	Inorganics - Water Quality, Burnaby, British Columbia
Kinny Wu	Laboratory Analyst	Metals, Burnaby, British Columbia
Matthew Woods	Lab Assistant	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Inorganics - Water Quality, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	No Unit
mg/L	milligrams per litre

<: less than.

>: greater than.

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

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DTMF	*Dissolved concentration exceeds total for field-filtered metals sample. Metallic contaminants may have been introduced to dissolved sample during field filtration.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	CRUS 200505	CRDS 200505	SWMP 200505	GULLY 200505	CRDP 200505
					Client sampling date / time	05-May-2020	05-May-2020	05-May-2020	05-May-2020	05-May-2020
						VA20A6078-001	VA20A6078-002	VA20A6078-003	VA20A6078-004	VA20A6078-005
						Result	Result	Result	Result	Result
Physical Tests										
alkalinity, bicarbonate (as CaCO3)	----	E290	1.0	mg/L		139	140	75.1	25.8	140
alkalinity, carbonate (as CaCO3)	----	E290	1.0	mg/L		3.8	4.8	<1.0	<1.0	4.6
alkalinity, hydroxide (as CaCO3)	----	E290	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
alkalinity, phenolphthalein (as CaCO3)	----	E290	1.0	mg/L		1.9	2.4	<1.0	<1.0	2.3
alkalinity, total (as CaCO3)	----	E290	1.0	mg/L		143	144	75.1	25.8	144
hardness (as CaCO3), from total Ca/Mg	----	EC100A	0.60	mg/L		167	165	158	28.4	169
solids, total suspended [TSS]	----	E160-H	3.0	mg/L		26.7	24.5	<3.0	<3.0	23.7
hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		164	162	158	28.9	166
Anions and Nutrients										
chloride	16887-00-6	E235.Cl	0.50	mg/L		1.28	1.35	172	<0.50	1.28
fluoride	16984-48-8	E235.F	0.020	mg/L		0.070	0.070	<0.100 DLDS	<0.020	0.070
nitrate (as N)	14797-55-8	E235.NO3-L	0.0050	mg/L		0.156	0.154	0.0278	<0.0050	0.155
nitrite (as N)	14797-65-0	E235.NO2-L	0.0010	mg/L		<0.0010	<0.0010	<0.0050 DLDS	<0.0010	<0.0010
sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L		25.4	25.3	8.93	2.99	25.4
Organic / Inorganic Carbon										
carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L		2.50	2.46	11.9	14.5	2.60
Total Metals										
aluminum, total	7429-90-5	E420	0.0030	mg/L		0.248	0.320	0.0220	0.143	0.237
antimony, total	7440-36-0	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, total	7440-38-2	E420	0.00010	mg/L		0.00076	0.00085	0.00018	0.00022	0.00079
barium, total	7440-39-3	E420	0.00010	mg/L		0.0437	0.0456	0.160	0.0913	0.0446
beryllium, total	7440-41-7	E420	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100
bismuth, total	7440-69-9	E420	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, total	7440-42-8	E420	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
cadmium, total	7440-43-9	E420	0.0000050	mg/L		0.0000056	0.0000052	0.0000054	<0.0000050	0.0000061
calcium, total	7440-70-2	E420	0.050	mg/L		40.2	39.2	36.1	6.16	40.5
cesium, total	7440-46-2	E420	0.000010	mg/L		0.000049	0.000061	<0.000010	<0.000010	0.000050
chromium, total	7440-47-3	E420.Cr-L	0.00010	mg/L		0.00038	0.00048	<0.00010	0.00011	0.00037
cobalt, total	7440-48-4	E420	0.00010	mg/L		0.00028	0.00034	<0.00010	<0.00010	0.00030
copper, total	7440-50-8	E420	0.00050	mg/L		0.00085	0.00091	0.00066	0.00068	0.00082
iron, total	7439-89-6	E420	0.010	mg/L		0.536	0.656	0.036	0.060	0.549

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	CRUS 200505	CRDS 200505	SWMP 200505	GULLY 200505	CRDP 200505
					Client sampling date / time	05-May-2020	05-May-2020	05-May-2020	05-May-2020	05-May-2020
						VA20A6078-001	VA20A6078-002	VA20A6078-003	VA20A6078-004	VA20A6078-005
						Result	Result	Result	Result	Result
Total Metals										
lead, total	7439-92-1	E420	0.000050	mg/L		0.000674	0.000742	<0.000050	<0.000050	0.000663
lithium, total	7439-93-2	E420	0.0010	mg/L		0.0025	0.0025	<0.0010	<0.0010	0.0024
magnesium, total	7439-95-4	E420	0.0050	mg/L		16.1	16.4	16.6	3.15	16.5
manganese, total	7439-96-5	E420	0.00010	mg/L		0.0223	0.0243	0.00711	0.00090	0.0225
mercury, total	7439-97-6	E508	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	0.0000078	<0.0000050
molybdenum, total	7439-98-7	E420	0.000050	mg/L		0.000478	0.000460	<0.000050	<0.000050	0.000462
nickel, total	7440-02-0	E420	0.00050	mg/L		0.00066	0.00076	<0.00050	<0.00050	0.00066
phosphorus, total	7723-14-0	E420	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, total	7440-09-7	E420	0.050	mg/L		0.637	0.650	0.842	0.450	0.634
rubidium, total	7440-17-7	E420	0.00020	mg/L		0.00095	0.00097	0.00034	0.00036	0.00087
selenium, total	7782-49-2	E420	0.000050	mg/L		0.000053	0.000074	<0.000050	<0.000050	0.000067
silicon, total	7440-21-3	E420	0.10	mg/L		2.96	2.99	4.22	3.83	2.92
silver, total	7440-22-4	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, total	7440-23-5	E420	0.050	mg/L		2.44	2.51	82.2	0.919	2.54
strontium, total	7440-24-6	E420	0.00020	mg/L		0.331	0.336	0.311	0.0825	0.337
sulfur, total	7704-34-9	E420	0.50	mg/L		8.93	8.78	3.78	0.98	9.30
tellurium, total	13494-80-9	E420	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, total	7440-28-0	E420	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, total	7440-29-1	E420	0.00010	mg/L		0.00011	0.00015	<0.00010	<0.00010	0.00011
tin, total	7440-31-5	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, total	7440-32-6	E420	0.00030	mg/L		0.00503	<0.00630 DLM	<0.00030	0.00112	<0.00510 DLM
tungsten, total	7440-33-7	E420	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, total	7440-61-1	E420	0.000010	mg/L		0.000818	0.000828	0.000017	0.000065	0.000808
vanadium, total	7440-62-2	E420	0.00050	mg/L		0.00051	0.00052	<0.00050	<0.00050	<0.00050
zinc, total	7440-66-6	E420	0.0030	mg/L		0.0043	0.0035	<0.0030	0.0030	<0.0030
zirconium, total	7440-67-7	E420	0.00020	mg/L		<0.00020	<0.00020	0.00022	0.00106	<0.00020
Dissolved Metals										
aluminum, dissolved	7429-90-5	E421	0.0010	mg/L		0.0033	0.0036	0.0204	0.135	0.0036
antimony, dissolved	7440-36-0	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
arsenic, dissolved	7440-38-2	E421	0.00010	mg/L		0.00040	0.00042	0.00016	0.00020	0.00040
barium, dissolved	7440-39-3	E421	0.00010	mg/L		0.0410	0.0424	0.168	0.0979	0.0416
beryllium, dissolved	7440-41-7	E421	0.000100	mg/L		<0.000100	<0.000100	<0.000100	<0.000100	<0.000100

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	CRUS 200505	CRDS 200505	SWMP 200505	GULLY 200505	CRDP 200505
					Client sampling date / time	05-May-2020	05-May-2020	05-May-2020	05-May-2020	05-May-2020
						VA20A6078-001	VA20A6078-002	VA20A6078-003	VA20A6078-004	VA20A6078-005
						Result	Result	Result	Result	Result
Dissolved Metals										
bismuth, dissolved	7440-69-9	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
boron, dissolved	7440-42-8	E421	0.010	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
calcium, dissolved	7440-70-2	E421	0.050	mg/L		38.4	39.2	37.1	6.33	39.4
cesium, dissolved	7440-46-2	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
chromium, dissolved	7440-47-3	E421.Cr-L	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
cobalt, dissolved	7440-48-4	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00044	0.00046	0.00062	0.00065	0.00037
iron, dissolved	7439-89-6	E421	0.010	mg/L		0.020	0.022	0.028	0.052	0.020
lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
lithium, dissolved	7439-93-2	E421	0.0010	mg/L		0.0022	0.0019	<0.0010	<0.0010	0.0022
magnesium, dissolved	7439-95-4	E421	0.0050	mg/L		16.5	15.7	16.0	3.17	16.4
manganese, dissolved	7439-96-5	E421	0.00010	mg/L		0.00397	0.00388	0.00326	0.00076	0.00405
mercury, dissolved	7439-97-6	E509	0.0000050	mg/L		<0.0000050	<0.0000050	<0.0000050	0.0000069	<0.0000050
molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L		0.000518	0.000504	0.000116 DTMF	<0.000050	0.000488
nickel, dissolved	7440-02-0	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
phosphorus, dissolved	7723-14-0	E421	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
potassium, dissolved	7440-09-7	E421	0.050	mg/L		0.603	0.585	0.805	0.464	0.602
rubidium, dissolved	7440-17-7	E421	0.00020	mg/L		0.00058	0.00056	0.00034	0.00040	0.00056
selenium, dissolved	7782-49-2	E421	0.000050	mg/L		0.000063	0.000067	<0.000050	<0.000050	0.000072
silicon, dissolved	7440-21-3	E421	0.050	mg/L		2.53	2.57	4.14	3.80	2.59
silver, dissolved	7440-22-4	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
sodium, dissolved	7440-23-5	E421	0.050	mg/L		2.59	2.51	81.0	0.938	2.63
strontium, dissolved	7440-24-6	E421	0.00020	mg/L		0.334	0.342	0.308	0.0849	0.342
sulfur, dissolved	7704-34-9	E421	0.50	mg/L		8.74	8.49	3.77	0.94	8.83
tellurium, dissolved	13494-80-9	E421	0.00020	mg/L		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
thallium, dissolved	7440-28-0	E421	0.000010	mg/L		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
thorium, dissolved	7440-29-1	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
tin, dissolved	7440-31-5	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
titanium, dissolved	7440-32-6	E421	0.00030	mg/L		<0.00030	<0.00030	<0.00030	0.00097	<0.00030
tungsten, dissolved	7440-33-7	E421	0.00010	mg/L		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
uranium, dissolved	7440-61-1	E421	0.000010	mg/L		0.000809	0.000807	0.000017	0.000068	0.000822

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	CRUS 200505	CRDS 200505	SWMP 200505	GULLY 200505	CRDP 200505
					Client sampling date / time	05-May-2020	05-May-2020	05-May-2020	05-May-2020	05-May-2020
						VA20A6078-001	VA20A6078-002	VA20A6078-003	VA20A6078-004	VA20A6078-005
						Result	Result	Result	Result	Result
Dissolved Metals										
vanadium, dissolved	7440-62-2	E421	0.00050	mg/L		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		0.0016	<0.0010	0.0035	0.0014	0.0011
zirconium, dissolved	7440-67-7	E421	0.00020	mg/L		<0.00020	<0.00020	0.00025	0.00111	<0.00020
dissolved mercury filtration location	----	EP509	-	-		Field	Field	Field	Field	Field
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field

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

Attachment 3

HC Test Charts

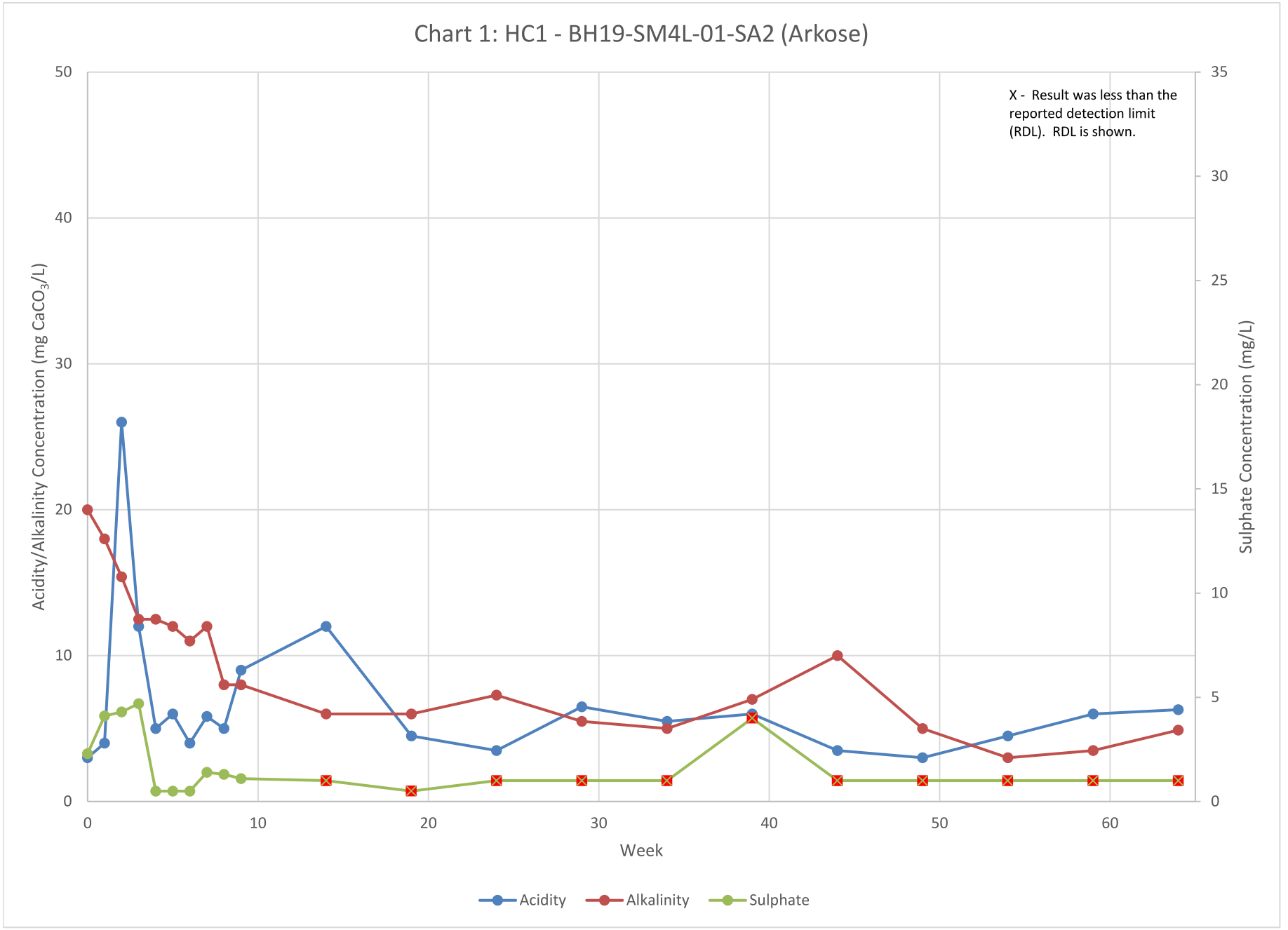
Chart 1: HC1 - BH19-SM4L-01-SA2 (Arkose)
X - Result was less than the reported detection limit (RDL). RDL is shown.
Acidity/Alkalinity Concentration (mg CaCO3/L)
Sulphate Concentration (mg/L)
Week
0
10
20
30
40
50
60
0
5
10
15
20
25
30
35
Acidity
Alkalinity
Sulphate

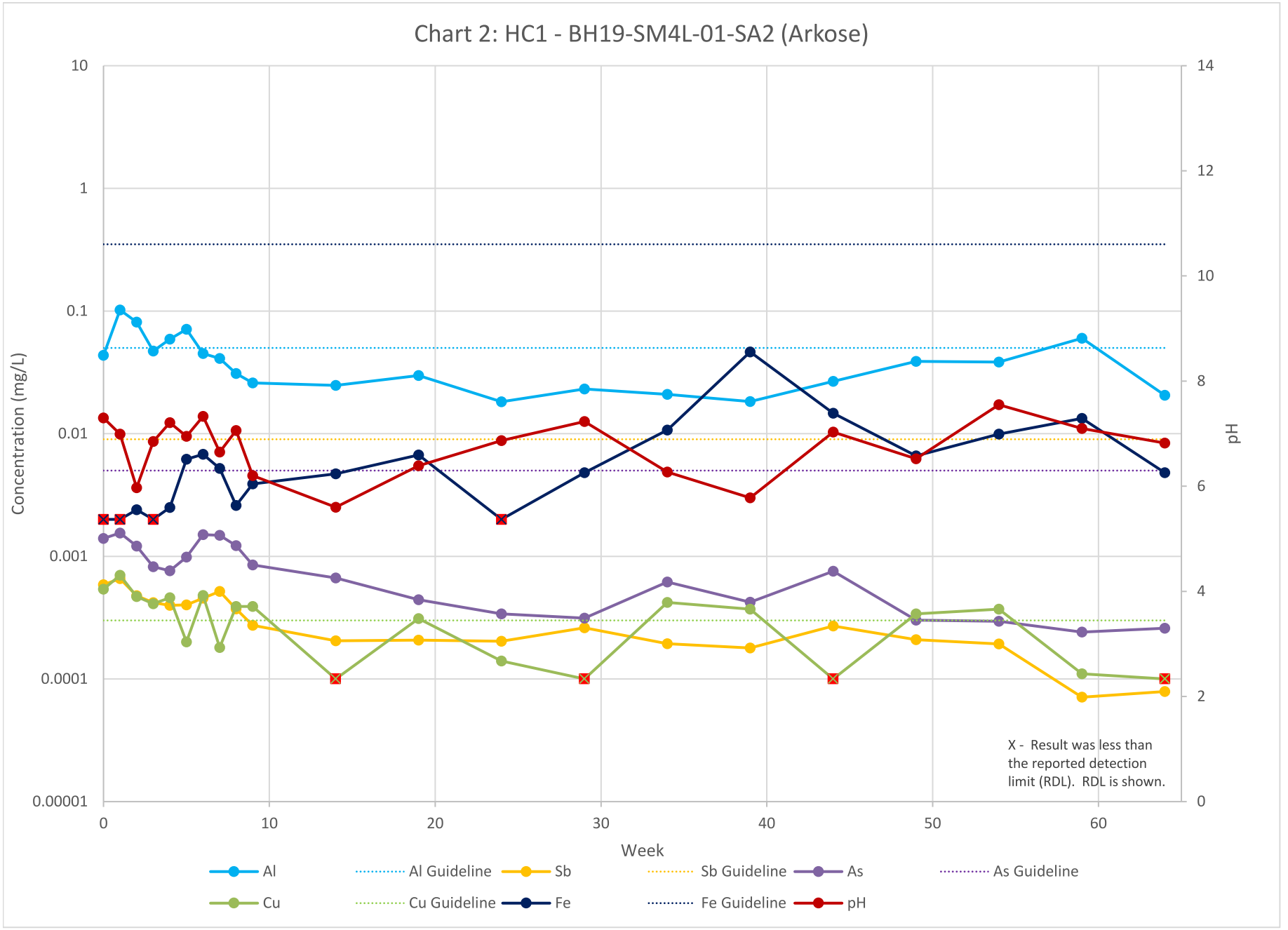
Chart 2: HC1 - BH19-SM4L-01-SA2 (Arkose)
Concentration (mg/L)
10
1
0.1
0.01
0.001
0.0001
0.00001
pH
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
Week
X - Result was less than the reported detection limit (RDL). RDL is shown.
Al
Al Guideline
Sb
Sb Guideline
As
As Guideline
Cu
Cu Guideline
Fe
Fe Guideline
pH

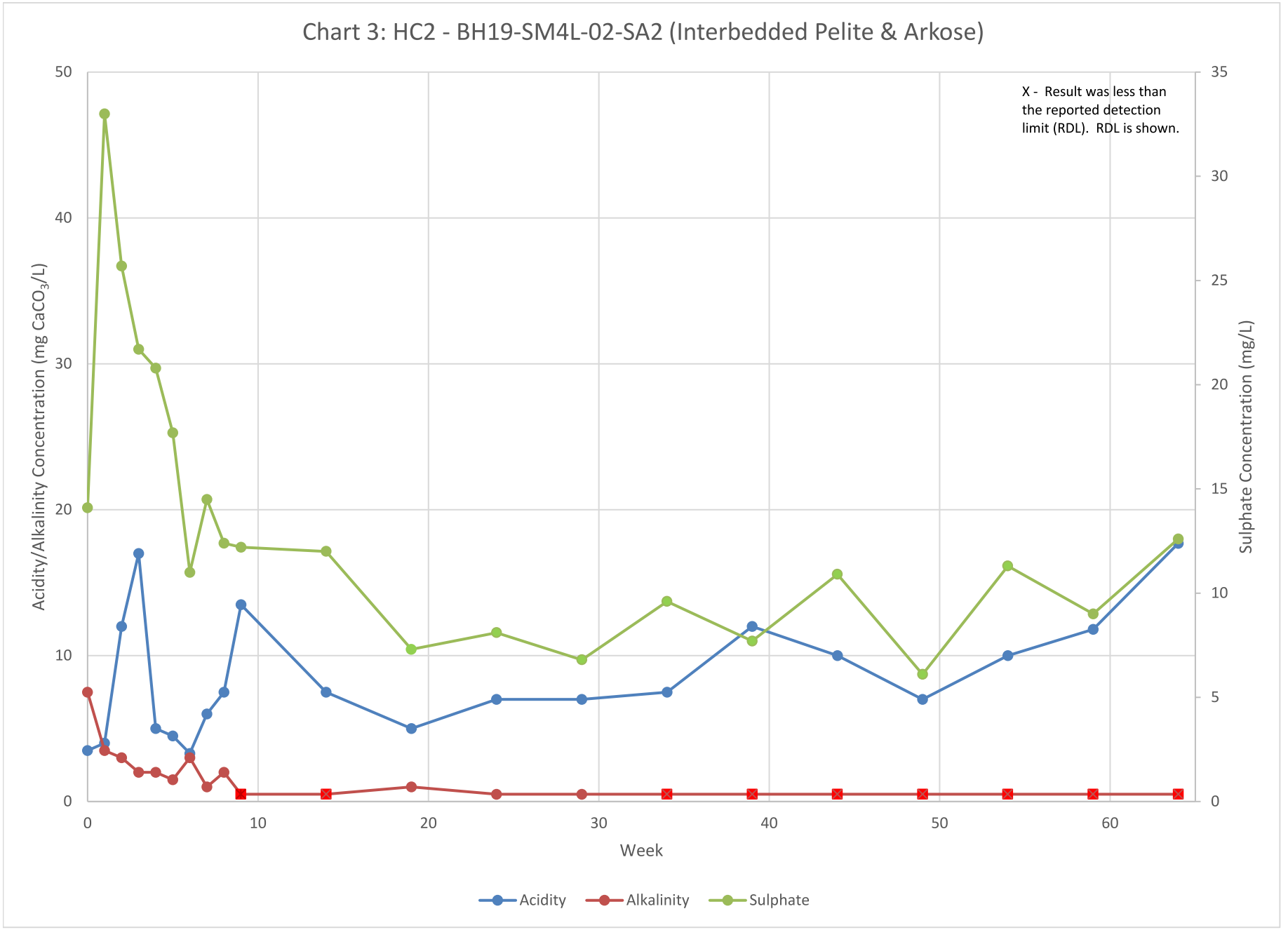
Chart 3: HC2 - BH19-SM4L-02-SA2 (Interbedded Pelite & Arkose)
X - Result was less than the reported detection limit (RDL). RDL is shown.
Acidity/Alkalinity Concentration (mg CaCO3/L)
Sulphate Concentration (mg/L)
Week
0
10
20
30
40
50
60
0
5
10
15
20
25
30
35
Acidity
Alkalinity
Sulphate

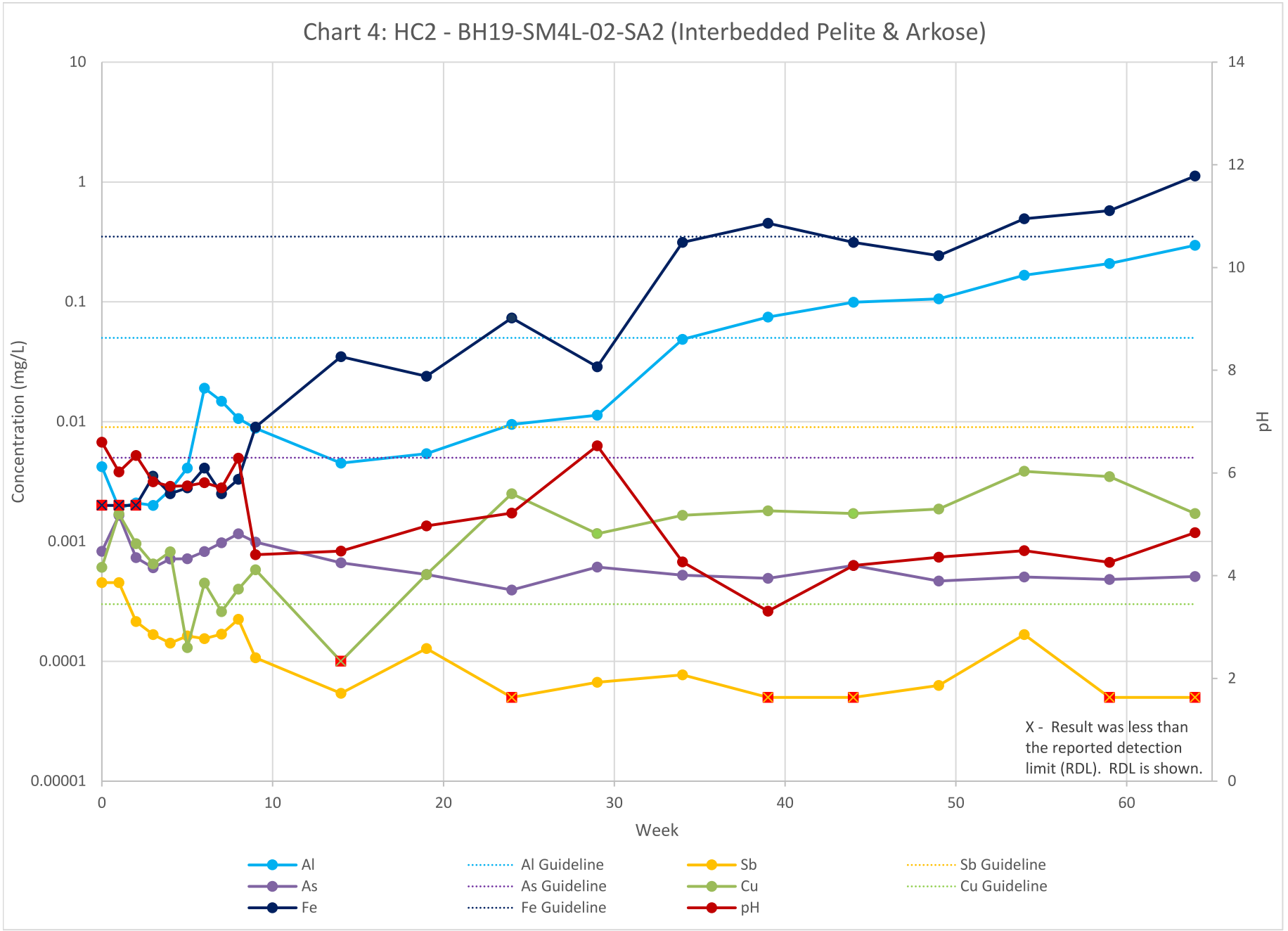
Chart 4: HC2 - BH19-SM4L-02-SA2 (Interbedded Pelite & Arkose)
Concentration (mg/L)
pH
Week
10
1
0.1
0.01
0.001
0.0001
0.00001
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
X - Result was less than the reported detection limit (RDL). RDL is shown.
Al
As
Fe
Al Guideline
As Guideline
Fe Guideline
Sb
Cu
pH
Sb Guideline
Cu Guideline

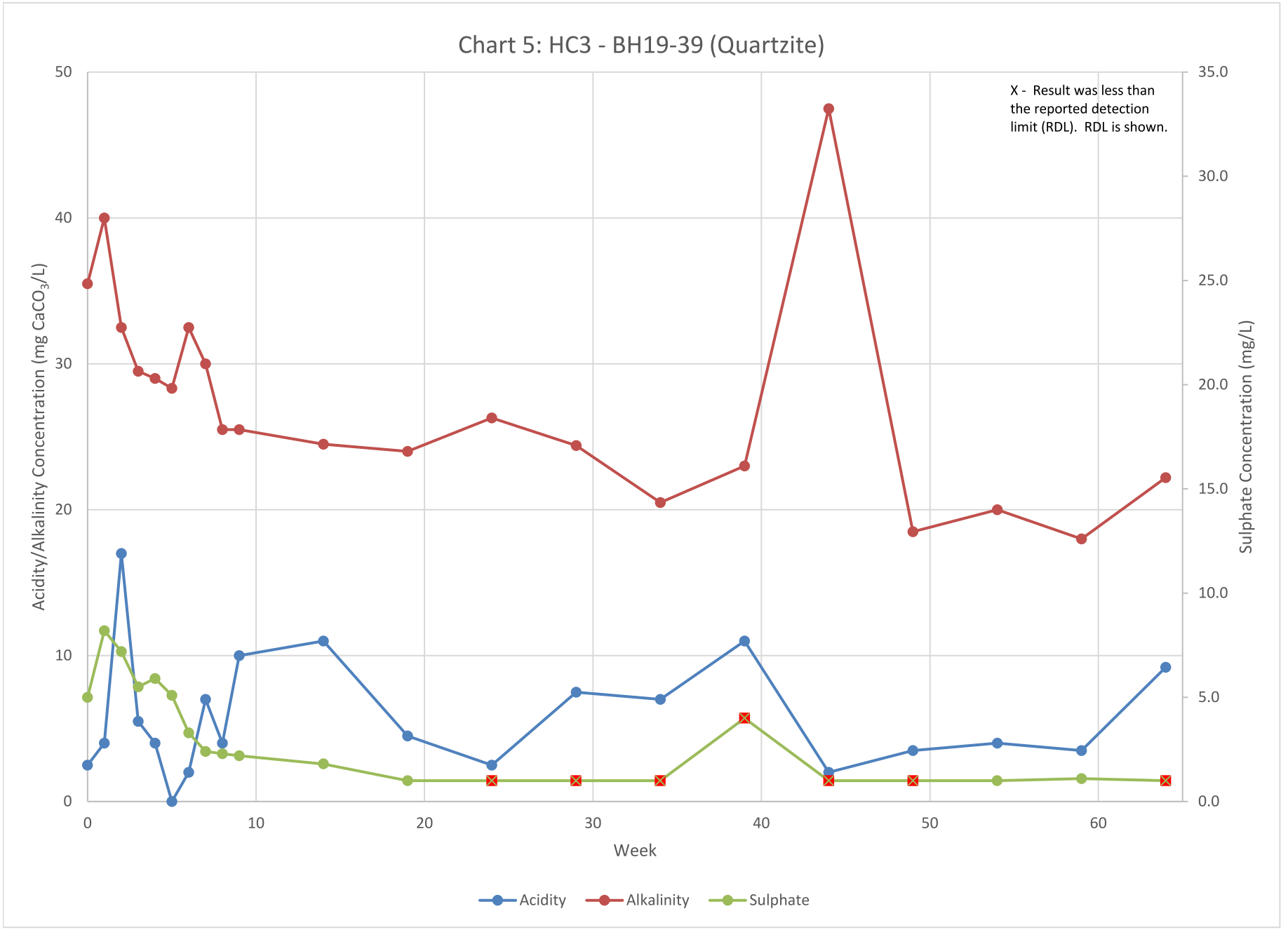
Chart 5: HC3 - BH19-39 (Quartzite)
X - Result was less than the reported detection limit (RDL). RDL is shown.
Acidity/Alkalinity Concentration (mg CaCO3/L)
Sulphate Concentration (mg/L)
Week
0
10
20
30
40
50
60
0
10
20
30
40
50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Acidity
Alkalinity
Sulphate

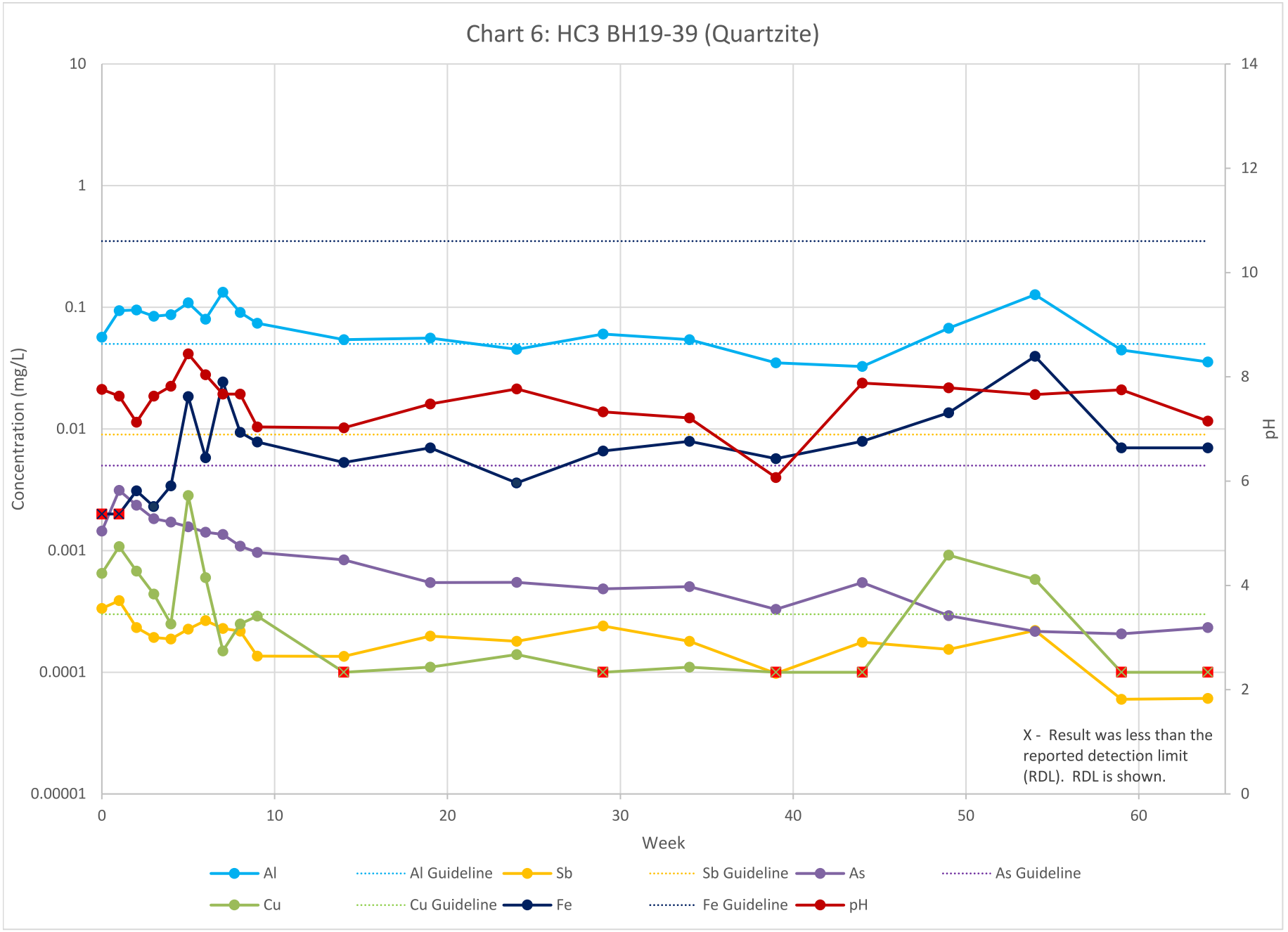
Chart 6: HC3 BH19-39 (Quartzite)
Concentration (mg/L)
pH
Week
10
1
0.1
0.01
0.001
0.0001
0.00001
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
X - Result was less than the reported detection limit (RDL). RDL is shown.
Al
Al Guideline
Sb
Sb Guideline
As
As Guideline
Cu
Cu Guideline
Fe
Fe Guideline
pH

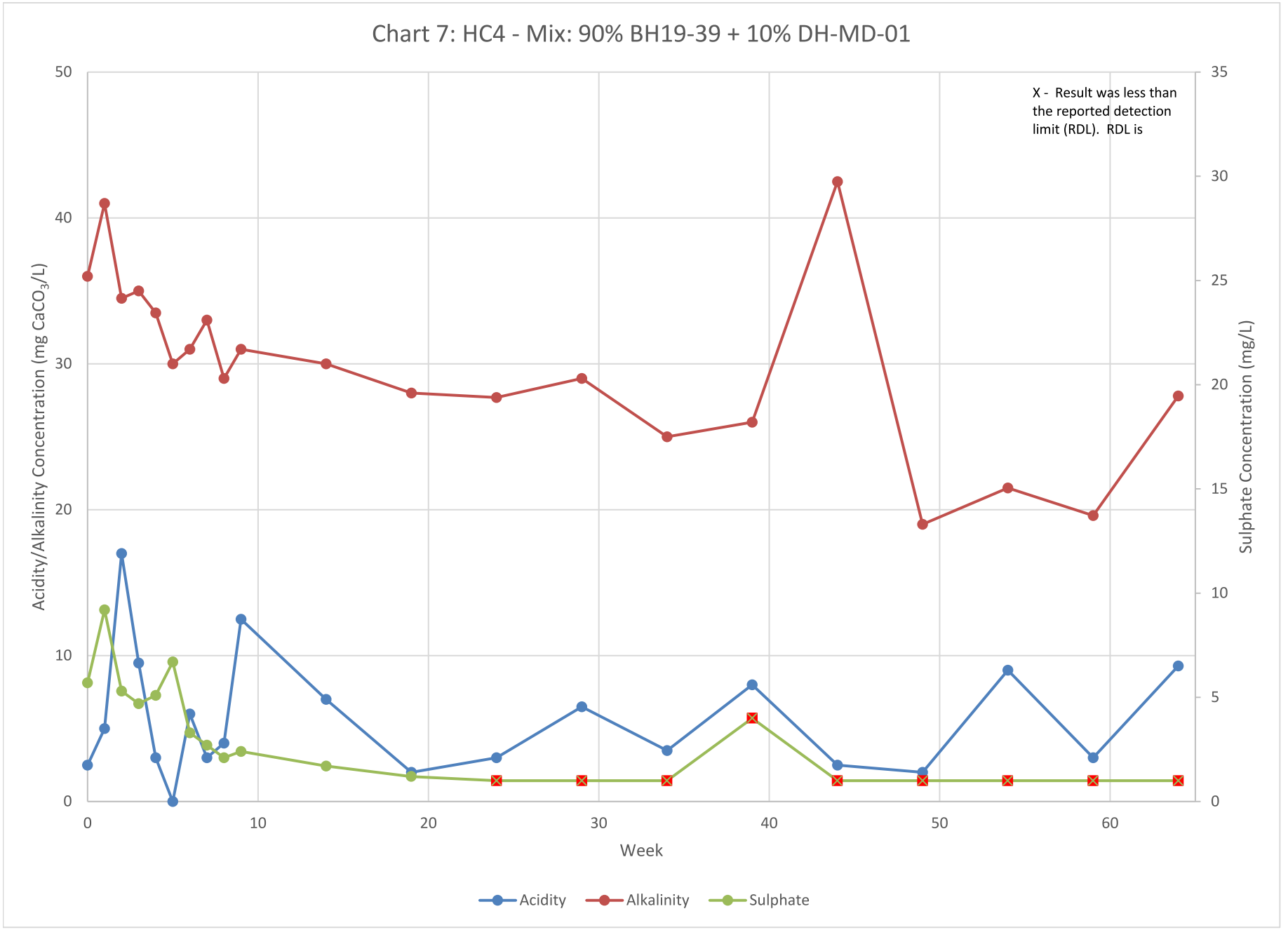
Chart 7: HC4 - Mix: 90% BH19-39 + 10% DH-MD-01
X - Result was less than the reported detection limit (RDL). RDL is
Acidity/Alkalinity Concentration (mg CaCO3/L)
Sulphate Concentration (mg/L)
Week
0
10
20
30
40
50
60
0
5
10
15
20
25
30
35
Acidity
Alkalinity
Sulphate

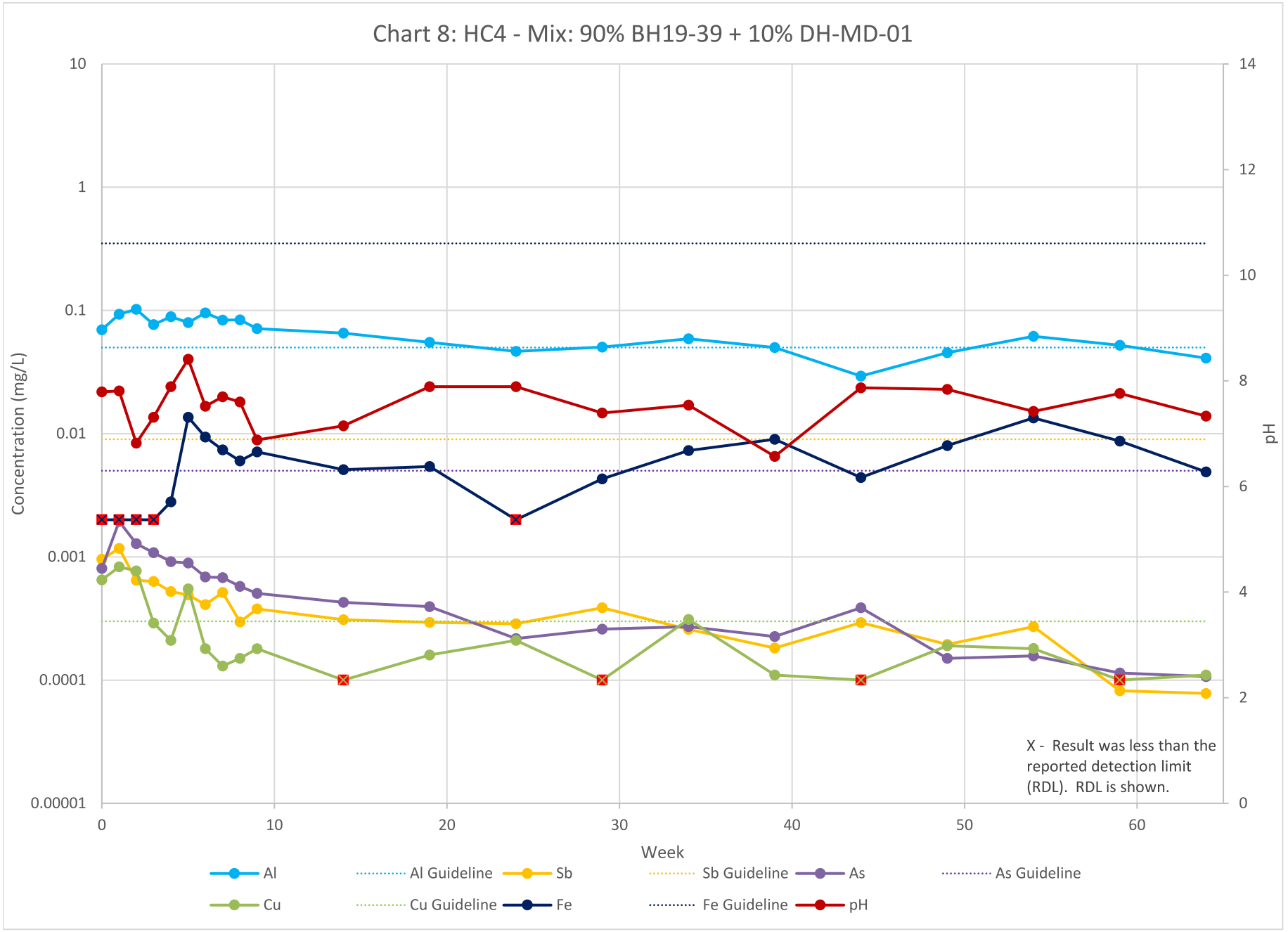
Chart 8: HC4 - Mix: 90% BH19-39 + 10% DH-MD-01
Concentration (mg/L)
pH
Week
10
1
0.1
0.01
0.001
0.0001
0.00001
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
X - Result was less than the reported detection limit (RDL). RDL is shown.
Al
Al Guideline
Sb
Sb Guideline
As
As Guideline
Cu
Cu Guideline
Fe
Fe Guideline
pH

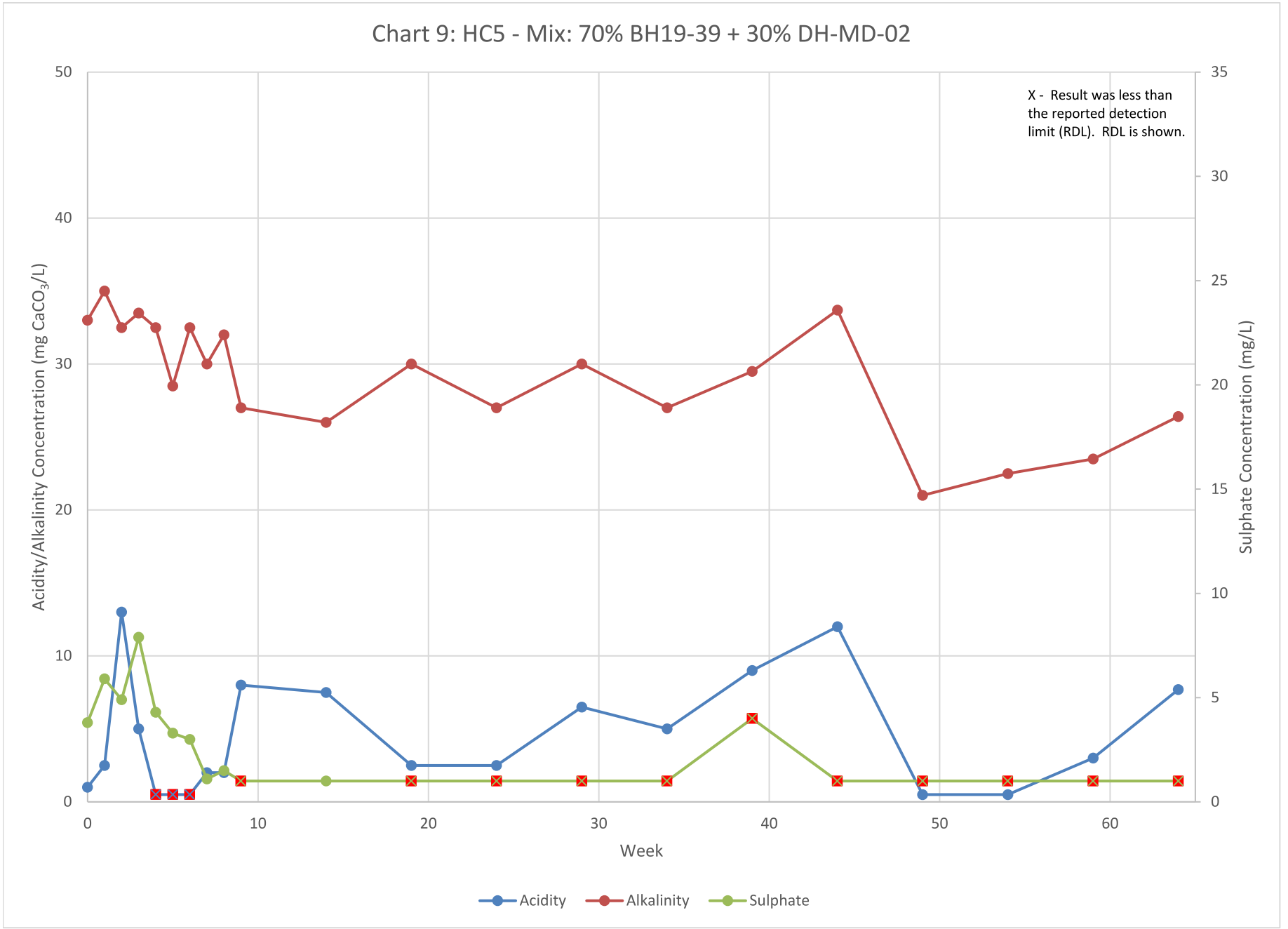
Chart 9: HC5 - Mix: 70% BH19-39 + 30% DH-MD-02
X - Result was less than the reported detection limit (RDL). RDL is shown.
Acidity/Alkalinity Concentration (mg CaCO3/L)
Sulphate Concentration (mg/L)
Week
0
10
20
30
40
50
60
0
5
10
15
20
25
30
35
Acidity
Alkalinity
Sulphate

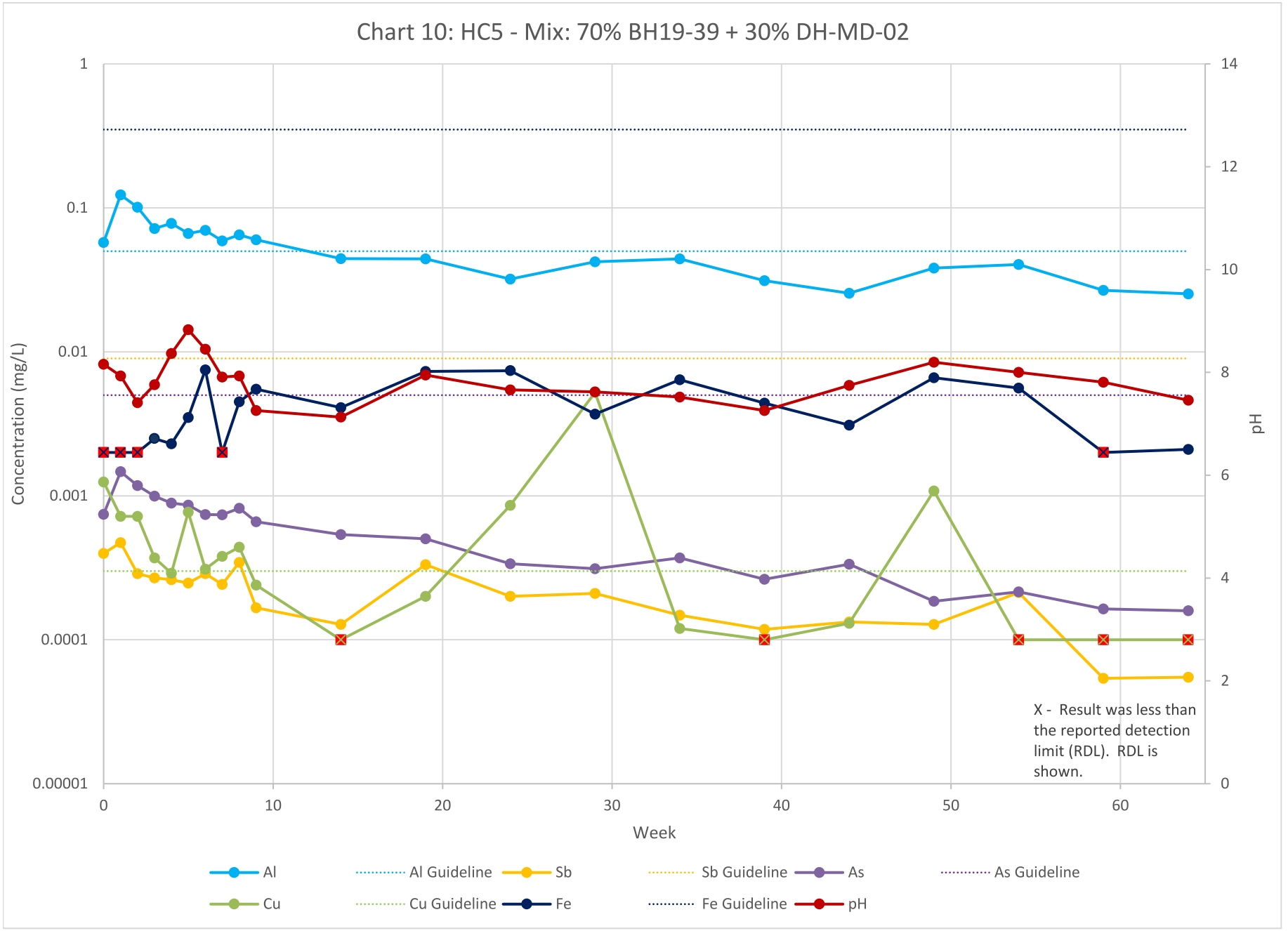
Chart 10: HC5 - Mix: 70% BH19-39 + 30% DH-MD-02
Concentration (mg/L)
1
0.1
0.01
0.001
0.0001
0.00001
pH
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
Week
X - Result was less than the reported detection limit (RDL). RDL is shown.
Al
Al Guideline
Sb
Sb Guideline
As
As Guideline
Cu
Cu Guideline
Fe
Fe Guideline
pH