Norman Wells Operations Aquatic Effects Monitoring Program Report

Imperial Norman Wells Operations

Imperial

10 March 2020

407011-00770-1000

Advisian
Worley Group

advisian.com

THIS REPORT CONTAINS PROVISIONS LIMITING LIABILITY, THE SCOPE OF THE REPORT AND THIRD PARTY RELIANCE

Company details

Worley Canada Services Ltd.
Suite 500, 151 Canada Olympic Rd SW
Calgary, AB T3B 6B7
Canada
Tel: 403-247-0200
Fax: 403-247-4811

PROJECT - 407011-00770-1000 WW-REP-0001: Norman Wells Operations Aquatic Effects Monitoring Program Report - Imperial Norman Wells Operations

Rev	Description	Author	Review	Advisian approval	Revision date
0	Issued as Final	N. Tanna	M. Vander Meulen	A. Haigh	10-Mar-20

U:\CAL\GBS\407011-00770\1000 - AEMP\12.0_Reports\12.2_Final

Table of Contents

Executive Summary .... **iv**

1 Introduction **1**

1.1 Background 1

1.2 Scope of Work 1

1.3 Environmental Assessment Guidelines 2

1.4 AEMP Locations 2

2 Sampling and Methodology **5**

3 Results **6**

3.1 Seasonal Trends 6

3.2 Spatial Trends 11

4 Summary **13**

5 Closure **14**

6 References **15**

Figures Within Text

Figure A Total Aluminum Concentration, AEMP 2017 - 2019 7

Figure B Power curves for successive years of AEMP sampling 9

Figure C Summary of regression slopes for sampling locations, spatial differences in seasonal total copper concentration 10

Figure D Total aluminum concentration, AEMP spatial trends 11

Figure

Figure 1 AEMP Monitoring Locations

Tables Within Text

Table A AEMP Monitoring Locations 3
Table B Regression parameters and power for seasonal trends in total aluminum concentration 8
Table C Regression parameters and power for seasonal trends across sampling locations 10
Table D Regression parameters and power for spatial trends in total aluminum concentration 12

Tables

Table 1 Surface Water Analytical Results: Indicators
Table 2 Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)
Table 3 Surface Water Analytical Results: Dissolved Metals and Trace Elements
Table 4 Surface Water Analytical Results: Total Metals and Trace Elements

Appendices

Appendix A Limitation of Liability, Scope of Report, and Third-Party Reliance
Appendix B Field Procedures
Appendix C Seasonal Trends in Water Quality
Appendix D Seasonal Trends Across Sampling Locations
Appendix E Spatial Trends in Water Quality

Executive Summary

Water quality samples were collected in the Mackenzie River and Bosworth Creek between June and October in 2017, 2018 and 2019 to discern potential impacts due to ongoing Norman Wells operations and/or presence of legacy contaminants.

The vast majority of analytes which were quantified in water samples were below detection limits. All hydrocarbon analytes were below detection limits, with additional analytes associated with hydrocarbon recovery and refining also below detection limits.

Al, Cu, Fe, Mg, Mn, Mo, Na, Ni, Sr, Ti, U, and concentrations of chloride and sulphate were examined in detail for longitudinal trends (spatial and temporal) because these analytes were quantifiable (i.e. above detection limits).

The resulting water quality data are characterized by appreciable variability, which limits statistical power to detect trends. An absence of differences between upstream and downstream locations, with high variability between locations sampled results in limited capacity to attribute differences to any specific driver.

1 Introduction

Imperial Oil Resources (Imperial) requested Worley Canada Services Ltd. (Worley) operating as Advisian to prepare a report to summarize monitoring activities in order to complete the 2019 Aquatic Effects Monitoring Program (AEMP) Sampling Program in Norman Wells, NT.

As the conclusion of the 2019 AEMP sampling activities marks the completion of the third sampling campaign, this report includes spatial and temporal statistical analysis of accumulated data.

1.1 Background

The Aquatic Effects Monitoring Program (AEMP) was developed in April 2017 as part of Imperial's 10-year Water License Renewal Application submitted to the Sahtu Land and Water Board (SLWB) in 2015. This approval grants Imperial permission to use water from the Mackenzie River, and stipulates that Imperial is to develop and maintain a variety of monitoring plans including the development and execution of an AEMP.

The Norman Wells Operations AEMP was created to contribute to satisfying requirements in Imperial's Water License to monitor potential effects from Imperial's operation. This includes evaluating immediate or long-term significance of potential aquatic effects as required, measuring the effect activities may be having on water, and identifying if steps are needed to prevent serious or permanent damage to aquatic life.

This program involves sampling at 13 monitoring locations three times per year (Spring, Summer, and Fall, which correspond to June, August, and October, respectively). The monitoring locations were established in order to allow characterizing of normal water quality conditions and to detect potential surface water quality issues across the area in which Norman Wells Operations maintains a presence.

1.2 Scope of Work

The scope of work for the 2019 Aquatic Effects Monitoring Program at the Site included the following:

- Collect surface water samples at AEMP locations for laboratory analysis of general, indicator, organic, nutrient, benzene, toluene, ethylbenzene and xylene [BTEX], petroleum hydrocarbon fractions F1 and F2, and metals and trace elements (total and dissolved).
- Provide a summary report presenting the work completed and any highlights.

The scope of this work is to simply identify any irregular or notable results and to provide a detailed record of the work completed during the program (2017-2019).

1.3 Environmental Assessment Guidelines

Currently, no specific water quality guidelines exist for the Northwest Territories. As a conservative measure, surface water assessment parameters in this report are compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) for the Protection of Freshwater Aquatic Life (FWAL; CCME 2017), as surface water bodies (e.g. Bosworth Creek and the Mackenzie River) are potential receptors of concern in most areas of interest for this program.

It should be emphasized that the aforementioned guidelines are used for comparative purposes only in the context of this report, and that ultimately this 3-year program is intended to measure system variability to serve as a foundation for detecting future change. Statistical analysis to evaluate variability and capacity for detecting change is included in the body of this report.

1.4 AEMP Locations

Monitoring locations have been established in Bosworth Creek and the Mackenzie River to:

- Obtain data both upstream and downstream from potential points of inputs;
- Capture the longitudinal nature of these watercourses so that the potential effects attributable to position along channel are quantified; and
- Support quantifying seasonal variability to account for it in subsequent analysis.

This conceptual basis is intended to allow comparison of water potentially influenced by operations with water not influenced by operations. The AEMP document submitted to the SLWB develops this rationale in relation to program design and resulted in the 13 sampling points listed in Table A below and illustrated in Figure 1.

Advisian
Worley Group

Imperial

Table A AEMP Monitoring Locations

Location	Name	Description	Stressors	Latitude	Longitude
Boat Access					
AEMP-01	Man-made Islands	Most downstream island in Mackenzie River	Flowline, Island Maintenance	65°16'37.13"N	126°55'3.13"W
AEMP-05	Bear Island	Surface water on island	Bunker, Flowline, Surface Water Release	65°15'37.76"N	126°52'36.48"W
AEMP-10	Upstream from Imperial Site	Upstream from Imperial's Norman Wells Operations		65°14'0.06"N	126°44'9.66"W
AEMP-11	Downstream from Imperial Site	Downstream at Radar Island and downstream of Imperial's Norman Wells Operations		65°18'11.70"N	127° 3'30.30"W
AEMP-13	Bear Island	Edge of the Mackenzie River adjacent to island		65°15'43.21"N	126° 52'42.32"W
Wading					
AEMP-02	Downstream Bosworth Creek	Near mouth with the Mackenzie River	Fuel Storage, Historical, Surface Water Release, Waste Storage	65°16'58.66"N	126°51'55.83"W
AEMP-03	Midstream Bosworth Creek	Down gradient from SNP – GWP Well	Fuel Storage, Historical, Surface Water Release, Waste Storage	65°17'4.81"N	126°52'34.54"W
AEMP-04	Upstream Bosworth Creek	Upstream of Imperial Norman Wells Operations		65°17'24.50"N	126°52'29.39"W
AEMP-06	Historical – Refinery	On Mackenzie River near refinery basin discharge	Fuel Storage, Historical, Surface Water Release, Waste Storage	65°16'41.29"N	126°50'25.99"W
AEMP-07	Natural Seep	Near observed natural seep on Mackenzie River	Seep	65°16'46.39"N	126°50'59.46"W

Location	Name	Description	Stressors	Latitude	Longitude
AEMP-08	Imperial's Main dock on Mackenzie River	On downstream side of dock projecting into Mackenzie River channel	Boat Activity, Bunker, Surface Water Release, Water Use	65°16'46.01"N	126°52'27.93"W
AEMP-09	Upstream CPF Effluent Discharge	Where effluent enters the Mackenzie River	Water Return, Water Use	65°16'57.61"N	126°53'10.86"W
AEMP-12	Seep	Downstream from Bosworth Creek inflow, near natural seep	Natural input of hydrocarbons	65°16'51.10"N	126°52'27.04"W

2 Sampling and Methodology

The AEMP surface water program was conducted by Advisian personnel between June and October of 2017, 2018 and 2019. Advisian staff followed field procedures as summarized in Appendix B.

Surface water samples were collected using lab-provided containers as grab samples. Results were compared with CCME FWAL guidelines (CCME 2017).

All surface water samples were submitted for laboratory analysis at an accredited third-party laboratory in Edmonton (Bureau Veritas) in accordance with standard packaging, preservation, and chain-of-custody (COC) procedures.

3 Results

The AEMP at Norman Wells currently consists of seasonal surface water sampling (approximately spring, summer, and fall) as a first step to detect and quantify any possible changes in water quality in the vicinity of Imperial's operations. It is assumed that detectable changes in water quality would motivate subsequent investigations of aquatic effects, such as time-integrated measures of water quality or changes in the status of biota.

Sampling locations are illustrated in Figure 1 and include an upstream location (AEMP-10) to characterize background conditions in the Mackenzie River relative to what may result from the proximity of operations. There are three sampling locations on Bosworth Creek (AEMP-04 is the farthest upstream and characterizes background conditions) and one on Bear Island. Most of the remaining locations are along the right bank of the Mackenzie River, AEMP-13 is adjacent to Bear Island, and AEMP-11 is downstream and perhaps reflective of any net incremental change in water quality. Sampling began in summer 2017 at some locations (AEMP-01 to 09), but not until summer 2018 at others (AEMP-10 to 13).

Water quality data (routine variables, petroleum hydrocarbons [PHCs], and total and dissolved metals) are presented in Tables 1 through 4. Many results are below respective detection limits, and notably this is the case for all analyses for presence of PHCs. Lack of detections places some constraints on possibilities for statistical analysis of results. Therefore, total concentrations of several metals (Al, Cu, Fe, Mg, Mn, Mo, Na, Ni, Sr, Ti, and U) and concentrations of chloride and sulphate were examined in detail for longitudinal trends (spatial and temporal) because these had detections. The only exception is iron at AEMP-03 in fall 2019, and the detection limit was entered as the datum; total iron was retained for analysis despite this single non-detection because it often is indicative of regional water chemistry.

3.1 Seasonal Trends

For any of the 13 sampling locations there are as many as 10 data points in the time series depending on when sampling began. Preliminary examination suggested that any seasonal patterns were repeated each year, so results from successive years of sampling were superimposed by day of year (each datum numbered day 0 to day 365). Figure A displays results for total aluminum as an example. A logarithmic scale is used to accommodate variability, and it is readily apparent that locations AEMP-02, -03, -04, and -05 (Bosworth Creek and on Bear Island) have concentrations different than the main channel. In the main channel, total aluminum concentrations are highest in spring with a decreasing trend during the year, but there is considerable variability. As a first cut at quantifying temporal trends, a simple exponential function was fitted for each location (these are superimposed for total aluminum at all 13 locations in Figure A). Table A summarizes regression coefficients, the proportion of variation explained (coefficient of determination, r^2) and whether the slope differs significantly from zero. The fact that only two of the slopes indicate statistically significant change for total aluminum concentration is a function of considerable variation (low r^2) and also relatively flat lines in some cases (e.g. AEMP-11). Note that ideally, analysis would include volume of flow in the river as a covariate to reduce variability, but such data were not available.

An important consideration for any monitoring program is the capacity to detect change when there is change. This is referred to as statistical power, and it was evaluated for each trend, such as those illustrated in Figure A. A desirable goal is to have statistical power of 0.8 (80%) to detect change of specified size (effect). Power was calculated *a posteriori* for data collected to date in the AEMP program using the pwr.f2.test statement in the pwr package of the R statistical programming language. The test requires input of the numerator and denominator degrees of freedom in the general linear model test, the probability indicative of statistical significance (0.05, by convention) and the effect size, which was estimated as $f2=r^2/(1-r^2)$, so that effect size is a function of both the slope and residual variability. Effect size and power also are given in Table B; power to detect change appears to have been adequate only for AEMP-08 and AEMP-13.

Figure A Total Aluminum Concentration, AEMP 2017 - 2019

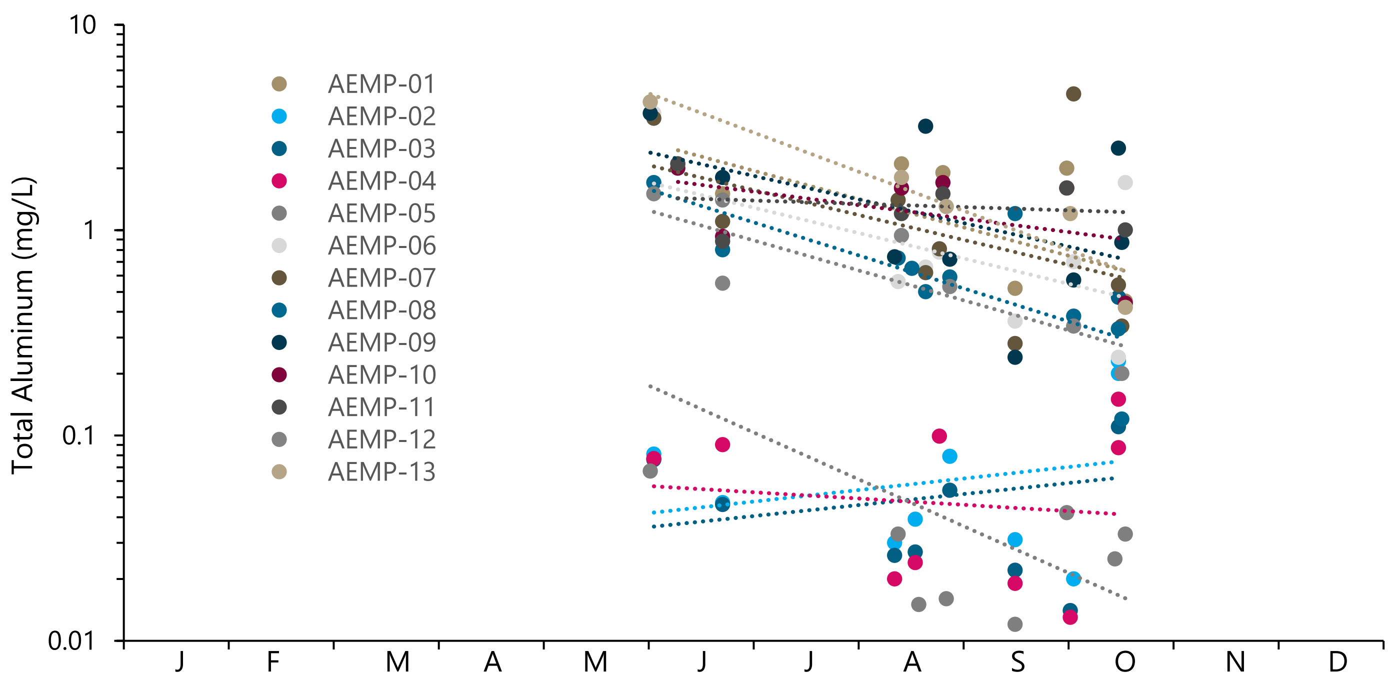


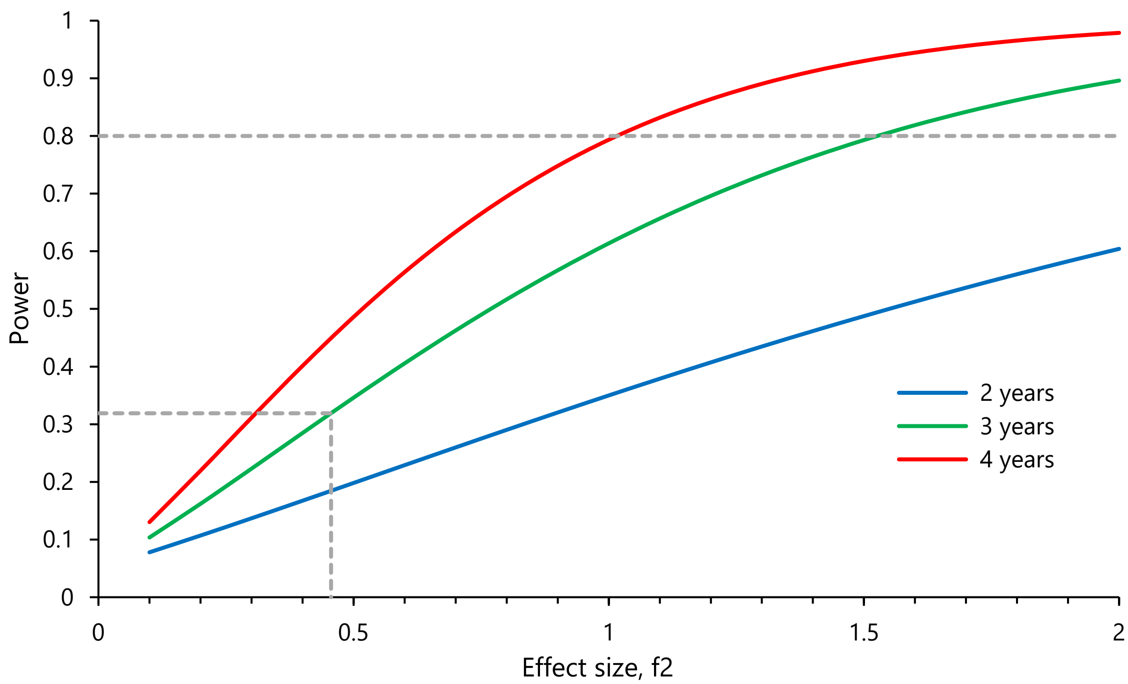
Table B Regression parameters and power for seasonal trends in total aluminum concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	13.098	-0.00452	0.427		0.745	0.419
2	0.022	0.001842	0.057		0.061	0.082
3	0.019	0.001759	0.034		0.035	0.068
4	0.081	-0.001	0.015		0.015	0.058
5	2.419	-0.00748	0.015		0.504	0.348
6	7.100	-0.00405	0.335		0.456	0.319
7	8.360	-0.00397	0.313		0.264	0.201
8	10.058	-0.00527	0.209	*	1.300	0.798
9	8.974	-0.00376	0.565		0.268	0.203
10	3.816	-0.00215	0.207		0.261	0.125
11	1.738	-0.00052	0.038		0.040	0.061
12	6.677	-0.00478	0.697		2.304	0.664
13	41.589	-0.00625	0.870	*	6.687	0.882

The same calculations were made for all other water quality variables with consistent detections. These are compiled in Appendix C as figures and tables, as for total aluminum. In all instances, results for Bosworth Creek (AEMP-02, -03, -04) and for the location on Bear Island (AEMP-05) appear to behave differently.

More generally, power curves were generated for two, three, and four years of sampling (assuming three samples per year). Figure B presents these curves and includes as an example the effect size and estimated power for three years of sampling for total aluminum at AEMP-06 (f2=0.456 and power=0.319, Table B). For any given effect size, power increases with ongoing sampling, as expected. The red curve presents expected power after another year of sampling. Power increases the probability that effects will be detected if there are any, or conversely, provides confidence that lack of effect is real.

Figure B Power curves for successive years of AEMP sampling



Presentation of data and analysis (Figure A and Table B) considered seasonal trends at given locations and the capacity to detect them, however, any differences among the lines in Figure A could be interpreted as effects on water quality if the seasonal pattern is different depending on location (i.e. upstream vs. downstream). Figure C uses concentration of total copper as an example, and regression coefficients (slopes, Table A) are plotted against the position of the sampling location. Data for each sampling event are plotted from upstream to downstream with spacing reflective of the distance between locations. Specifically, the upstream location AEMP-10 and the downstream location AEMP-11 are on opposite ends of the horizontal axis, and clustered in the middle are AEMP-06, -07, -12, -08, -09, and -01 all of which are along the right bank near operations or mid-channel (AEMP-01) (Figure1). Locations on Bosworth Creek (AEMP-02, 03, and 04), on Bear Island (AEMP-05) and beside it (AEMP-13) are not included so as to consider only a series along which water might flowing in an approximately straight path. All slopes are negative (see Figure C-1) but less so with distance downstream. However, the slope in Figure C is not significant, and the effect size and power are small (Table C). This is true also for all other water quality variables (Table C); the comparable figures are given in Appendix D.

Figure C Summary of regression slopes for sampling locations, spatial differences in seasonal total copper concentration

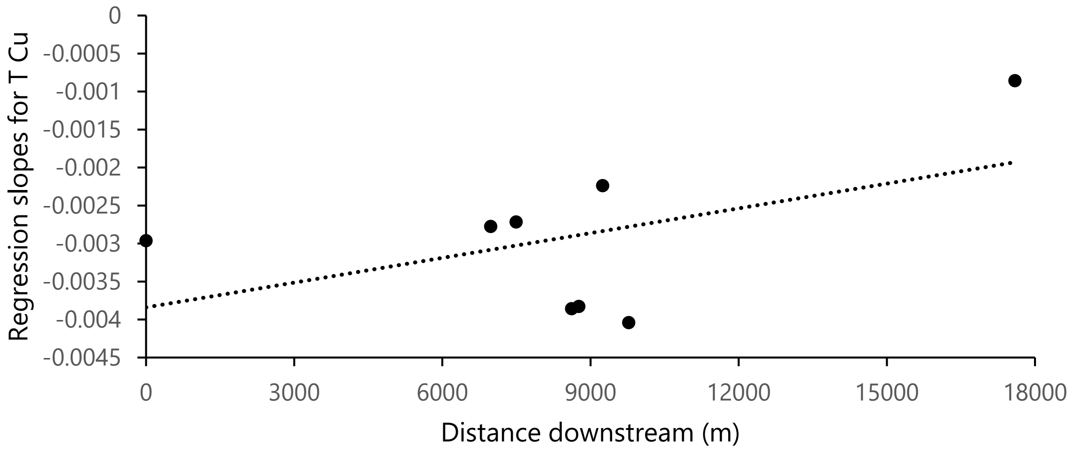


Table C Regression parameters and power for seasonal trends across sampling locations

Water quality variable	Intercept	Slope	Coefficient of determination, r^2	Effect size, f2	Power
Total Aluminum	-0.0044	9.276E-08	0.081	0.089	0.090
Total Copper	-3.84E-03	1.085E-07	0.244	0.323	0.206
Total Iron	-0.0048	1.533E-07	0.190	0.235	0.161
Total Magnesium	0.0002	-5.932E-09	0.006	0.006	0.053
Total Manganese	-0.0038	9.450E-08	0.092	0.101	0.095
Total Molybdenum	-9.71E-04	3.281E-08	0.094	0.104	0.097
Total Sodium	0.0011	1.596E-08	0.017	0.017	0.058
Total Nickel	-0.0034	6.884E-08	0.102	0.114	0.101
Total Strontium	-4.3090	1.321E-03	0.464	0.866	0.476
Total Titanium	-0.0021	-4.855E-09	0.000	0.000	0.050
Total Uranium	-8.22E-04	2.688E-08	0.068	0.073	0.082
Chloride	0.0013	5.374E-09	0.002	0.002	0.051
Sulphate	0.0003	3.567E-08	0.108	0.121	0.105

3.2 Spatial Trends

The preceding considered seasonal trends for given water quality variables, presented data graphically, and quantified trends, and then examined differences in seasonal trends as a metric of effects on water quality. However, a more direct search for effects considers how at any time (season) water quality changes with distance downstream (i.e. from background upstream, past operations, and downstream). Therefore, monitoring results for the same water quality variables were examined for separate sampling events.

Figure D uses total aluminum again as an example, and the three seasonal sampling events for 2018 and 2019 are shown. Data are plotted relative to distance downstream. Figure D has six relatively flat lines indicative of no change in total aluminum concentration as water flows downstream; slopes are not significant, and with the variation in the middle cluster of points, there is almost no statistical power (Table D). Lines for Fall 2018 and Spring 2019 also are flat, but have lower and higher concentrations, respectively.

As before, the conditions for regression are not ideal given the uneven spacing of the points and the potentially disproportionate influence of those widely removed on either end; however, the alternative is simply to compare those two points. More positively, the lack of difference between the extremes of upstream and downstream suggests that the variability near operations represents at most only localized effects. The same analyses were made for all other water quality variables with consistent detections. These are compiled in Appendix E as figures and tables, as for total aluminum.

Figure D Total aluminum concentration, AEMP spatial trends

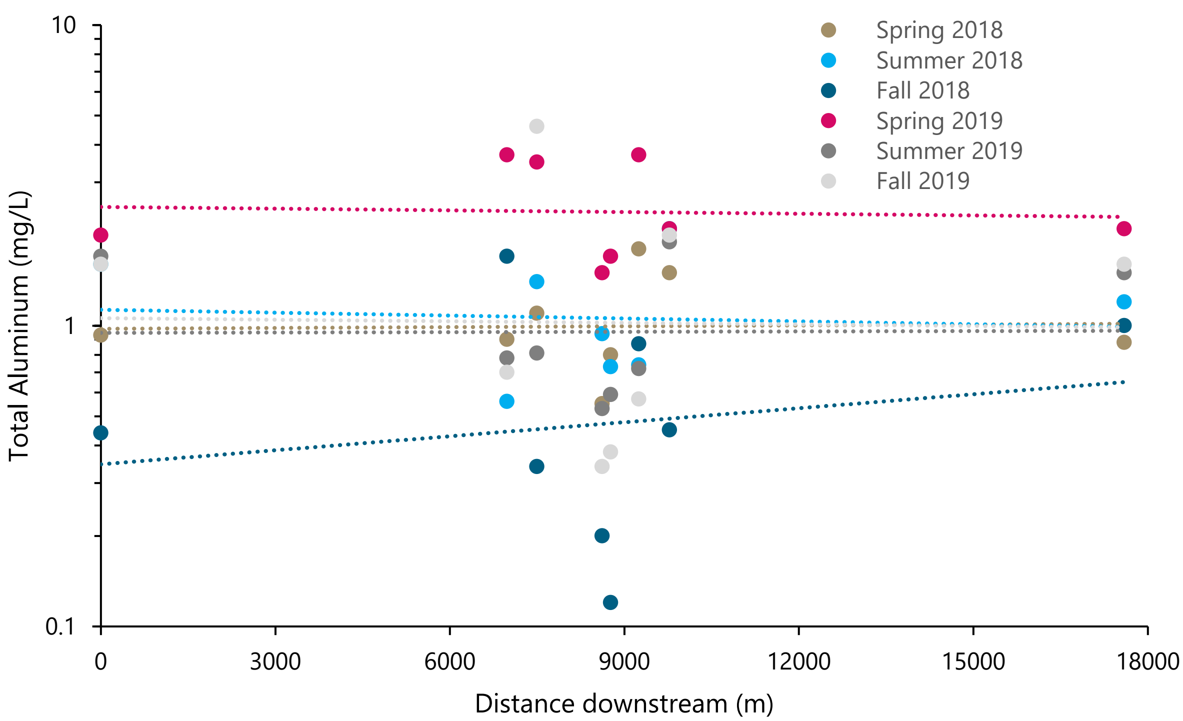


Table D Regression parameters and power for spatial trends in total aluminum concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	0.977	9.419E-07	0.0008		0.001	0.050
Summer 2018	1.130	-3.221E-06	0.0062		0.006	0.052
Fall 2018	0.346	1.554E-05	0.0387		0.040	0.061
Spring 2019	2.484	-1.876E-06	0.0032		0.003	0.051
Summer 2019	0.947	4.007E-07	0.0001		0.000	0.050
Fall 2019	1.060	-1.731E-06	0.0004		0.000	0.050

4 Summary

AEMP water quality data are characterized by appreciable variability, which limits statistical power to detect trends. Note that power was examined *post hoc*, so it includes no information that was not contained in respective coefficients of determination and tests of significance, but the analysis does provide perspective as to the strength of any conclusions.

Seasonal trends were examined at each sampling location for a suite of water quality variables for which there were consistent detections. Whereas seasonal changes in water quality may be expected, the patterns of changes were examined to see if they differed with location in a manner that might be indicative of influence of operations; however, there was no evidence that position of sampling along the river had any effect on seasonal trends in water quality.

Similarly, for the same suite of water quality variables, data were considered for longitudinal trends (upstream to downstream) among locations at particular sampling times (this done for spring, summer, and fall, 2018 and 2019). In no instance was there a significant increasing trend in concentration for any analyte (i.e. no net difference between upstream background concentration and downstream concentration). There is variability in water quality adjacent to operations, but any higher concentration do not manifest in increases downstream and any effects may eb highly localized.

5 Closure

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Report Prepared by

ALBERTA SOCIETY of Professional Biologists
Rajiv Neal Tanna
2114
PROFESSIONAL BIOLOGIST

R. Neal Tanna, M.Sc., P.Biol.
Technical Consultant

Senior Review by:

ALBERTA SOCIETY of Professional Biologists
Michael B. Vander Meulen
1922
PROFESSIONAL BIOLOGIST

Michael Vander Meulen, Ph.D., P.Biol.
Senior Aquatic Ecologist

Advisian Americas

6 References

CCME (Canadian Council of Ministers for the Environment) 2017. Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Winnipeg, Manitoba. Available online at: http://st-ts.ccme.ca/en/index.html

Figure

LEGEND

	SNP - SURFACE WATER LOCATIONS
	SNP GROUNDWATER WELLS
	GNWT COMMUNITY BASED WATER MONITORING PROGRAM LOCATION
	AEMP MONITORING LOCATIONS
	MOST ACTIVE NATURAL SEEPS
	2009-2011 BOSWORTH CREEK SURFACE WATER MONITORING STATIONS

IMPERIAL
AQUATIC EFFECTS MONITORING PROGRAM
NORMAN WELLS, NT

AEMP MONITORING LOCATIONS

Date: 22-JAN-20	Drawn by: OTHERS	Edited by: MYT	App'd by:
Advisian Worley Group		Project No. 407011-00770-1000	
		FIG No 1	REV A

USER NAME: mira.telford
ISSUING OFFICE: eCAD
PLOT DATE & TIME: 22/1/2020 2:01:58 PM
SAVE DATE & TIME: 22/1/2020 2:01:16 PM

FILE LOCATION: U:\CAL\GBS\407011-00770\1000 - AEMP\11.0_FIGURES_&_MAPS\11.4_CAD_FILES\00770-1000-00-EN-DWG-2015-SITEPLAN.DWG

Tables

Advisian
Worley Group

Table 1
Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 407011-00770		Anions					Cations						General									Inorganic Nitrogen Compounds							Inorganic Sulphur Compounds	Miscellaneous			
Monitoring Station	Date	Bicarbonate	Carbonate	Chloride	Sulphate	Hydroxide	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Alkalinity (Total; as $CaCO_3$)	Alkalinity (PP; as $CaCO_3$)	Colour	Electrical Conductivity	Hardness (Total; as $CaCO_3$)	pH	Total Dissolved Solids	Total Suspended Solids	Turbidity	Ammonia (Total; as N)	Nitrate	Nitrate (as N)	Nitrite	Nitrite (as N)	Nitrite-plus-Nitrate (as N)	Total Kjeldahl Nitrogen	Sulphide (asH2S)	Biochemical Oxygen Demand	Chemical Oxygen Demand	Dissolved Organic Carbon	Total Organic Carbon
	(dd-mmm-yyyy)	(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)	(color unit)	(uS/cm)	(mg/L)	(pH Units)	(mg/L)	(mg/L)	(NTU)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		---	---	120	---	---	---	0.3	---	---	---	---	---	---	---	---	---	(6.5 - 9)	---	---	---	8.5	---	2.9	---	0.06	---	---	---	---	---	---	---
AEMP																																	
AEMP-01	16-Sep-2017	120	< 0.50	9.4	48	< 0.50	42	< 0.060	11	< 0.0040	0.94	9.0	99	< 0.50	---	320	150	---	160	22	---	---	0.17	0.038	< 0.033	< 0.010	0.038	---	< 0.0020	< 2.0 [#2]	---	4.3	3.5
	16-Oct-2017	120	< 1.0	10	47	< 1.0	37	< 0.060	11	< 0.0040	0.94	9.3	97	< 1.0	---	310	140	---	170	8.0	---	---	0.20	0.046	< 0.033	< 0.010	0.046	---	0.0020	< 2.0	---	3.6	4.2
	23-Jun-2018	100	< 1.0	6.3	44	< 1.0	33	< 0.060	9.5	< 0.0040	0.82	6.1	82	< 1.0	---	260	120	---	160	71	60	0.024	0.16	0.035	< 0.033	< 0.010	0.035	0.28	< 0.0020	---	32	5.7	5.0
	14-Aug-2018	120	< 1.0	8.7	57	< 1.0	38	< 0.060	12	< 0.0040	0.84	7.6	98	< 1.0	---	330	140	---	190	220	130	0.033	0.095	0.021	< 0.033	< 0.010	0.021	0.64	0.016	< 2.0	41	4.9	5.2
	18-Oct-2018	110	< 1.0	11	32	< 1.0	30	< 0.060	10	0.0093	0.91	10	86	< 1.0	---	260	120	---	160	58	7.3	< 0.015	0.35	0.079	< 0.033	< 0.010	0.079	0.21	0.0050	2.1	22	2.8	3.1
	10-Jun-2019	98	< 1.0	5.8	37	< 1.0	31	< 0.060	8.1	< 0.0040	0.78	5.7	80	< 1.0	19	250	110	8.00	180	150	120	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.44	0.0090	< 2.0 [#3]	45	6.8	5.8
	26-Aug-2019	120	< 1.0	9.6	57	< 1.0	38	< 0.060	12	< 0.0040	0.86	8.2	99	< 1.0	9.8	330	150	8.20	190	55	49	0.027	0.17	0.038	< 0.033	< 0.010	0.038	0.30	0.0050	< 2.0	21	5.2	4.7
	01-Oct-2019	120	< 1.0	11	60	< 1.0	39	< 0.060	11	< 0.0040	0.93	8.9	96	< 1.0	21	320	140	8.07	220	76	92	0.020	0.15	0.033	< 0.033	< 0.010	0.033	0.37	0.011	2.2	45	6.7	5.9
AEMP-02	18-Aug-2017	230	< 0.50	24	140	< 0.50	76	< 0.060	28	0.0077	1.1	23	190	< 0.50	---	650	310	---	400	4.0	---	---	0.054	0.012	< 0.033	< 0.010	< 0.014	---	---	< 2.0 [#4]	---	3.3	4.0
	16-Sep-2017	220	< 0.50	19	130	< 0.50	80	< 0.060	29	0.0081	1.0	18	180	< 0.50	---	630	320	---	390	2.7	---	---	0.15	0.033	< 0.033	< 0.010	0.033	---	0.0030	< 2.0 [#2]	---	5.1	4.2
(Duplicate)	16-Sep-2017	220	< 0.50	19	130	< 0.50	79	< 0.060	29	0.0078	0.96	18	180	< 0.50	---	630	320	---	380	1.3	---	---	0.15	0.033	< 0.033	< 0.010	0.033	---	0.0020	< 2.0 [#2]	---	4.3	3.7
	16-Oct-2017	220	< 1.0	20	150	< 1.0	75	< 0.060	30	0.0091	0.97	19	180	< 1.0	---	650	310	---	420	21	---	---	0.26	0.059	< 0.033	< 0.010	0.059	---	< 0.0020	< 2.0	---	3.8	4.0
	23-Jun-2018	230	< 1.0	19	130	< 1.0	78	< 0.060	28	0.0058	1.1	17	180	< 1.0	---	620	310	---	400	2.0	1.3	0.019	0.17	0.038	< 0.033	< 0.010	0.038	0.21	< 0.0020	---	13	4.8	4.3
	12-Aug-2018	220	< 1.0	14	140	< 1.0	74	< 0.060	29	0.0079	1.0	16	180	< 1.0	---	610	300	---	400	3.3	---	0.018	0.068	0.015	< 0.033	< 0.010	0.015	0.23	0.0030	< 2.0	19	3.8	4.2
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.086	0.019	< 0.033	< 0.010	0.019	---	---	---	---	---	---
	16-Oct-2018	230	< 1.0	17	160	< 1.0	78	< 0.060	31	0.0046	1.0	18	190	< 1.0	---	660	320	---	410	19	1.5	< 0.015	0.17	0.038	< 0.033	< 0.010	0.038	0.17	< 0.0020	2.5 [#2]	13	2.7	2.9
	03-Jun-2019	190	< 1.0	17	120	< 1.0	65	< 0.060	24	0.0050	0.85	14	160	< 1.0	16	560	260	8.21	350	4.7	3.7	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.21	< 0.0020	< 2.0	15	5.2	4.7
(Duplicate)	03-Jun-2019	190	< 1.0	17	120	< 1.0	65	< 0.060	24	0.0049	0.84	14	160	< 1.0	18	560	260	8.18	360	4.0	4.1	< 0.015	0.19	0.042	< 0.033	< 0.010	0.042	0.21	< 0.0020	< 2.0	20	5.0	4.9
	28-Aug-2019	230	< 1.0	17	140	< 1.0	76	< 0.060	27	0.0069	0.96	16	190	< 1.0	15	630	300	8.29	400	3.3	2.0	0.028	0.18	0.040	< 0.033	< 0.010	0.040	0.24	< 0.0020	< 2.0	< 10	5.6	4.5
	03-Oct-2019	230	< 1.0	19	160	< 1.0	83	< 0.060	32	0.0069	1.0	19	190	< 1.0	7.0	670	340	---	430	3.3	2.0	0.022	0.27	0.060	< 0.033	< 0.010	0.060	0.19	0.0020	< 2.0	20	3.1	2.9
AEMP-03	18-Aug-2017	220	2.6	24	140	< 0.50	76	< 0.060	28	0.0056	1.1	22	190	2.2	---	650	310	---	400	1.3	---	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	---	---	< 2.0 [#4]	---	3.3	3.7
	16-Sep-2017	220	< 0.50	19	130	< 0.50	79	< 0.060	29	0.0057	1.0	17	180	< 0.50	---	630	320	---	400	2.7	---	---	0.14	0.032	< 0.033	< 0.010	0.032	---	< 0.0020	< 2.0 [#2]	---	4.4	4.0
	16-Oct-2017	220	< 0.50	20	150	< 0.50	75	< 0.060	30	0.0063	0.94	19	180	< 0.50	---	650	310	---	420	10	---	---	0.26	0.059	< 0.033	< 0.010	0.059	---	< 0.0020	< 2.0	---	3.6	4.1
	23-Jun-2018	230	< 1.0	20	140	< 1.0	77	< 0.060	28	0.0060	1.1	18	190	< 1.0	---	630	310	---	380	2.0	1.4	0.019	0.17	0.038	< 0.033	< 0.010	0.038	0.20	< 0.0020	---	24	5.1	4.3
	12-Aug-2018	220	< 1.0	14	140	< 1.0	73	< 0.060	29	0.0057	1.0	15	180	< 1.0	---	610	300	---	400	2.7	---	< 0.015	0.057	0.013	< 0.033	< 0.010	< 0.014	0.23	0.0020	< 2.0	21	3.8	4.2
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.089	0.020	< 0.033	< 0.010	0.020	---	---	---	---	---	---
	16-Oct-2018	220	< 1.0	17	160	< 1.0	78	< 0.060	31	< 0.0040	1.0	17	180	< 1.0	---	660	320	---	420	42	3.6	< 0.015	0.17	0.038	< 0.033	< 0.010	0.038	0.24	< 0.0020	< 2.0 [#2]	15	3.1	3.0
	03-Jun-2019	190	< 1.0	17	110	< 1.0	65	< 0.060	24	0.0052	0.91	14	160	< 1.0	16	560	260	8.29	370	3.3	3.2	< 0.015	0.19	0.043	< 0.033	< 0.010	0.043	0.20	< 0.0020	< 2.0	21	5.5	4.8
	28-Aug-2019	220	< 1.0	17	140	< 1.0	76	< 0.060	28	0.0055	1.0	16	180	< 1.0	14	630	300	8.22	400	3.3	1.8	0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.23	< 0.0020	< 2.0	< 10	5.4	4.7
	02-Oct-2019	230	< 1.0	19	150	< 1.0	79	< 0.060	30	0.0044	0.99	18	180	< 1.0	7.9	680	320	8.31	440	2.7	0.55	0.024	0.26	0.060	< 0.033	< 0.010	0.060	0.23	< 0.0020	< 2.0	13	3.6	3.7
AEMP-04	18-Aug-2017	230	< 0.50	24	140	< 0.50	76	< 0.060	28	0.0047	1.1	21	190	< 0.50	---	650	310	---	440	3.3	---	---	0.058	0.013	< 0.033	< 0.010	< 0.014	---	---	< 2.0	---	4.6	4.3
	16-Sep-2017	210	< 0.50	19	130	< 0.50	73	< 0.060	28	0.0049	0.99	17	180	< 0.50	---	620	300	---	390	2.0	---	---	0.14	0.031	< 0.033	< 0.010	0.031	---	< 0.0020	< 2.0 [#2]	---	4.0	4.3
	16-Oct-2017	210	< 1.0	21	150	< 1.0	75	< 0.060	30	0.0050	0.98	19	170	< 1.0	---	660	310	---	420	6.0	---	---	0.26	0.059	< 0.033	< 0.010	0.059	---	< 0.0020	< 2.0	---	3.0	3.5
	23-Jun-2018	230	< 1.0	20	140	< 1.0	76	< 0.060	28	0.0070	1.1	18	180	< 1.0	---	640	300	---	380	4.7	1.4	0.039	0.18	0.041	< 0.033	< 0.010	0.041	0.20	< 0.0020	---	15	4.9	3.9
(Duplicate)	23-Jun-2018	230	< 1.0	19	140	< 1.0	71	< 0.060	26	0.0066	1.0	17	190	< 1.0	---	640	280	---	390	4.7	1.1	0.037	0.18	0.040	< 0.033	< 0.010	0.040	0.21	< 0.0020	---	22	4.7	4.1
	12-Aug-2018	220	< 1.0	14	140	< 1.0	73	< 0.060	29	0.0055	0.99	15	180	< 1.0	---	610	300	---	400	3.3	---	< 0.015	0.054	0.012	< 0.033	< 0.010	< 0.014	0.19	< 0.0020	< 2.0	16	4.0	3.8
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.083	0.019	< 0.033	< 0.010	0.019	---	---	---	---	---	---
	16-Oct-2018	230	< 1.0	17	160	< 1.0	79	< 0.060	31	< 0.0040	1.0	17	180	< 1.0	---	660	330	---	420	16	1.3	< 0.015	0.17	0.037	< 0.033	< 0.010	0.037	0.15	0.0030	< 2.0 [#2]	14	2.5	2.7
	03-Jun-2019	190	< 1.0	17	120	< 1.0	65	< 0.060	24	0.0041	0.86	14	160	< 1.0	16	560	260	8.22	360	6.0	4.2	< 0.015	0.18	0.041	< 0.033	< 0.010	0.041	0.31	< 0.0020	< 2.0	15	5.3	4.3
	25-Aug-2019	210	< 1.0	13	140	< 1.0	69	< 0.060	28	0.0049	0.91	13	180	< 1.0	9.8	600	290	8.26	360	3.3	2.9	0.030 [#5]	0.16	0.036	< 0.033	< 0.010	0.036	0.22	< 0.0020	< 2.0 [#4]	13	4.5	4.7
	02-Oct-2019	230	< 1.0	18	150	< 1.0	78	< 0.060	30	< 0.0040	1.0	17	180	< 1.0	7.9	690	320	8.31	440	1.3	0.51	< 0.015	0.28	0.063	< 0.033	< 0.010	0.063	0.14	< 0.0020	< 2.0	15	3.7	3.2
AEMP-05	19-Aug-2017	210	< 0.50	4.5	19	< 0.50	52	0.073	14	0.0071	1.5	5.6	170	< 0.50	---	360	190	---	210	2.7	---	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	---	---	< 2.0	---	10	9.0
	16-Sep-2017	200	< 0.50	4.7	18	< 0.50	53	< 0.060	13	< 0.0040	1.7	5.1	160	< 0.50	---	350	190	---	180	1.3	---	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	---	< 0.0020	2.0 [#2]	---	9.1	7.8
	15-Oct-2017	200	< 0.50	5.6	18	< 0.50	48	< 0.060	14	0.0052	2.3	5.2	170	< 0.50	---	350	180	---	180	2.0	---	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	---	< 0.0020	< 2.0	---	10	10
	23-Jun-2018	110	< 1.0	6.6	47	< 1.0	34	< 0.060	10	0.013	0.84	6.3	88	< 1.0	---	280	130	---	150	71	61	0.030	0.14	0.031	< 0.033	< 0.010	0.031	0.35	0.0030	---	35	5.6	5.4
	13-Aug-2018	190	< 1.0	3.7	5.0	< 1.0	42	0.34 [#1]	14	0.028	1.4	3.9	160	< 1.0	---	310	160	---	200	3.3	---	0.028	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	0.55	0.0040	< 2.0	42	12	12
	14-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	---	---	---	---	---	---
	18-Oct-2018	230	< 1.0	5.1	14	< 1.0	52	0.18	15	0.18	3.6	4.6	190	< 1.0	---	380	190	---	220	2.0	2.4	< 0.015	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	0.52	0.0040	2.9	32	12	12
	02-Jun-2019	190	< 1.0	3.6	9.8	< 1.0	43	0.25	14	0.040	2.4	3.8	150	< 1.0	20	320	160	7.98	210	4.0	4.9	< 0.015	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	0.47	0.0030	< 2.0	35	12	12
	27-Aug-2019	190	< 1.0	3.3	7.3	< 1.0	43	< 0.060	13	< 0.0040	2.0	3.3	160	< 1.0	15	310	160	8.21	190	1.3	0.90	0.034	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	0.51	< 0.0020	< 2.0 [#4]	26	13	11
	01-Oct-2019	190	< 1.0	4.0	5.3	< 1.0	42	0.11	16	< 0.0040	1.7	3.1	160	< 1.0	18	310	170	8.16	200	6.7	1.1	0.015	< 0.044	< 0.010	< 0.033	< 0.010	< 0.014	0.51	0.0030	< 2.0	38	14	13

Table 1
Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 407011-00770		Anions					Cations						General									Inorganic Nitrogen Compounds							Inorganic Sulphur Compounds	Miscellaneous			
Monitoring Station	Date (dd-mmm-yyyy)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Sulphide (asH2S) (mg/L)	Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		---	---	**120**	---	---	---	**0.3**	---	---	---	---	---	---	---	---	---	**(6.5 - 9)**	---	---	---	**8.5**	---	**2.9**	---	**0.06**	---	---	---	---	---	---	---
AEMP-06	21-Aug-2017	110	< 0.50	9.0	41	< 0.50	31	< 0.060	9.7	< 0.0040	0.84	8.2	87	< 0.50	---	270	120	---	170	39	---	---	0.25	0.057	< 0.033	< 0.010	0.057	---	---	< 2.0 [#6]	---	4.4	4.5
	16-Sep-2017	100	< 0.50	9.8	36	< 0.50	30	< 0.060	9.9	< 0.0040	0.91	8.6	85	< 0.50	---	260	120	---	140	19	---	---	0.31	0.070	< 0.033	< 0.010	0.070	---	< 0.0020	< 2.0 [#2]	---	4.6	4.3
	16-Oct-2017	110	< 0.50	10	38	< 0.50	32	< 0.060	10	0.0068	0.90	9.2	90	< 0.50	---	280	120	---	190	13	---	---	0.36	0.082	< 0.033	< 0.010	0.082	---	< 0.0020	< 2.0	---	3.8	4.3
	23-Jun-2018	92	< 1.0	7.5	34	< 1.0	28	< 0.060	8.5	< 0.0040	0.78	6.7	76	< 1.0	---	230	100	---	120	33	33	0.023	0.23	0.051	< 0.033	< 0.010	0.051	0.25	< 0.0020	---	21	5.1	4.5
	13-Aug-2018	110	< 1.0	11	43	< 1.0	30	< 0.060	9.6	< 0.0040	0.77	8.5	89	< 1.0	---	280	110	---	180	19 [#7]	24	0.015	0.16	0.035	< 0.033	< 0.010	0.035	0.23	0.0050	< 2.0	23	4.4	4.8
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.16	0.035	< 0.033	< 0.010	0.035	---	---	---	---	---	---
	18-Oct-2018	98	< 1.0	11	34	< 1.0	28	< 0.060	9.3	0.018	0.92	9.4	80	< 1.0	---	260	110	---	140	170	52	0.016	0.41	0.093	< 0.033	< 0.010	0.093	0.36	0.0030	2.8	29	3.1	2.7
	03-Jun-2019	93	< 1.0	8.2	32	< 1.0	26	< 0.060	8.4	< 0.0040	0.73	6.5	76	< 1.0	18	240	100	8.00	150	220	180	< 0.015	0.35	0.079	< 0.033	< 0.010	0.080	0.45	0.012	< 2.0	53	5.3	5.0
	25-Aug-2019	110	< 1.0	11	50	< 1.0	29	< 0.060	10	< 0.0040	0.80	8.3	88	< 1.0	6.9	270	110	8.15	160	22	25	0.031 [#5]	0.34	0.076	< 0.033	< 0.010	0.076	0.23	< 0.0020	< 2.0 [#4]	17	4.0	4.1
	02-Oct-2019	100	< 1.0	10	36	< 1.0	29	< 0.060	9.7	< 0.0040	0.79	8.0	82	< 1.0	9.9	260	110	8.06	160	18	21	< 0.015	0.35	0.078	< 0.033	< 0.010	0.078	0.20	0.0030	< 2.0	24	4.2	4.2
(Duplicate)	03-Oct-2019	99	< 1.0	10	35	< 1.0	29	< 0.060	9.6	< 0.0040	0.81	8.0	81	< 1.0	13	260	110	8.07	160	19	21	0.038	0.36	0.081	< 0.033	< 0.010	0.081	0.20	< 0.0020	< 2.0	20	4.3	3.8
AEMP-07	21-Aug-2017	110	< 0.50	9.1	41	< 0.50	31	< 0.060	9.7	< 0.0040	0.79	8.1	88	< 0.50	---	270	120	---	170	35	---	---	0.25	0.056	< 0.033	< 0.010	0.056	---	---	< 2.0 [#4]	---	4.5	3.6
(Duplicate)	21-Aug-2017	100	< 0.50	9.2	41	< 0.50	30	< 0.060	9.5	< 0.0040	0.82	8.0	86	< 0.50	---	270	110	---	180	37	---	---	0.25	0.056	< 0.033	< 0.010	0.056	---	---	< 2.0 [#4]	---	4.0	3.1
	16-Sep-2017	100	< 0.50	9.7	35	< 0.50	30	< 0.060	9.8	< 0.0040	0.88	8.6	86	< 0.50	---	260	110	---	140	25	---	---	0.31	0.070	< 0.033	< 0.010	0.070	---	< 0.0020	< 2.0 [#2]	---	5.2	4.2
	16-Oct-2017	100	< 0.50	10	37	< 0.50	29	< 0.060	9.5	0.022	0.85	8.8	82	< 0.50	---	260	110	---	170	17	---	---	0.37	0.083	< 0.033	< 0.010	0.083	---	< 0.0020	< 2.0 [#6]	---	3.8	3.3
	23-Jun-2018	93	< 1.0	7.7	33	< 1.0	27	< 0.060	8.4	< 0.0040	0.78	6.9	76	< 1.0	---	230	100	---	120	43	44	0.022	0.23	0.053	< 0.033	< 0.010	0.053	0.31	0.0050	---	32	5.0	5.0
	13-Aug-2018	110	< 1.0	11	43	< 1.0	31	< 0.060	10	< 0.0040	0.79	8.9	87	< 1.0	---	290	120	---	180	110	56	0.028	0.15	0.034	< 0.033	< 0.010	0.034	0.43	0.0040	< 2.0	41	4.6	5.0
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.14	0.032	< 0.033	< 0.010	0.032	---	---	---	---	---	---
	17-Oct-2018	100	< 1.0	11	35	< 1.0	28	< 0.060	9.5	0.013	0.94	10	82	< 1.0	---	260	110	---	150	24	12	< 0.015	0.40	0.091	< 0.033	< 0.010	0.091	0.18	< 0.0020	2.9 [#4]	9.2	3.0	2.5
(Duplicate)	17-Oct-2018	100	< 1.0	12	36	< 1.0	28	< 0.060	9.6	0.018	0.94	10	83	< 1.0	---	260	110	---	150	27	22	< 0.015	0.40	0.090	< 0.033	< 0.010	0.090	0.13	0.0020	2.6 [#4]	6.1	3.0	2.6
	03-Jun-2019	100	< 1.0	8.8	35	< 1.0	28	< 0.060	8.6	0.0098	0.81	8.7	82	< 1.0	18	260	100	8.16	170	230	190	< 0.015	0.35	0.078	< 0.033	< 0.010	0.078	0.52	0.017	2.5	62	6.0	5.4
	25-Aug-2019	100	< 1.0	11	38	< 1.0	29	< 0.060	10	< 0.0040	0.81	8.2	85	< 1.0	5.9	270	110	8.12	160	18	22	0.044 [#5]	0.34	0.077	< 0.033	< 0.010	0.077	0.22	0.0020	< 2.0 [#4]	15	4.5	3.8
	03-Oct-2019	100	< 1.0	9.7	35	< 1.0	29	< 0.060	9.6	0.029	0.78	7.9	85	< 1.0	8.9	260	110	8.03	140	920	120	0.027	0.34	0.078	< 0.033	< 0.010	0.078	0.78	0.0070	< 2.0	81	3.7	3.8
AEMP-08	17-Aug-2017	120	< 0.50	7.1	54	< 0.50	40	< 0.060	12	< 0.0040	0.93	7.8	96	< 0.50	---	310	150	---	180	33	---	---	0.18	0.040	< 0.033	< 0.010	0.040	---	< 0.0020	< 2.0	---	4.8	4.1
	21-Aug-2017	110	< 0.50	9.4	42	< 0.50	31	< 0.060	9.9	< 0.0040	0.83	8.4	88	< 0.50	---	280	120	---	160	31	---	---	0.25	0.057	< 0.033	< 0.010	0.057	---	---	< 2.0	---	3.7	3.6
	16-Sep-2017	110	< 0.50	10	38	< 0.50	33	< 0.060	10	0.0041	0.83	8.8	86	< 0.50	---	270	130	---	150	110	---	---	0.30	0.068	< 0.033	< 0.010	0.068	---	0.0080	< 2.0 [#2]	---	4.7	4.0
	16-Oct-2017	100	< 0.50	9.9	44	< 0.50	30	< 0.060	10	0.0049	0.89	8.8	82	< 0.50	---	270	120	---	130	29	---	---	0.38	0.086	< 0.033	< 0.010	0.086	---	< 0.0020	< 2.0	---	3.0	3.6
	23-Jun-2018	97	< 1.0	8.9	36	< 1.0	26	0.20	8.1	0.011	0.72	6.3	79	< 1.0	---	250	99	---	140	51	33	0.037	0.23	0.052	< 0.033	< 0.010	0.052	0.27	< 0.0020	---	33	5.5	4.9
	13-Aug-2018	110	< 1.0	11	45	< 1.0	33	< 0.060	11	< 0.0040	0.83	10	90	< 1.0	---	290	130	---	200	29	---	0.018	0.17	0.037	< 0.033	< 0.010	0.037	0.28	0.0030	< 2.0	25	4.8	4.8
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.17	0.038	< 0.033	< 0.010	0.038	---	---	---	---	---	---
	17-Oct-2018	100	< 1.0	11	40	< 1.0	31	< 0.060	11	< 0.0040	0.92	9.4	85	< 1.0	---	270	120	---	160	5.3	2.2	< 0.015	0.41	0.093	< 0.033	< 0.010	0.093	0.12	< 0.0020	2.4 [#6]	7.2	3.0	2.8
	03-Jun-2019	110	< 1.0	8.7	39	< 1.0	31	< 0.060	10	0.0048	0.82	7.4	87	< 1.0	17	280	120	8.07	190	130	97	< 0.015	0.54	0.12	< 0.033	< 0.010	0.12	0.38	0.0070	< 2.0	52	6.7	5.1
	28-Aug-2019	110	< 1.0	9.4	47	< 1.0	34	< 0.060	11	< 0.0040	0.84	8.5	94	< 1.0	14	300	130	8.17	180	22	17	0.026	0.31	0.069	< 0.033	< 0.010	0.069	0.23	0.0020	< 2.0	< 10	4.7	3.6
	03-Oct-2019	110	< 1.0	10	43	< 1.0	32	< 0.060	11	< 0.0040	0.81	8.5	89	< 1.0	8.9	290	120	---	150	18	20	0.015	0.34	0.077	< 0.033	< 0.010	0.077	0.19	0.0030	< 2.0	26	3.6	3.5
AEMP-09	21-Aug-2017	110	< 0.50	9.5	43	< 0.50	31	< 0.060	10	0.013	0.82	8.5	89	< 0.50	---	280	120	---	180	130	---	---	0.17	0.038	< 0.033	< 0.010	0.038	---	---	< 2.0	---	3.8	4.0
	16-Sep-2017	110	< 0.50	11	44	< 0.50	38	< 0.060	11	0.019	0.86	9.7	90	< 0.50	---	300	140	---	170	16 [#7]	---	---	0.18	0.040	< 0.033	< 0.010	0.040	---	0.0070	< 2.0 [#2]	---	4.9	4.7
	16-Oct-2017	160	< 0.50	16	45	< 0.50	36	< 0.060	12	0.092	1.0	26	130	< 0.50	---	380	140	---	200	290 [#7]	---	---	0.31	0.071	< 0.033	< 0.010	0.071	---	0.0030	< 2.0	---	6.2	7.5
	23-Jun-2018	96	< 1.0	8.2	34	< 1.0	28	< 0.060	8.6	< 0.0040	0.81	7.3	78	< 1.0	---	240	110	---	140	200	64	0.032	0.22	0.050	< 0.033	< 0.010	0.050	0.40	< 0.0020	---	34	5.0	4.7
	12-Aug-2018	110	< 1.0	12	44	< 1.0	35	0.20	11	0.020	0.93	11	94	< 1.0	---	300	130	---	190	45	---	0.024	0.093	0.021	< 0.033	< 0.010	0.021	0.30	0.0060	< 2.0	29	5.6	4.9
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.080	0.018	< 0.033	< 0.010	0.018	---	---	---	---	---	---
	17-Oct-2018	120	< 1.0	13	42	< 1.0	31	< 0.060	11	0.019	0.91	12	100	< 1.0	---	310	120	---	170	74	5.3	0.029	0.38	0.085	< 0.033	< 0.010	0.085	0.25	0.0060	2.4 [#6]	12	3.5	2.9
	02-Jun-2019	100	< 1.0	7.3	34	< 1.0	32	< 0.060	9.4	0.021	0.84	8.5	86	< 1.0	19	270	120	8.05	190	240 [#8]	180	0.018	0.33	0.074	< 0.033	< 0.010	0.074	0.57	0.013	< 2.0	64	6.6	6.9
	28-Aug-2019	120	< 1.0	9.5	40	< 1.0	33	< 0.060	11	0.0078	0.83	10	94	< 1.0	15	290	130	8.07	180	18	19	0.031	0.30	0.067	< 0.033	< 0.010	0.067	0.28	0.0030	< 2.0	16	6.6	5.4
	03-Oct-2019	110	< 1.0	9.9	41	< 1.0	31	< 0.060	10	0.0071	0.83	9.6	88	< 1.0	9.9	280	120	---	160	38	35	0.022	0.33	0.074	< 0.033	< 0.010	0.074	0.24	0.0050	< 2.0	25	3.6	3.1
AEMP-10	23-Jun-2018	99	< 1.0	7.3	38	< 1.0	31	< 0.060	8.7	< 0.0040	0.79	6.1	81	< 1.0	---	250	110	---	140	39	40	0.025	0.099	0.022	< 0.033	< 0.010	0.022	0.27	0.0040	---	33	5.8	5.1
	14-Aug-2018	120	< 1.0	8.6	49	< 1.0	36	< 0.060	11	< 0.0040	0.83	7.7	97	< 1.0	---	310	130	---	180	59	51	0.016	0.093	0.021	< 0.033	< 0.010	0.021	0.30	0.0040	< 2.0	25	4.5	4.8
(Duplicate)	14-Aug-2018	120	< 1.0	8.6	49	< 1.0	37	0.28	11	0.018	0.93	7.7	96	< 1.0	---	310	140	---	170	66	51	0.023	0.085	0.019	< 0.033	< 0.010	0.019	0.32	0.0030	< 2.0	26	5.3	4.9
	18-Oct-2018	100	< 1.0	11	33	< 1.0	28	< 0.060	9.5	0.0099	0.91	9.7	85	< 1.0	---	260	110	---	150	39	12	0.020	0.41	0.093	< 0.033	< 0.010	0.093	0.19	0.0030	< 2.0	9.2	2.9	3.0
	10-Jun-2019	96	< 1.0	6.2	35	< 1.0	30	< 0.060	7.6	< 0.0040	0.78	5.7	79	< 1.0	20	240	110	8.06	170	150	120	< 0.015	0.23	0.052	< 0.033	< 0.010	0.052	0.45	0.010	2.0 [#3]	44	7.3	6.0
	26-Aug-2019	120	< 1.0	11	50	< 1.0	35	< 0.060	11	< 0.0040	0.86	8.1	98	< 1.0	11	310	130	8.12	180	46	43	0.018	0.17	0.039	< 0.033	< 0.010	0.039	0.26	0.0050	< 2.0	26	5.7	4.6
	01-Oct-2019	120	< 1.0	9.9	60	< 1.0	39	< 0.060	11	< 0.0040	0.90	8.9	100	< 1.0	21	320	140	8.04	230	32	75	0.029	0.16	0.036	< 0.033	< 0.010	0.036	0.32	0.014	2.1	39	6.5	5.9

Advisian
Worley Group

Table 1
Surface Water Analytical Results: Indicator Analysis Parameters

PROJECT No.: 407011-00770		Anions					Cations						General									Inorganic Nitrogen Compounds							Inorganic Sulphur Compounds	Miscellaneous			
Monitoring Station	Date (dd-mmm-yyyy)	Bicarbonate (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Hydroxide (mg/L)	Calcium (mg/L)	Iron (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Alkalinity (Total; as $CaCO_3$) (mg/L)	Alkalinity (PP; as $CaCO_3$) (mg/L)	Colour (color unit)	Electrical Conductivity (uS/cm)	Hardness (Total; as $CaCO_3$) (mg/L)	pH (pH Units)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)	Ammonia (Total; as N) (mg/L)	Nitrate (mg/L)	Nitrate (as N) (mg/L)	Nitrite (mg/L)	Nitrite (as N) (mg/L)	Nitrite-plus-Nitrate (as N) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Sulphide (asH2S) (mg/L)	Biochemical Oxygen Demand (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Organic Carbon (mg/L)	Total Organic Carbon (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		**---**	**---**	**120**	**---**	**---**	**---**	**0.3**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**---**	**(6.5 - 9)**	**---**	**---**	**---**	**8.5**	**---**	**2.9**	**---**	**0.06**	**---**	**---**	**---**	**---**	**---**	**---**	**---**
AEMP-11	23-Jun-2018	96	< 1.0	6.8	35	< 1.0	29	< 0.060	8.4	< 0.0040	0.82	6.4	79	< 1.0	---	240	110	---	140	78	37	0.024	0.18	0.039	< 0.033	< 0.010	0.039	0.29	< 0.0020	---	31	5.2	5.0
	14-Aug-2018	110	< 1.0	9.3	44	< 1.0	37	< 0.060	10	0.0043	0.79	7.6	91	< 1.0	---	290	130	---	180	61	45	0.015	0.13	0.029	< 0.033	< 0.010	0.029	0.27	0.0040	< 2.0	28	4.3	4.8
	18-Oct-2018	110	< 1.0	12	36	< 1.0	29	< 0.060	9.3	< 0.0040	0.96	9.3	88	< 1.0	---	280	110	---	150	81	23	< 0.015	0.40	0.090	< 0.033	< 0.010	0.090	0.24	0.0020	< 2.0	16	3.1	2.7
	10-Jun-2019	92	< 1.0	7.7	31	< 1.0	28	< 0.060	7.6	< 0.0040	0.75	5.8	76	< 1.0	20	230	100	7.99	160	200	120	< 0.015	0.27	0.061	< 0.033	< 0.010	0.061	0.39	0.0060	< 2.0 [#3]	41	6.4	5.6
	26-Aug-2019	120	< 1.0	9.8	60	< 1.0	35	< 0.060	11	< 0.0040	0.85	8.1	98	< 1.0	9.8	310	130	8.18	180	47	43	0.026	0.18	0.040	< 0.033	< 0.010	0.040	0.28	0.0040	< 2.0	20	4.9	4.4
	01-Oct-2019	110	< 1.0	10	56	< 1.0	37	**0.91** [#1]	11	0.054	0.92	9.6	94	< 1.0	18	320	140	8.27	200	130	120	0.051 [#9]	0.25	0.056	< 0.033	< 0.010	0.056	0.44	0.0060	< 2.0	47	5.5	5.3
AEMP-12	23-Jun-2018	99	< 1.0	8.2	40	< 1.0	31	< 0.060	9.4	< 0.0040	0.79	7.3	81	< 1.0	---	260	120	---	130	23	23	0.022	0.23	0.053	< 0.033	< 0.010	0.053	0.24	< 0.0020	---	24	5.6	4.7
	14-Aug-2018	130	< 1.0	11	59	< 1.0	42	< 0.060	14	0.012	0.91	11	110	< 1.0	---	350	160	---	190	86	33	0.023	0.13	0.030	< 0.033	< 0.010	0.030	0.29	0.0040	2.5	31	4.2	4.3
	15-Aug-2018	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.15	0.033	< 0.033	< 0.010	0.033	---	---	< 2.0	---	---	---
	17-Oct-2018	180	< 1.0	15	120	< 1.0	62	< 0.060	25	0.0054	0.99	15	150	< 1.0	---	530	260	---	340	21	2.9	< 0.015	0.35	0.079	< 0.033	< 0.010	0.079	0.13	< 0.0020	2.6 [#6]	< 5.0	2.7	2.4
	03-Jun-2019	130	< 1.0	10	57	< 1.0	38	< 0.060	13	0.0071	0.81	9.1	100	< 1.0	18	350	150	8.10	230	93	74	< 0.015	0.28	0.064	< 0.033	< 0.010	0.064	0.32	0.0040	< 2.0	36	5.6	4.7
	28-Aug-2019	120	< 1.0	10	46	< 1.0	34	< 0.060	12	< 0.0040	0.84	9.1	95	< 1.0	12	310	130	8.18	190	16	16	0.026	0.36	0.081	< 0.033	< 0.010	0.081	0.21	< 0.0020	< 2.0	< 10	3.9	4.1
(Duplicate)	28-Aug-2019	110	< 1.0	10	48	< 1.0	34	< 0.060	12	0.0072	0.84	9.1	94	< 1.0	62	300	140	8.19	180	13	17	0.027	0.30	0.067	< 0.033	< 0.010	0.067	0.21	< 0.0020	< 2.0	< 10	5.5	3.7
	03-Oct-2019	110	< 1.0	11	45	< 1.0	32	< 0.060	11	0.0042	0.80	8.7	92	< 1.0	9.9	290	130	8.19	140	13	16	0.017	0.33	0.074	< 0.033	< 0.010	0.074	0.21	0.0030	< 2.0	30	3.4	3.6
AEMP-13	14-Aug-2018	120	< 1.0	10	60	< 1.0	41	**0.32** [#1]	12	0.042	0.92	8.5	100	< 1.0	---	350	150	---	200	220	83	0.039	0.098	0.022	< 0.033	< 0.010	0.022	0.42	0.020	< 2.0	28	5.1	5.2
	18-Oct-2018	150	< 1.0	14	51	< 1.0	43	< 0.060	12	0.040	1.1	11	120	< 1.0	---	370	160	---	210	23	19	0.022	0.17	0.038	< 0.033	< 0.010	0.038	0.20	0.0020	< 2.0	11	4.4	4.5
	02-Jun-2019	100	< 1.0	6.5	41	< 1.0	35	< 0.060	9.4	0.0065	0.91	6.6	84	< 1.0	20	270	130	8.09	180	330 [#8]	230	0.021	0.26	0.058	< 0.033	< 0.010	0.058	0.62	0.0070	< 2.0	73	5.9	6.2
	27-Aug-2019	150	< 1.0	9.6	62	< 1.0	43	< 0.060	13	0.022	0.96	8.8	130	< 1.0	14	380	160	8.15	240	10	35	0.064	0.14	0.031	< 0.033	< 0.010	0.031	0.31	0.0050	< 2.0 [#4]	14	6.2	5.4
	02-Oct-2019	250	< 1.0	9.7	72	< 1.0	79	< 0.060	22	0.68	1.6	8.7	210	< 1.0	18	520	290	8.03	350	16	61	0.32 [#9]	0.099	0.022	< 0.033	< 0.010	0.022	0.68	0.0070	< 2.0	32	8.1	7.6

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding

   (CCME. 2018. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2018.)

   Guideline based on chronic exposure

   Ammonia (Total; as N):

   Guideline for total ammonia is dependent on pH and temperature of surface water. Guideline based on Temperature of 10oC and pH of 7

   Nitrate (as N):

   Guideline based on long term exposure

   Nitrite (as N):

   Standard is for NO_2 as N, equivalent standard for NO_2 is 0.197 mg/L.
7. Superscript [#2] - Method blank exceeds 0.2 mg/L stipulated in Reference Method. No other Quality Control measures affected.
8. Superscript [#3] - Sample incubation time was outside method specifications. This may increase the uncertainty associated with these results.
9. Superscript [#4] - Sample analyzed past hold time. Sample analysis is recommended within 48 hours of sampling.
10. Superscript [#5] - Detection limits raised due to dilution to bring analyte within the calibrated range.
11. Superscript [#6] - Sample was past hold time when received.
12. Superscript [#7] - Detection limit raised based on sample volume used for analysis.
13. Superscript [#8] - Detection limit raised based on sample volume used and sample matrix
14. Superscript [#9] - Detection limits raised due to matrix interference.

Table 2
Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		**0.37**	**0.002**	**0.09**	---	---	---	---	---	---
AEMP										
AEMP-01	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	10-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	26-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	01-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-02	18-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
(Duplicate)	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	12-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	16-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	28-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-03	18-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	12-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	16-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	28-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-04	18-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	12-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	16-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	25-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-05	19-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	15-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	13-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10

Advisian
Worley Group

Table 2
Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		**0.37**	**0.002**	**0.09**	---	---	---	---	---	---
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	27-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	01-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-06	21-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	13-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	25-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-07	21-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
(Duplicate)	21-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	13-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	17-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	17-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	25-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-08	17-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	21-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	13-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	17-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	28-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-09	21-Aug-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Sep-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	16-Oct-2017	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00080	< 0.10	< 0.10	< 0.10
	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	12-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	17-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	28-Aug-2019	0.00043	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10

![Advisian Worley Group]

Table 2
Surface Water Analytical Results: Petroleum Hydrocarbons (PHCs)

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	m&p-Xylene (mg/L)	o-Xylene (mg/L)	Xylenes (Total) (mg/L)	PHC F1 (C_6-C_{10}) (mg/L)	PHC F1 (C_6-C_{10}) - BTEX (mg/L)	PHC F2 (C_{10}-C_{16}) (mg/L)
CCME CEQG Freshwater Aquatic Life #1		**0.37**	**0.002**	**0.09**	---	---	---	---	---	---
AEMP-10	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	10-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	26-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	01-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-11	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	10-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	26-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	01-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-12	23-Jun-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	17-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	28-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
(Duplicate)	28-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	03-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
AEMP-13	14-Aug-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	18-Oct-2018	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Jun-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	27-Aug-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10
	02-Oct-2019	< 0.00040	< 0.00040	< 0.00040	< 0.00080	< 0.00040	< 0.00089	< 0.10	< 0.10	< 0.10

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript #1 denotes values exceeding

(CCME. 2018. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2018.)

Advisian
Worley Group

Table 3
Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life		**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.002**	**0.3**	**0.001**	**---**	**---**	**0.000026**	**0.073**	**0.025**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
AEMP																													
AEMP-01	16-Sep-2017	0.051	< 0.00060	0.00025	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00092	0.0014	< 0.10	0.00035	1.8	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00072	< 0.0010	< 0.0030
	16-Oct-2017	0.024	< 0.00060	0.00028	0.047	< 0.0010	< 0.020	0.000022	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0010	0.0017	< 0.10	0.00034	1.7	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00076	< 0.0010	< 0.0030
	23-Jun-2018	0.047	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00097	0.0011	< 0.10	0.00029	1.6	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	14-Aug-2018	0.090	< 0.00060	0.00028	0.048	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000031	0.00090	0.0015	< 0.10	0.00034	1.6	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00083	< 0.0010	< 0.0030
	18-Oct-2018	0.0060	< 0.00060	0.00031	0.047	< 0.0010	0.020	< 0.000020	< 0.0010	< 0.00030	0.00088	< 0.060	< 0.00020	< 0.020	0.0093	< 0.0000020	0.00075	0.00092	< 0.10	< 0.00020	1.4	< 0.00010	0.27	< 0.00020	< 0.0010	< 0.0010	0.00056	< 0.0010	< 0.0030
	10-Jun-2019	0.020	< 0.00060	0.00021	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00085	0.0014	< 0.10	0.00026	1.7	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	26-Aug-2019	0.047	< 0.00060	0.00020	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00094	0.0014	< 0.10	0.00036	1.8	< 0.00010	0.27	< 0.00020	< 0.0010	< 0.0010	0.00084	< 0.0010	< 0.0030
	01-Oct-2019	0.032	< 0.00060	0.00033	0.051	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0017	< 0.10	0.00057	1.8	< 0.00010	0.24	< 0.00020	< 0.0010	0.0011	0.00078	< 0.0010	0.0057
AEMP-02	18-Aug-2017	< 0.0030	< 0.00060	< 0.00020	0.087	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00086	< 0.060	< 0.00020	< 0.020	0.0077	< 0.0000020	0.0019	0.00088	< 0.10	< 0.00020	2.1	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.00099	< 0.0010	< 0.0030
	16-Sep-2017	0.0054	< 0.00060	0.00020	0.077	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00042	< 0.060	< 0.00020	< 0.020	0.0081	0.0000023	0.0017	0.00069	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	16-Sep-2017	0.0051	< 0.00060	< 0.00020	0.076	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00037	< 0.060	< 0.00020	< 0.020	0.0078	0.0000021	0.0017	0.00074	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	16-Oct-2017	0.0033	< 0.00060	0.00021	0.072	< 0.0010	0.024	< 0.000020	< 0.0010	< 0.00030	0.00042	< 0.060	< 0.00020	< 0.020	0.0091	< 0.0000020	0.0018	0.00077	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	23-Jun-2018	< 0.0030	< 0.00060	0.00023	0.085	< 0.0010	0.028	< 0.000020	< 0.0010	< 0.00030	0.00045	< 0.060	< 0.00020	< 0.020	0.0058	< 0.0000020	0.0019	0.00074	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	12-Aug-2018	< 0.0030	< 0.00060	< 0.00020	0.078	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00062	< 0.060	< 0.00020	< 0.020	0.0079	0.0000020	0.0017	0.00078	< 0.10	0.00024	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	0.0060	< 0.00060	< 0.00020	0.068	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00092	< 0.060	< 0.00020	< 0.020	0.0046	< 0.0000020	0.0019	< 0.00050	< 0.10	< 0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	03-Jun-2019	0.0033	< 0.00060	0.00023	0.072	< 0.0010	0.021	< 0.000020	< 0.0010	< 0.00030	0.00086	< 0.060	< 0.00020	< 0.020	0.0050	< 0.0000020	0.0017	0.00060	< 0.10	< 0.00020	1.6	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.00098	< 0.0010	< 0.0030
(Duplicate)	03-Jun-2019	0.0035	< 0.00060	0.00020	0.071	< 0.0010	0.021	< 0.000020	< 0.0010	< 0.00030	0.00047	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.0016	0.00058	< 0.10	< 0.00020	1.6	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	28-Aug-2019	< 0.0030	< 0.00060	< 0.00020	0.076	< 0.0010	0.024	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	0.0069	< 0.0000020	0.0016	< 0.00050	< 0.10	< 0.00020	1.9	< 0.00010	1.3	< 0.00020	0.0047	< 0.0010	0.0011	< 0.0010	< 0.0030
	03-Oct-2019	< 0.0030	< 0.00060	< 0.00020	0.076	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00059	< 0.060	< 0.00020	< 0.020	0.0069	< 0.0000020	0.0018	0.00062	< 0.10	0.00020	2.1	< 0.00010	1.4	< 0.00020	0.0020	< 0.0010	0.0012	< 0.0010	0.0055
AEMP-03	18-Aug-2017	0.0060	< 0.00060	0.00022	0.088	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	0.0056	0.0000025	0.0018	0.00076	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	0.0046
	16-Sep-2017	0.0054	< 0.00060	< 0.00020	0.076	< 0.0010	0.025	< 0.000020	< 0.0010	< 0.00030	0.00051	< 0.060	< 0.00020	< 0.020	0.0057	0.0000033	0.0017	0.00073	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	16-Oct-2017	< 0.0030	< 0.00060	< 0.00020	0.070	< 0.0010	0.022	< 0.000020	< 0.0010	< 0.00030	0.00033	< 0.060	< 0.00020	< 0.020	0.0063	< 0.0000020	0.0018	0.00074	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	23-Jun-2018	0.0097	< 0.00060	0.00028	0.084	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00085	< 0.060	< 0.00020	< 0.020	0.0060	< 0.0000020	0.0021	0.00068	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	12-Aug-2018	0.0039	< 0.00060	0.00021	0.081	< 0.0010	0.028	< 0.000020	< 0.0010	< 0.00030	0.00070	< 0.060	< 0.00020	< 0.020	0.0057	< 0.0000020	0.0018	0.0016	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	16-Oct-2018	< 0.0030	< 0.00060	< 0.00020	0.068	< 0.0010	0.024	< 0.000020	< 0.0010	< 0.00030	0.00058	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0018	< 0.00050	< 0.10	< 0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	03-Jun-2019	0.025	< 0.00060	< 0.00020	0.070	< 0.0010	0.020	< 0.000020	< 0.0010	< 0.00030	0.00041	< 0.060	< 0.00020	< 0.020	0.0052	0.0000020	0.0015	0.00085	< 0.10	< 0.00020	1.7	< 0.00010	1.1	< 0.00020	< 0.0010	0.0011	0.0010	< 0.0010	< 0.0030
	28-Aug-2019	< 0.0030	< 0.00060	< 0.00020	0.077	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00032	< 0.060	< 0.00020	< 0.020	0.0055	< 0.0000020	0.0015	< 0.00050	< 0.10	< 0.00020	1.9	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	02-Oct-2019	< 0.0030	< 0.00060	< 0.00020	0.070	< 0.0010	0.027	< 0.000020	< 0.0010	< 0.00030	0.00030	< 0.060	< 0.00020	< 0.020	0.0044	< 0.0000020	0.0018	0.00057	< 0.10	0.00026	1.8	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
AEMP-04	18-Aug-2017	< 0.0030	< 0.00060	0.00042	0.087	< 0.0010	0.025	**0.00019** [#1]	< 0.0010	< 0.00030	0.00082	< 0.060	< 0.00020	< 0.020	0.0047	< 0.0000020	0.0020	0.0010	< 0.10	0.00029	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	16-Sep-2017	0.0033	< 0.00060	0.00021	0.079	< 0.0010	0.025	0.000028	< 0.0010	< 0.00030	0.00071	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.0018	0.00076	< 0.10	< 0.00020	1.9	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.019
	16-Oct-2017	< 0.0030	< 0.00060	< 0.00020	0.070	< 0.0010	0.022	< 0.000020	< 0.0010	< 0.00030	0.00031	< 0.060	< 0.00020	< 0.020	0.0050	< 0.0000020	0.0018	0.00051	< 0.10	0.00022	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	23-Jun-2018	0.0032	< 0.00060	0.00029	0.084	< 0.0010	0.029	< 0.000020	< 0.0010	< 0.00030	0.00055	< 0.060	< 0.00020	< 0.020	0.0070	< 0.0000020	0.0019	0.00059	< 0.10	< 0.00020	2.0	< 0.00010	1.3	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
(Duplicate)	23-Jun-2018	0.0034	< 0.00060	0.00029	0.083	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	0.0066	< 0.0000020	0.0018	0.00063	< 0.10	< 0.00020	1.8	< 0.00010	1.2	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.019
	12-Aug-2018	0.0069	< 0.00060	< 0.00020	0.078	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00053	< 0.060	< 0.00020	< 0.020	0.0055	< 0.0000020	0.0018	0.0010	< 0.10	< 0.00020	2.1	< 0.00010	1.4	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	< 0.0030	< 0.00060	< 0.00020	0.071	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	0.00097	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0019	< 0.00050	< 0.10	0.00020	2.0	< 0.00010	1.5	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
	03-Jun-2019	< 0.0030	< 0.00060	< 0.00020	0.070	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00037	< 0.060	< 0.00020	< 0.020	0.0041	< 0.0000020	0.0016	0.00063	< 0.10	< 0.00020	1.6	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0030
	25-Aug-2019	< 0.0030	< 0.00060	< 0.00020	0.075	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00031	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.0016	0.00058	< 0.10	< 0.00020	1.9	< 0.00010	1.3	< 0.00020	0.0019	< 0.0010	0.0011	< 0.0010	< 0.0030
	02-Oct-2019	< 0.0030	< 0.00060	0.00020	0.070	< 0.0010	0.026	< 0.000020	< 0.0010	< 0.00030	**0.0037** [#1]	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0019	0.00064	< 0.10	0.00024	1.8	< 0.00010	1.4	< 0.00020	0.0015	< 0.0010	0.0012	< 0.0010	0.0095
AEMP-05	19-Aug-2017	0.0030	< 0.00060	0.00089	0.15	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.00020	0.073	< 0.00020	< 0.020	0.0071	< 0.0000020	0.0015	0.00099	< 0.10	< 0.00020	0.21	< 0.00010	0.25	< 0.00020	< 0.0010	< 0.0010	0.00034	< 0.0010	< 0.0030
	16-Sep-2017	0.0043	< 0.00060	0.00049	0.14	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.00020	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0016	0.0010	< 0.10	< 0.00020	0.25	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00033	< 0.0010	< 0.0030
	15-Oct-2017	< 0.0030	< 0.00060	0.00064	0.13	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00042	< 0.060	< 0.00020	< 0.020	0.0052	< 0.0000020	0.0013	0.0012	< 0.10	< 0.00020	0.39	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00029	< 0.0010	< 0.0030
	23-Jun-2018	0.040	< 0.00060	0.00030	0.052	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	0.013	0.0000025	0.0010	0.0011	< 0.10	0.00033	1.5	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	13-Aug-2018	< 0.0030	< 0.00060	0.0011	0.15	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00055	**0.34** [#1]	< 0.00020	< 0.020	0.028	< 0.0000020	0.0017	0.0013	< 0.10	< 0.00020	0.44	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00018	< 0.0010	< 0.0030
	18-Oct-2018	0.015	< 0.00060	0.00081	0.17	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	0.18	< 0.00020	< 0.020	0.18	< 0.0000020	0.0015	0.0017	< 0.10	< 0.00020	0.34	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00032	< 0.0010	0.0032
	02-Jun-2019	0.0051	< 0.00060	0.00090	0.13	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00024	0.25	< 0.00020	< 0.020	0.040	< 0.0000020	0.00093	0.0011	< 0.10	< 0.00020	1.1	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00022	< 0.0010	< 0.0030
	27-Aug-2019	< 0.0030	< 0.00060	0.00062	0.15	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	< 0.00020	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0014	0.00068	< 0.10	< 0.00020	0.17	< 0.00010	0.17	< 0.00020	0.0018	< 0.0010	0.00018	< 0.0010	< 0.0030
	01-Oct-2019	< 0.0030	< 0.00060	0.00047	0.15	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00031	0.11	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.00080	< 0.10	< 0.00020	0.25	< 0.00010	0.15	< 0.00020	< 0.0010	< 0.0010	0.00018	< 0.0010	< 0.0030
AEMP-06	21-Aug-2017	0.032	< 0.00060	0.00038	0.043	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00087	0.0010	< 0.10	0.00033	1.5	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	16-Sep-2017	0.027	< 0.00060	0.00024	0.040	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.00091	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00079	0.0011	< 0.10	< 0.00020	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	0.010
	16-Oct-2017	0.013	< 0.00060	0.00030	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00083	< 0.060	< 0.00020	< 0.020	0.0068	< 0.0000020	0.0014	0.0013	< 0.10	0.00022	1.5	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00080	< 0.0010	< 0.0030
	23-Jun-2018	0.027	< 0.00060	0.00032	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00086	0.00096	< 0.10	0.00021	1.4	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	< 0.0030
	13-Aug-2018	0.048	< 0.00060	0.00029	0.043	< 0.0010	< 0.020	0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00085	0.0017	< 0.10	0.00031	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00064	< 0.0010	0.0034
	18-Oct-2018	0.0069	< 0.00060	0.00049	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00079	< 0.060	< 0.00020	< 0.020	0.018	< 0.0000020	0.00077	0.00092	< 0.10	0.00027	1.4	< 0.00010	0.22	< 0.00020	0.0023	< 0.0010	0.00048	< 0.0010	< 0.0030
	03-Jun-2019	0.015	< 0.00060	0.00029	0.035	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000021	0.00074	0.00096	< 0.10	< 0.00020	1.4	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00058	< 0.0010	< 0.0030
	25-Aug-2019	0.024	< 0.00060	0.00023	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00091	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00068	0.00068	< 0.10	0.00022	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	02-Oct-2019	0.015	< 0.00060	0.00024	0.036	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00078	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.00098	< 0.10	0.00021	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	< 0.0030

Table 3

Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life		**0.1**	**---**	**0.005**	**---**	**---**	**1.5**	**0.00009**	**0.0089**	**---**	**0.002**	**0.3**	**0.001**	**---**	**---**	**0.000026**	**0.073**	**0.025**	**---**	**0.001**	**---**	**0.00025**	**---**	**0.0008**	**---**	**---**	**0.015**	**---**	**0.03**
(Duplicate)	03-Oct-2019	0.016	< 0.00060	0.00028	0.036	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00081	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.00096	< 0.10	0.00023	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
AEMP-07	21-Aug-2017	0.033	< 0.00060	0.00034	0.043	< 0.0010	< 0.020	0.000028	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00084	0.0011	< 0.10	0.00032	1.5	< 0.00010	0.22	< 0.00020	0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
(Duplicate)	21-Aug-2017	0.030	< 0.00060	0.00036	0.042	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00083	0.00089	< 0.10	0.00032	1.5	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	< 0.0030
	16-Sep-2017	0.026	< 0.00060	0.00022	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00075	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00072	0.0011	< 0.10	0.00022	1.4	< 0.00010	0.22	< 0.00020	0.0019	< 0.0010	0.00054	< 0.0010	< 0.0030
	16-Oct-2017	0.012	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00070	< 0.060	< 0.00020	< 0.020	0.022	< 0.0000020	0.00082	0.0010	< 0.10	< 0.00020	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00060	< 0.0010	< 0.0030
	23-Jun-2018	0.028	< 0.00060	0.00025	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000031	0.00081	0.0010	< 0.10	< 0.00020	1.4	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	13-Aug-2018	0.048	< 0.00060	0.00027	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000022	0.00076	0.0014	< 0.10	0.00026	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	17-Oct-2018	0.0077	< 0.00060	0.00044	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00092	< 0.060	< 0.00020	< 0.020	0.013	< 0.0000020	0.00081	0.00086	< 0.10	0.00025	1.3	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00050	< 0.0010	< 0.0030
(Duplicate)	17-Oct-2018	0.0088	< 0.00060	0.00046	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00081	< 0.060	< 0.00020	< 0.020	0.018	< 0.0000020	0.00087	0.00091	< 0.10	0.00024	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00048	< 0.0010	< 0.0030
	03-Jun-2019	0.016	< 0.00060	0.00033	0.037	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	0.0098	0.0000020	0.00089	0.0012	< 0.10	0.00023	1.4	< 0.00010	0.19	< 0.00020	0.0018	< 0.0010	0.00060	< 0.0010	< 0.0030
	25-Aug-2019	0.022	< 0.00060	0.00030	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00084	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00085	0.00092	< 0.10	0.00024	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00069	< 0.0010	< 0.0030
	03-Oct-2019	0.014	< 0.00060	0.00043	0.062	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00070	< 0.060	< 0.00020	< 0.020	0.029	< 0.0000020	0.00081	0.0025	< 0.10	0.00022	1.4	< 0.00010	0.20	< 0.00020	< 0.0010	< 0.0010	0.00057	< 0.0010	< 0.0030
AEMP-08	17-Aug-2017	0.067	< 0.00060	0.00043	0.051	< 0.0010	< 0.020	0.000030	< 0.0010	< 0.00030	0.0019	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0012	0.0015	< 0.10	0.00044	1.9	< 0.00010	0.25	< 0.00020	< 0.0010	< 0.0010	0.00085	0.0011	0.0049
	21-Aug-2017	0.035	< 0.00060	0.00035	0.044	< 0.0010	< 0.020	0.000032	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00086	0.0011	< 0.10	0.00026	1.6	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	16-Sep-2017	0.033	< 0.00060	0.00027	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0041	< 0.0000020	0.00070	0.0010	< 0.10	< 0.00020	1.5	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	16-Oct-2017	0.015	< 0.00060	0.00035	0.036	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	0.0049	< 0.0000020	0.00070	0.0011	< 0.10	0.00025	1.4	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	< 0.0030
	23-Jun-2018	**0.13** [#1]	< 0.00060	0.00031	0.047	< 0.0010	< 0.020	0.000023	< 0.0010	< 0.00030	**0.0030** [#1]	0.20	0.00026	< 0.020	0.011	0.0000026	0.00079	0.0012	< 0.10	0.00021	1.4	< 0.00010	0.18	< 0.00020	< 0.0010	0.0010	0.00050	< 0.0010	0.0078
	13-Aug-2018	0.048	< 0.00060	0.00036	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00086	0.0017	< 0.10	0.00022	1.5	< 0.00010	0.26	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	17-Oct-2018	0.0097	< 0.00060	0.00023	0.039	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.00099	< 0.10	< 0.00020	1.4	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	03-Jun-2019	0.018	< 0.00060	0.00029	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0048	< 0.0000020	0.00081	0.00096	< 0.10	0.00028	1.4	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00056	< 0.0010	< 0.0030
	28-Aug-2019	0.022	< 0.00060	0.00024	0.042	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00079	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00091	0.00088	< 0.10	0.00021	1.5	< 0.00010	0.31	< 0.00020	< 0.0010	< 0.0010	0.00066	< 0.0010	< 0.0030
	03-Oct-2019	0.014	< 0.00060	0.00039	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0021** [#1]	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00091	0.00086	< 0.10	0.00026	1.4	< 0.00010	0.27	< 0.00020	< 0.0010	0.0012	0.00057	< 0.0010	0.0098
AEMP-09	21-Aug-2017	0.031	< 0.00060	0.00039	0.045	< 0.0010	< 0.020	0.000027	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	0.013	< 0.0000020	0.00088	0.00098	< 0.10	0.00032	1.5	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00064	< 0.0010	< 0.0030
	16-Sep-2017	0.029	< 0.00060	0.00026	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	0.019	< 0.0000020	0.0010	0.0013	< 0.10	0.00028	1.4	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00080	< 0.0010	< 0.0030
	16-Oct-2017	0.0076	< 0.00060	0.00053	0.071	< 0.0010	0.050	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	0.092	< 0.0000020	0.00084	0.0012	< 0.10	0.00023	1.7	< 0.00010	0.26	< 0.00020	< 0.0010	< 0.0010	0.00060	< 0.0010	< 0.0030
	23-Jun-2018	0.026	< 0.00060	0.00036	0.039	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	0.0000023	0.00091	0.00095	< 0.10	< 0.00020	1.4	< 0.00010	0.18	< 0.00020	< 0.0010	< 0.0010	0.00051	< 0.0010	< 0.0030
	12-Aug-2018	**0.13** [#1]	< 0.00060	0.00038	0.053	< 0.0010	< 0.020	0.000025	< 0.0010	< 0.00030	0.0014	0.20	0.00023	< 0.020	0.020	0.0000027	0.00083	0.0016	< 0.10	0.00023	1.6	< 0.00010	0.27	< 0.00020	< 0.0010	0.0011	0.00070	< 0.0010	< 0.0030
	17-Oct-2018	0.0099	< 0.00060	0.00050	0.067	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0020 [#1]	< 0.060	< 0.00020	< 0.020	0.019	< 0.0000020	0.0010	0.0010	< 0.10	0.00020	1.4	< 0.00010	0.27	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	02-Jun-2019	0.017	< 0.00060	0.00039	0.049	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	0.021	0.0000021	0.0011	0.0012	< 0.10	0.00021	1.5	< 0.00010	0.19	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	28-Aug-2019	0.027	< 0.00060	0.00035	0.052	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0023** [#1]	< 0.060	< 0.00020	< 0.020	0.0078	< 0.0000020	0.0010	0.00094	< 0.10	0.00025	1.6	< 0.00010	0.26	< 0.00020	0.0014	< 0.0010	0.00064	< 0.0010	< 0.0030
	03-Oct-2019	0.020	< 0.00060	0.00034	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.0071	< 0.0000020	0.00084	0.00094	< 0.10	0.00021	1.4	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	0.0039
AEMP-10	23-Jun-2018	0.045	< 0.00060	0.00025	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00094	0.0012	< 0.10	0.00029	1.5	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
	14-Aug-2018	0.074	< 0.00060	< 0.00020	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0015	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00097	0.0017	< 0.10	0.00036	1.6	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00076	< 0.0010	< 0.0030
(Duplicate)	14-Aug-2018	**0.24** [#1]	< 0.00060	0.00050	0.054	< 0.0010	< 0.020	0.000065	< 0.0010	0.00050	0.0019	0.28	0.00034	< 0.020	0.018	0.0000021	0.00090	0.0024	< 0.10	0.00037	2.0	< 0.00010	0.22	< 0.00020	< 0.0010	0.0027	0.00077	< 0.0010	0.0079
	18-Oct-2018	0.0061	< 0.00060	0.00030	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00081	< 0.060	< 0.00020	< 0.020	0.0099	< 0.0000020	0.00077	0.00079	< 0.10	< 0.00020	1.4	< 0.00010	0.22	< 0.00020	< 0.0010	< 0.0010	0.00050	< 0.0010	< 0.0030
	10-Jun-2019	0.017	< 0.00060	0.00021	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	**0.0022** [#1]	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00090	0.0013	< 0.10	0.00026	1.6	< 0.00010	0.17	< 0.00020	< 0.0010	< 0.0010	0.00065	< 0.0010	< 0.0030
	26-Aug-2019	0.039	< 0.00060	< 0.00020	0.047	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0012	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00077	0.0012	< 0.10	0.00038	1.8	< 0.00010	0.25	< 0.00020	0.0019	< 0.0010	0.00078	< 0.0010	< 0.0030
	01-Oct-2019	0.026	< 0.00060	0.00028	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0014	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0018	< 0.10	0.00048	1.8	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00082	< 0.0010	< 0.0030
AEMP-11	23-Jun-2018	0.037	< 0.00060	0.00027	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.0011	0.0011	< 0.10	0.00027	1.5	< 0.00010	0.15	< 0.00020	< 0.0010	< 0.0010	0.00059	< 0.0010	0.0031
	14-Aug-2018	0.068	< 0.00060	0.00037	0.044	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0013	< 0.060	< 0.00020	< 0.020	0.0043	0.0000022	0.00084	0.0017	< 0.10	0.00024	1.5	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	18-Oct-2018	0.0074	< 0.00060	0.00021	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00099	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00076	0.00097	< 0.10	< 0.00020	1.4	< 0.00010	0.21	< 0.00020	< 0.0010	< 0.0010	0.00053	< 0.0010	< 0.0030
	10-Jun-2019	0.014	< 0.00060	0.00025	0.038	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00076	0.0011	< 0.10	0.00024	1.5	< 0.00010	0.16	< 0.00020	< 0.0010	< 0.0010	0.00055	< 0.0010	< 0.0030
	26-Aug-2019	0.038	< 0.00060	< 0.00020	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00079	0.0013	< 0.10	0.00033	1.8	< 0.00010	0.25	< 0.00020	< 0.0010	< 0.0010	0.00079	< 0.0010	< 0.0030
	01-Oct-2019	0.023	< 0.00060	0.00024	0.042	< 0.0010	0.020	0.000027	< 0.0010	0.00092	**0.0023** [#1]	**0.91** [#1]	< 0.00020	< 0.020	0.054	< 0.0000020	0.00085	0.0030	< 0.10	0.00032	1.7	< 0.00010	0.24	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	0.011
AEMP-12	23-Jun-2018	0.027	< 0.00060	0.00031	0.041	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0010	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00096	0.0011	< 0.10	0.00022	1.4	< 0.00010	0.23	< 0.00020	< 0.0010	< 0.0010	0.00054	< 0.0010	< 0.0030
	14-Aug-2018	0.044	< 0.00060	0.00031	0.051	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00092	< 0.060	< 0.00020	< 0.020	0.012	0.0000027	0.0010	0.0012	< 0.10	0.00028	1.6	< 0.00010	0.44	< 0.00020	< 0.0010	< 0.0010	0.00074	< 0.0010	< 0.0030
	17-Oct-2018	0.0037	< 0.00060	0.00026	0.060	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00065	< 0.060	< 0.00020	< 0.020	0.0054	< 0.0000020	0.0015	0.00068	< 0.10	< 0.00020	1.9	< 0.00010	1.1	< 0.00020	< 0.0010	< 0.0010	0.00096	< 0.0010	< 0.0030
	03-Jun-2019	0.026	< 0.00060	0.00031	0.048	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00097	< 0.060	< 0.00020	< 0.020	0.0071	0.0000020	0.0010	0.0010	< 0.10	0.00022	1.5	< 0.00010	0.46	< 0.00020	< 0.0010	< 0.0010	0.00067	< 0.0010	< 0.0030
	28-Aug-2019	0.021	< 0.00060	0.00023	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00071	< 0.060	< 0.00020	< 0.020	< 0.0040	< 0.0000020	0.00089	0.00087	< 0.10	0.00026	1.5	< 0.00010	0.36	< 0.00020	< 0.0010	< 0.0010	0.00062	< 0.0010	< 0.0030
(Duplicate)	28-Aug-2019	0.021	< 0.00060	0.00026	0.045	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00075	< 0.060	< 0.00020	< 0.020	0.0072	< 0.0000020	0.00084	0.00083	< 0.10	0.00022	1.5	< 0.00010	0.35	< 0.00020	< 0.0010	< 0.0010	0.00063	< 0.0010	< 0.0030
	03-Oct-2019	0.019	< 0.00060	0.00023	0.040	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.00065	< 0.060	< 0.00020	< 0.020	0.0042	< 0.0000020	0.00081	0.00086	< 0.10	0.00023	1.4	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00058	< 0.0010	0.0050
AEMP-13	14-Aug-2018	**0.21** [#1]	< 0.00060	0.00049	0.063	< 0.0010	< 0.020	0.000071	< 0.0010	0.00041	**0.0024** [#1]	**0.32** [#1]	0.00039	< 0.020	0.042	0.0000028	0.00093	0.0031	< 0.10	0.00036	2.0	< 0.00010	0.24	< 0.00020	< 0.0010	0.0030	0.00090	< 0.0010	0.0072
	18-Oct-2018	0.0090	< 0.00060	0.00032	0.056	< 0.0010	< 0.020	0.000021	< 0.0010	< 0.00030	0.0016	< 0.060	< 0.00020	< 0.020	0.040	< 0.0000020	0.0010	0.0017	< 0.10	0.00029	1.7	< 0.00010	0.28	< 0.00020	< 0.0010	< 0.0010	0.00081	< 0.0010	< 0.0030
	02-Jun-2019	0.027	< 0.00060	0.00033	0.046	< 0.0010	< 0.020	< 0.000020	< 0.0010	< 0.00030	0.0017	< 0.060	< 0.00020	< 0.020	0.0065	0.0000026	0.00090	0.0014	< 0.10	0.00036	1.6	< 0.00010	0.19	< 0.00020	0.0013	< 0.0010	0.00070	< 0.0010	< 0.0030
	27-Aug-2019	0.042	< 0.00060	0.00028	0.055	< 0.0010	< 0.020	0.000028	< 0.0010	< 0.00030	0.0011	< 0.060	< 0.00020	< 0.020	0.022	< 0.0000020	0.0011	0.0016	< 0.10	0.00038	1.8	< 0.00010	0.30	< 0.00020	< 0.0010	< 0.0010	0.00091	< 0.0010	< 0.0030
	02-Oct-2019	0.0067	< 0.00060	0.00027	0.097	< 0.0010	< 0.020	0.000043	< 0.0010	0.0014	0.0011	< 0.060	< 0.00020	< 0.020	0.68	< 0.0000020	0.0012	0.0035	< 0.10	0.00032	2.9	< 0.00010	0.49	< 0.00020	< 0.0010	< 0.0010	0.00088	< 0.0010	< 0.0030

Advisian
Worley Group

Table 3
Surface Water Analytical Results: Dissolved Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#]		0.1	---	0.005	---	---	1.5	0.00009	0.0089	---	0.002	0.3	0.001	---	---	0.000026	0.073	0.025	---	0.001	---	0.00025	---	0.0008	---	---	0.015	---	0.03

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript [#1] denotes values exceeding

(CCME. 2018. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2018.)

Aluminum:
Standard varies with pH.
pH < 6.5 = 0.005 mg/L
pH >= 6.5 = 0.1 mg/L

Boron:
Guideline based on long term exposure

Cadmium:
Guideline based on long term exposure

Chromium (Total):
Limit is for Chromium(III).

Copper:
Guideline is hardness dependent. Presented guideline set to lower limit.

Lead:
Guideline is hardness dependent. Presented guideline set to lower limit.

Mercury:
Guideline for Inorganic mercury

Nickel:
Guideline is hardness dependent. Presented guideline set to lower limit.

Silver:
Guideline based on long term exposure

Uranium:
Guideline based on long term exposure

Advisian
Worley Group

Table 4
Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		**0.1**	---	**0.005**	---	---	**1.5**	**0.00009**	---	**0.0089**	---	**0.002**	**0.3**	**0.001**	---	---	---	**0.000026**	**0.073**	**0.025**	---	---	**0.001**	---	**0.00025**	---	---	**0.0008**	---	---	**0.015**	---	**0.03**
AEMP																																	
AEMP-01	16-Sep-2017	**0.52** [#1]	< 0.00060	0.00065	0.061	< 0.0010	< 0.020	0.000040	38	0.0010	0.00054	0.0020 [#1]	**0.88** [#1]	0.00048	< 0.020	11	0.022	< 0.0000020	0.0011	0.0029	< 0.10	1.1	0.00034	2.4	< 0.00010	9.4	0.23	< 0.00020	< 0.0010	0.0082	0.00083	0.0026	0.023
	16-Oct-2017	**0.33** [#1]	< 0.00060	0.00050	0.053	< 0.0010	< 0.020	0.000050	37	< 0.0010	0.00034	0.0017	**0.50** [#1]	0.00034	< 0.020	11	0.015	< 0.0000020	0.0011	0.0026	< 0.10	1.1	0.00039	2.1	< 0.00010	9.1	0.24	< 0.00020	< 0.0010	0.0083	0.00080	0.0020	0.0045
	23-Jun-2018	**1.5** [#1]	< 0.00060	0.0015	0.073	< 0.0010	< 0.020	**0.00015** [#1]	37	0.0028	0.0025	**0.0055** [#1]	**2.3** [#1]	**0.0016** [#1]	< 0.020	11	0.054	0.0000049	0.0016	0.0086	< 0.10	1.2	0.00060	2.9	< 0.00010	6.4	0.17	< 0.00020	< 0.0010	0.018	0.0011	0.0040	0.026
	14-Aug-2018	**2.1** [#1]	< 0.00060	0.0016	0.099	< 0.0010	< 0.020	**0.00042** [#1]	51	0.0022	0.0033	**0.0064** [#1]	**3.3** [#1]	**0.0023** [#1]	< 0.020	15	0.13	0.000010	0.0010	0.011	0.17	1.3	0.00048	4.3	< 0.00010	7.5	0.27	< 0.00020	< 0.0010	0.024	0.0011	0.0054	**0.056** [#1]
	18-Oct-2018	**0.45** [#1]	< 0.00060	0.00070	0.059	< 0.0010	< 0.020	0.000065	32	< 0.0010	0.00053	**0.0021** [#1]	**1.0** [#1]	0.00063	< 0.020	10	0.028	0.0000047	0.00076	0.0025	< 0.10	1.1	0.00030	2.1	< 0.00010	9.4	0.22	< 0.00020	< 0.0010	0.0079	0.00057	0.0016	0.0070
	10-Jun-2019	**2.1** [#1]	0.00094	0.0023	0.10	< 0.0010	< 0.020	**0.00015** [#1]	39	0.0038	0.0024	**0.0078** [#1]	**5.0** [#1]	**0.0026** [#1]	< 0.020	11	0.11	0.0000089	0.0013	0.0087	0.11	1.6	0.00045	4.2	< 0.00010	6.3	0.19	< 0.00020	< 0.0010	0.028	0.00086	0.0059	**0.045** [#1]
	26-Aug-2019	**1.9** [#1]	< 0.00060	0.0011	0.077	< 0.0010	< 0.020	0.000084	42	0.0028	0.0012	**0.0034** [#1]	**2.2** [#1]	0.0010 [#1]	< 0.020	12	0.040	0.0000033	0.0011	0.0049	< 0.10	1.5	0.00062	5.5	< 0.00010	8.3	0.27	< 0.00020	< 0.0010	0.086	0.0011	0.0055	0.013
	01-Oct-2019	**2.0** [#1]	< 0.00060	0.0017	0.11	< 0.0010	< 0.020	**0.00012** [#1]	39	0.0037	0.0015	**0.0050** [#1]	**3.4** [#1]	**0.0018** [#1]	< 0.020	12	0.047	0.0000074	0.0014	0.0066	< 0.10	1.5	0.00061	3.3	< 0.00010	9.2	0.25	< 0.00020	< 0.0010	0.037	0.00097	0.0060	0.017
AEMP-02	18-Aug-2017	0.039	< 0.00060	0.00026	0.085	< 0.0010	0.031	0.000020	74	< 0.0010	< 0.00030	0.00092	0.11	< 0.00020	< 0.020	27	0.0098	0.0000021	0.0018	0.00079	< 0.10	1.1	0.00021	2.1	< 0.00010	22	1.3	< 0.00020	< 0.0010	0.0032	0.0010	0.0014	< 0.0030
	16-Sep-2017	0.031	< 0.00060	0.00032	0.082	< 0.0010	0.024	< 0.000020	73	< 0.0010	< 0.00030	0.00064	0.096	< 0.00020	< 0.020	29	0.0087	< 0.0000020	0.0017	0.00077	< 0.10	1.0	< 0.00020	2.1	< 0.00010	19	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
(Duplicate)	16-Sep-2017	0.032	< 0.00060	0.00027	0.080	< 0.0010	0.023	< 0.000020	72	< 0.0010	< 0.00030	0.00035	0.10	< 0.00020	< 0.020	28	0.0084	< 0.0000020	0.0018	0.00078	< 0.10	0.98	< 0.00020	2.1	< 0.00010	19	1.2	< 0.00020	< 0.0010	< 0.0010	0.0011	0.0013	< 0.0030
	16-Oct-2017	**0.23** [#1]	< 0.00060	0.00040	0.079	< 0.0010	0.022	0.000027	75	< 0.0010	< 0.00030	0.00074	**0.57** [#1]	0.00030	< 0.020	31	0.020	< 0.0000020	0.0019	0.0014	< 0.10	1.1	0.00025	2.3	< 0.00010	20	1.4	< 0.00020	< 0.0010	0.0039	0.0012	0.0020	< 0.0030
	23-Jun-2018	0.047	< 0.00060	0.00036	0.086	< 0.0010	0.029	< 0.000020	76	< 0.0010	< 0.00030	0.00073	0.12	< 0.00020	< 0.020	27	0.0085	< 0.0000020	0.0027	0.0012	< 0.10	1.1	0.00031	2.0	< 0.00010	18	1.3	< 0.00020	< 0.0010	< 0.0010	0.0016	< 0.0010	< 0.0030
	12-Aug-2018	0.030	< 0.00060	0.00026	0.073	< 0.0010	0.023	< 0.000020	72	< 0.0010	< 0.00030	0.00033	0.11	< 0.00020	< 0.020	28	0.0091	0.0000025	0.0018	0.0010	< 0.10	0.93	< 0.00020	2.1	< 0.00010	14	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	**0.20** [#1]	< 0.00060	0.00024	0.074	< 0.0010	0.027	0.000031	78	< 0.0010	< 0.00030	0.00071	**0.50** [#1]	0.00026	< 0.020	31	0.017	0.0000020	0.0019	0.0013	< 0.10	1.1	0.00031	2.3	< 0.00010	18	1.5	< 0.00020	< 0.0010	0.0038	0.0013	< 0.0010	< 0.0030
	03-Jun-2019	0.081	< 0.00060	0.00032	0.076	< 0.0010	0.022	< 0.000020	67	< 0.0010	< 0.00030	0.00076	0.18	< 0.00020	< 0.020	25	0.0078	< 0.0000020	0.0016	0.00089	< 0.10	1.1	< 0.00020	1.8	< 0.00010	15	1.1	< 0.00020	< 0.0010	0.0012	0.0011	< 0.0010	< 0.0030
(Duplicate)	03-Jun-2019	0.078	< 0.00060	0.00027	0.077	< 0.0010	0.022	< 0.000020	68	< 0.0010	< 0.00030	0.00061	0.19	< 0.00020	< 0.020	25	0.0081	< 0.0000020	0.0017	0.00079	< 0.10	1.0	< 0.00020	1.8	< 0.00010	15	1.1	< 0.00020	< 0.0010	0.0022	0.0011	< 0.0010	< 0.0030
	28-Aug-2019	0.079	< 0.00060	0.00023	0.083	< 0.0010	0.023	< 0.000020	79	< 0.0010	< 0.00030	0.00047	0.17	< 0.00020	< 0.020	28	0.0087	< 0.0000020	0.0018	0.00083	< 0.10	1.1	< 0.00020	2.1	< 0.00010	17	1.2	< 0.00020	< 0.0010	0.077	0.0011	< 0.0010	< 0.0030
	03-Oct-2019	0.020	< 0.00060	< 0.00020	0.075	< 0.0010	0.029	< 0.000020	79	< 0.0010	< 0.00030	0.00051	0.082	< 0.00020	< 0.020	28	0.0078	< 0.0000020	0.0016	0.0010	< 0.10	1.0	0.00032	1.8	< 0.00010	19	1.4	< 0.00020	< 0.0010	0.0010	0.0012	< 0.0010	< 0.0030
AEMP-03	18-Aug-2017	0.027	< 0.00060	0.00036	0.085	< 0.0010	0.029	< 0.000020	74	< 0.0010	< 0.00030	0.00093	0.087	< 0.00020	< 0.020	27	0.0075	0.0000091	0.0020	0.00068	< 0.10	1.1	0.00023	2.1	< 0.00010	21	1.3	< 0.00020	< 0.0010	< 0.0010	0.00096	0.0022	< 0.0030
	16-Sep-2017	0.022	< 0.00060	0.00034	0.081	< 0.0010	0.023	0.000024	73	< 0.0010	< 0.00030	0.00054	0.071	< 0.00020	< 0.020	28	0.0063	< 0.0000020	0.0021	0.00059	< 0.10	0.98	0.00024	2.1	< 0.00010	19	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	< 0.0010	0.0042
	16-Oct-2017	**0.11** [#1]	< 0.00060	0.00026	0.073	< 0.0010	0.021	< 0.000020	73	< 0.0010	< 0.00030	0.00049	0.28	< 0.00020	< 0.020	30	0.014	< 0.0000020	0.0019	0.00091	< 0.10	1.0	0.00027	2.2	< 0.00010	19	1.4	< 0.00020	< 0.0010	0.0035	0.0012	0.0014	< 0.0030
	23-Jun-2018	0.046	< 0.00060	0.00035	0.086	< 0.0010	0.029	< 0.000020	76	< 0.0010	< 0.00030	0.00084	0.10	< 0.00020	< 0.020	27	0.0084	< 0.0000020	0.0026	0.0010	< 0.10	1.1	0.00025	2.0	< 0.00010	18	1.3	< 0.00020	< 0.0010	0.0022	0.0015	< 0.0010	< 0.0030
	12-Aug-2018	0.026	< 0.00060	0.00037	0.074	< 0.0010	0.020	< 0.000020	73	< 0.0010	< 0.00030	0.00026	0.091	< 0.00020	< 0.020	28	0.0081	0.0000025	0.0017	0.00069	< 0.10	0.97	< 0.00020	2.1	< 0.00010	14	1.4	< 0.00020	< 0.0010	0.0041	0.0010	< 0.0010	< 0.0030
	16-Oct-2018	**0.47** [#1]	< 0.00060	0.00041	0.081	< 0.0010	0.030	0.000032	78	< 0.0010	0.00051	0.0011	**1.1** [#1]	0.00062	< 0.020	31	0.034	0.0000021	0.0018	0.0021	< 0.10	1.1	0.00027	2.6	< 0.00010	18	1.5	< 0.00020	< 0.0010	0.0095	0.0013	< 0.0010	0.0053
	03-Jun-2019	0.076	< 0.00060	0.00025	0.077	< 0.0010	0.022	< 0.000020	68	< 0.0010	< 0.00030	0.00063	0.18	< 0.00020	< 0.020	25	0.0071	< 0.0000020	0.0017	0.00084	< 0.10	1.0	0.00022	1.8	< 0.00010	15	1.1	< 0.00020	< 0.0010	0.0012	0.0011	< 0.0010	< 0.0030
	28-Aug-2019	0.054	< 0.00060	0.00026	0.081	< 0.0010	< 0.020	< 0.000020	77	< 0.0010	< 0.00030	0.00030	0.12	< 0.00020	< 0.020	27	0.0063	< 0.0000020	0.0016	0.00052	< 0.10	1.0	0.00020	2.0	< 0.00010	16	1.2	< 0.00020	< 0.0010	0.0011	0.0011	< 0.0010	< 0.0030
	02-Oct-2019	0.014	< 0.00060	0.00027	0.072	< 0.0010	< 0.020	< 0.000020	83	< 0.0010	< 0.00030	**0.0024** [#1]	< 0.060	< 0.00020	< 0.020	31	0.011	< 0.0000020	0.0019	0.00080	< 0.10	1.1	0.00023	2.0	< 0.00010	20	1.4	< 0.00020	< 0.0010	< 0.0010	0.0013	< 0.0010	< 0.0030
AEMP-04	18-Aug-2017	0.024	< 0.00060	0.00030	0.089	< 0.0010	0.030	< 0.000020	77	< 0.0010	< 0.00030	0.00058	0.10	< 0.00020	< 0.020	28	0.0068	< 0.0000020	0.0021	0.00089	< 0.10	1.2	0.00021	2.2	< 0.00010	22	1.3	< 0.00020	< 0.0010	0.0012	0.0010	0.0018	< 0.0030
	16-Sep-2017	0.019	< 0.00060	0.00031	0.081	< 0.0010	0.022	< 0.000020	74	< 0.0010	< 0.00030	0.00028	0.069	< 0.00020	< 0.020	29	0.0057	< 0.0000020	0.0018	0.00076	< 0.10	1.0	< 0.00020	2.1	< 0.00010	19	1.3	< 0.00020	< 0.0010	< 0.0010	0.0011	0.0011	< 0.0030
	16-Oct-2017	0.087	< 0.00060	0.00027	0.072	< 0.0010	< 0.020	< 0.000020	74	< 0.0010	< 0.00030	0.00041	0.21	< 0.00020	< 0.020	31	0.010	< 0.0000020	0.0020	0.00088	< 0.10	1.0	0.00025	2.1	< 0.00010	19	1.4	< 0.00020	< 0.0010	0.0015	0.0013	0.0015	< 0.0030
	23-Jun-2018	0.090	< 0.00060	0.00044	0.086	< 0.0010	0.029	< 0.000020	76	< 0.0010	< 0.00030	0.00083	0.14	< 0.00020	< 0.020	27	0.0098	< 0.0000020	0.0028	0.0012	< 0.10	1.1	0.00028	2.0	< 0.00010	19	1.3	< 0.00020	< 0.0010	0.0014	0.0015	< 0.0010	< 0.0030
(Duplicate)	23-Jun-2018	0.057	< 0.00060	0.00034	0.089	< 0.0010	0.031	< 0.000020	78	< 0.0010	< 0.00030	0.00077	0.15	< 0.00020	< 0.020	28	0.010	< 0.0000020	0.0023	0.00087	< 0.10	1.2	0.00023	2.1	< 0.00010	19	1.3	< 0.00020	< 0.0010	0.0015	0.0013	< 0.0010	< 0.0030
	12-Aug-2018	0.020	< 0.00060	0.00024	0.076	< 0.0010	0.023	< 0.000020	73	< 0.0010	< 0.00030	0.00050	0.088	< 0.00020	< 0.020	29	0.0072	0.0000027	0.0018	0.00074	< 0.10	0.92	< 0.00020	2.1	< 0.00010	14	1.4	< 0.00020	< 0.0010	0.0012	0.0011	< 0.0010	< 0.0030
	16-Oct-2018	**0.15** [#1]	< 0.00060	0.00027	0.072	< 0.0010	0.027	< 0.000020	76	< 0.0010	< 0.00030	0.00081	**0.35** [#1]	0.00021	< 0.020	31	0.012	< 0.0000020	0.0019	0.0010	< 0.10	1.0	0.00079	2.2	< 0.00010	17	1.5	< 0.00020	< 0.0010	0.0031	0.0012	< 0.0010	< 0.0030
	03-Jun-2019	0.077	< 0.00060	0.00026	0.076	< 0.0010	0.021	< 0.000020	68	< 0.0010	< 0.00030	0.00066	0.17	< 0.00020	< 0.020	25	0.0070	< 0.0000020	0.0018	0.00091	< 0.10	1.0	< 0.00020	1.8	< 0.00010	15	1.2	< 0.00020	< 0.0010	0.0013	0.0011	< 0.0010	< 0.0030
	25-Aug-2019	0.099	< 0.00060	0.00021	0.074	< 0.0010	0.020	< 0.000020	72	< 0.0010	< 0.00030	0.00050	0.19	< 0.00020	< 0.020	26	0.0075	< 0.0000020	0.0016	0.00084	< 0.10	0.94	0.00033	1.9	< 0.00010	13	1.2	< 0.00020	< 0.0010	0.0055	0.0012	< 0.0010	< 0.0030
	02-Oct-2019	0.013	< 0.00060	< 0.00020	0.072	< 0.0010	< 0.020	< 0.000020	84	< 0.0010	< 0.00030	0.00030	< 0.060	< 0.00020	< 0.020	31	0.0044	< 0.0000020	0.0019	0.00071	< 0.10	1.1	0.00025	2.0	< 0.00010	20	1.4	< 0.00020	< 0.0010	< 0.0010	0.0012	< 0.0010	< 0.0030
AEMP-05	19-Aug-2017	0.015	< 0.00060	0.0011	0.16	< 0.0010	< 0.020	< 0.000020	52	< 0.0010	< 0.00030	0.00034	0.17	< 0.00020	< 0.020	14	0.013	0.0000038	0.0017	0.0011	< 0.10	1.7	< 0.00020	0.27	< 0.00010	5.7	0.25	< 0.00020	< 0.0010	< 0.0010	0.00041	0.0024	< 0.0030
	16-Sep-2017	0.012	< 0.00060	0.00073	0.15	< 0.0010	< 0.020	< 0.000020	48	< 0.0010	< 0.00030	0.00032	0.078	< 0.00020	< 0.020	13	0.0051	< 0.0000020	0.0016	0.0013	< 0.10	1.7	< 0.00020	0.27	< 0.00010	5.4	0.20	< 0.00020	< 0.0010	< 0.0010	0.00036	0.0011	< 0.0030
	15-Oct-2017	0.025	< 0.00060	0.00060	0.15	< 0.0010	< 0.020	< 0.000020	51	< 0.0010	< 0.00030	0.00030	0.11	< 0.00020	< 0.020	14	0.0060	< 0.0000020	0.0016	0.0011	< 0.10	2.3	0.00027	0.41	< 0.00010	5.4	0.20	< 0.00020	< 0.0010	< 0.0010	0.00034	0.0015	< 0.0030
	23-Jun-2018	**1.4** [#1]	< 0.00060	0.0018	0.089	< 0.0010	< 0.020	**0.00017** [#1]	39	0.0025	0.0022	**0.0058** [#1]	**2.4** [#1]	**0.0018** [#1]	< 0.020	11	0.075	0.0000049	0.0016	0.0081	< 0.10	1.2	0.00054	2.8	< 0.00010	6.4	0.19	< 0.00020	< 0.0010	0.022	0.0011	0.0044	0.024
	13-Aug-2018	0.033	< 0.00060	0.0011	0.14	< 0.0010	< 0.020	< 0.000020	42	< 0.0010	< 0.00030	0.00029	**0.50** [#1]	< 0.00020	< 0.020	14	0.031	0.0000028	0.0017	0.0011	< 0.10	1.4	< 0.00020	0.50	< 0.00010	3.6	0.16	< 0.00020	< 0.0010	0.0011	0.00017	< 0.0010	< 0.0030
	18-Oct-2018	0.033	< 0.00060	0.00075	0.17	< 0.0010	< 0.020	< 0.000020	50	< 0.0010	< 0.00030	0.00042	**0.34** [#1]	< 0.00020	< 0.020	15	0.18	< 0.0000020	0.0016	0.0016	< 0.10	3.5	< 0.00020	0.36	< 0.00010	4.2	0.20	< 0.00020	< 0.0010	0.0014	0.00035	< 0.0010	< 0.0030
	02-Jun-2019	0.067	< 0.00060	0.0011	0.14	< 0.0010	< 0.020	< 0.000020	44	< 0.0010	< 0.00030	0.00038	**0.56** [#1]	< 0.00020	< 0.020	13	0.041	< 0.0000020	0.0010	0.0014	< 0.10	2.3	< 0.00020	1.1	< 0.00010	3.8	0.14	< 0.00020	< 0.0010	0.0011	0.00028	< 0.0010	0.0071
	27-Aug-2019	0.016	< 0.00060	0.00085	0.16	< 0.0010	< 0.020	< 0.000020	44	< 0.0010	< 0.00030	0.00027	0.12	< 0.00020	< 0.020	13	0.0056	< 0.0000020	0.0014	0.00078	< 0.10	2.0	< 0.00020	0.25	< 0.00010	3.4	0.16	< 0.00020	< 0.0010	< 0.0010	0.00020	< 0.0010	< 0.0030
	01-Oct-2019	0.042	< 0.00060	0.00069	0.16	< 0.0010	< 0.020	< 0.000020	42	< 0.0010	< 0.00030	0.00038	**0.41** [#1]	< 0.00020	< 0.020	16	0.0094	< 0.0000020	0.0013	0.0011	< 0.10	1.8	< 0.00020	0.33	< 0.00010	3.3	0.15	< 0.00020	< 0.0010	0.0012	0.00017	< 0.0010	< 0.0030
AEMP-06	21-Aug-2017	**0.66** [#1]	< 0.00060	0.00095	0.061	< 0.0010	< 0.020	0.000055	34	0.0011	0.00079	**0.0023** [#1]	**1.3** [#1]	0.00071	< 0.020	11	0.031	0.0000028	0.0010	0.0031	< 0.10	1.1	0.00035	2.4	< 0.00010	8.3	0.23	< 0.00020	< 0.0010	0.0087	0.00075	0.0023	0.0074
	16-Sep-2017	**0.36** [#1]	< 0.00060	0.00063	0.049	< 0.0010	< 0.020	0.000032	31	< 0.0010	0.00042	0.0014	**0.68** [#1]	0.00043	< 0.020	10	0.019	< 0.0000020	0.00086	0.0021	< 0.10	0.96	0.00022	2.0	< 0.00010	9.4	0.21	< 0.00020	< 0.0010	0.0061	0.00062	0.0020	0.0065
	16-Oct-2017	**0.24** [#1]	< 0.00060	0.00050	0.044	< 0.0010	< 0.020	0.000023	31	< 0.0010	< 0.00030	0.0013	**0.36** [#1]	0.00025	< 0.020	11	0.016	< 0.0000020	0.0013	0.0018	< 0.10	1.0	0.00024	1.8	< 0.00010	9.1	0.22	< 0.00020	< 0.0010	0.0069	0.00080	0.0019	0.0036
	23-Jun-2018	**0.90** [#1]	< 0.00060	0.0012	0.055	< 0.0010	< 0.020	0.000087	29	0.0017	0.0012	**0.0038** [#1]	**1.2** [#1]	0.0010 [#1]	< 0.020	8.8	0.029	< 0.0000020	0.0014	0.0051	< 0.10	0.98	0.00043	2.1	< 0.00010	6.8	0.17	< 0.00020	< 0.0010	0.010	0.00092	0.0030	0.012
	13-Aug-2018	**0.56** [#1]	< 0.00060	0.00068	0.049	< 0.0010	< 0.020	0.000061	33	< 0.0010	0.00054	0.0018	**0.70** [#1]	0.00045	< 0.020	10	0.021	0.0000033	0.00085	0.0028	< 0.10	0.92	0.00030	2.2	< 0.00010	8.7	0.22	< 0.00020	< 0.0010	0.0071	0.00066	0.0016	0.0094
	18-Oct-2018	**1.7** [#1]	0.00098	0.0020	0.10	< 0.0010	< 0.020	**0.00015** [#1]	35	0.0033	0.0024	**0.0075** [#1]	**4.5** [#1]	**0.0027** [#1]	< 0.020	11	0.099	0.0000079	0.0012	0.0086	0.12	1.5	0.00031	5.0	< 0.00010	9.1	0.23	< 0.00020	< 0.0010	0.019	0.00076	0.0046	**0.036** [#1]
	03-Jun-2019	**3.7** [#1]	< 0.00060	0.0027	0.11	< 0.0010	< 0.020	**0.00014** [#1]	37	0.0060	0.0035	**0.0078** [#1]	**7.4** [#1]	**0.0031** [#1]	< 0.020	12	0.13	0.000011	0.0011	0.011	0.14	1.9	0.00030	5.6	< 0.00010	7.0	0.20	< 0.00020	< 0.0010	0.048	0.00083	0.0095	**0.034** [#1]
	25-Aug-2019	**0.78** [#1]	< 0.00060	0.00072	0.054	< 0.0010	< 0.020	0.000047	32	0.0013	0.00054	0.0017	**1.1** [#1]	0.00059	< 0.020	10	0.021	0.0000021	0.00085	0.0025	< 0.10	1.1	0.00039	3.2	< 0.00010	8.4	0.22	< 0.00020	< 0.0010	0.020 [#2]	0.00065	0.0024	0.0073
(Duplicate)	02-Oct-2019	**0.66** [#1]	< 0.00060	0.00061	0.053	< 0.0010	< 0.020	0.000037	29	0.0011	0.00039	0.0017	**0.88** [#1]	0.00043	< 0.020	9.5	0.015	0.0000020	0.00084	0.0024	< 0.10	1.1	0.00027	3.0	< 0.00010	8.2	0.21	< 0.00020	< 0.0010	0.014	0.00062	0.0024	0.0052
	03-Oct-2019	**0.70** [#1]	< 0.00060	0.00069	0.054	< 0.0010	< 0.020	0.000024	32	0.0016	0.00043	0.0017	**0.88** [#1]	0.00046	< 0.020	10	0.014	< 0.0000020	0.00084	0.0023	< 0.10	1.2	0.00025	3.2	< 0.00010	9.1	0.22	< 0.00020	< 0.0010	0.016	0.00066	0.0024	0.0050
AEMP-07	21-Aug-2017	**0.62** [#1]	< 0.00060	0.00083	0.058	< 0.0010	< 0.020	0.000060	33	0.0011	0.00069	**0.0023** [#1]	**1.2** [#1]	0.00063	< 0.020	10	0.029	0.0000024	0.00097	0.0030	< 0.10	1.1	0.00034	2.4	< 0.00010	8.1	0.23	< 0.00020	< 0.0010	0.0089	0.00074	0.0022	0.0082
(Duplicate)	21-Aug-2017	**0.67** [#1]	< 0.00060	0.00093	0.059	< 0.0010	< 0.020	0.000053	33	0.0013	0.00077	**0.0025** [#1]	**1.3** [#1]	0.00074	< 0.020	11	0.031	0.0000026	0.0010	0.0032	< 0.10	1.1	0.00038	2.4	< 0.00010	8.2	0.23	< 0.00020	< 0.0010	0.011	0.00079	0.0024	0.0078
	16-Sep-2017	**0.28** [#1]	< 0.00060	0.00056	0.047	< 0.0010	< 0.020	0.000028	30	< 0.0010	0.00034	0.0013	**0.67** [#1]	0.00039	< 0.020	10	0.018	< 0.0000020	0.00076	0.0018	< 0.10	0.89	< 0.00020	1.9	< 0.00010	9.0	0.20	< 0.00020	< 0.0010	0.0038	0.00057	0.0017	0.0042

Advisian
Worley Group

Table 4
Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life [#1]		0.1	---	0.005	---	---	1.5	0.00009	---	0.0089	---	0.002	0.3	0.001	---	---	---	0.000026	0.073	0.025	---	---	0.001	---	0.00025	---	---	0.0008	---	---	0.015	---	0.03
	16-Oct-2017	0.54[#1]	< 0.00060	0.00086	0.056	< 0.0010	< 0.020	0.000057	29	0.0010	0.00050	0.0020[#1]	0.80[#1]	0.00058	< 0.020	10	0.048	< 0.0000020	0.00095	0.0026	< 0.10	1.1	0.00028	1.9	< 0.00010	8.8	0.22	< 0.00020	< 0.0010	0.023	0.00075	0.0038	0.0064
	23-Jun-2018	1.1[#1]	< 0.00060	0.0013	0.060	< 0.0010	< 0.020	0.000098[#1]	29	0.0022	0.0015	0.0042[#1]	1.6[#1]	0.0014[#1]	< 0.020	8.9	0.038	0.0000033	0.0014	0.0059	< 0.10	1.1	0.00042	2.4	< 0.00010	7.2	0.16	< 0.00020	< 0.0010	0.017	0.00094	0.0040	0.014
	13-Aug-2018	1.4[#1]	< 0.00060	0.0018	0.093	< 0.0010	< 0.020	0.00017[#1]	39	0.0019	0.0017	0.0044[#1]	3.0[#1]	0.0019[#1]	< 0.020	12	0.079	0.000010	0.00098	0.0060	0.12	1.2	0.00040	3.2	< 0.00010	9.0	0.23	< 0.00020	< 0.0010	0.019	0.00081	0.0043	0.021
	17-Oct-2018	0.34[#1]	< 0.00060	0.00060	0.052	< 0.0010	< 0.020	0.000040	28	< 0.0010	0.00042	0.0018	0.66[#1]	0.00047	< 0.020	9.1	0.024	< 0.0000020	0.00091	0.0020	< 0.10	1.0	< 0.00020	2.1	< 0.00010	9.5	0.21	< 0.00020	< 0.0010	0.013	0.00059	< 0.0010	0.0039
(Duplicate)	17-Oct-2018	0.34[#1]	< 0.00060	0.00046	0.053	< 0.0010	< 0.020	0.000038	28	< 0.0010	0.00040	0.0015	0.72[#1]	0.00047	< 0.020	9.2	0.026	< 0.0000020	0.00078	0.0020	< 0.10	1.0	< 0.00020	2.2	< 0.00010	9.7	0.21	< 0.00020	< 0.0010	0.0069	0.00054	< 0.0010	0.0038
	03-Jun-2019	3.5[#1]	< 0.00060	0.0028	0.11	< 0.0010	< 0.020	0.00015[#1]	37	0.0062	0.0036	0.0083[#1]	7.5[#1]	0.0034[#1]	< 0.020	12	0.15	0.000013	0.0014	0.012	0.15	1.9	0.00031	5.5	< 0.00010	9.8	0.20	< 0.00020	< 0.0010	0.12	0.00088	0.0096	0.035[#1]
	25-Aug-2019	0.81[#1]	< 0.00060	0.00061	0.051	< 0.0010	< 0.020	0.000028	31	0.0011	0.00047	0.0017	0.89[#1]	0.00046	< 0.020	9.9	0.018	< 0.0000020	0.00082	0.0024	< 0.10	1.1	0.00035	3.0	< 0.00010	8.3	0.22	< 0.00020	< 0.0010	0.013	0.00065	0.0017	0.0060
	03-Oct-2019	4.6[#1]	< 0.00060	0.0062[#1]	0.34	< 0.0010	0.021	0.00048[#1]	70	0.0093[#1]	0.0069	0.014[#1]	16[#1]	0.0077[#1]	< 0.020	24	0.36	0.000021	0.0019	0.021	0.51	2.2	0.00063	9.0	< 0.00010	8.6	0.27	< 0.00020	< 0.0010	0.059	0.0012	0.015	0.072[#1]
AEMP-08	17-Aug-2017	0.65[#1]	< 0.00060	0.0011	0.066	< 0.0010	< 0.020	0.000071	39	0.0011	0.00079	0.0025[#1]	1.2[#1]	0.00077	< 0.020	12	0.031	0.0000038	0.0012	0.0037	< 0.10	1.1	0.00052	2.6	< 0.00010	7.3	0.25	< 0.00020	< 0.0010	0.011	0.00094	0.0032	0.011
	21-Aug-2017	0.50[#1]	< 0.00060	0.00079	0.056	< 0.0010	< 0.020	0.000035	33	< 0.0010	0.00056	0.0020[#1]	0.98[#1]	0.00054	< 0.020	10	0.024	0.0000026	0.00095	0.0027	< 0.10	1.1	0.00031	2.2	< 0.00010	8.3	0.24	< 0.00020	< 0.0010	0.011	0.00072	0.0019	0.0057
	16-Sep-2017	1.2[#1]	< 0.00060	0.0015	0.085	< 0.0010	< 0.020	0.000092[#1]	39	0.0022	0.0016	0.0037[#1]	3.2[#1]	0.0017[#1]	< 0.020	14	0.077	0.0000026	0.00095	0.0051	< 0.10	1.2	0.00026	3.0	< 0.00010	9.4	0.24	< 0.00020	< 0.0010	0.016	0.00074	0.0043	0.016
	16-Oct-2017	0.33[#1]	< 0.00060	0.00056	0.048	< 0.0010	< 0.020	0.000029	31	< 0.0010	0.00039	0.0013	0.74[#1]	0.00040	< 0.020	11	0.020	< 0.0000020	0.00077	0.0020	< 0.10	0.99	0.00033	2.1	< 0.00010	9.2	0.23	< 0.00020	< 0.0010	0.0069	0.00060	0.0026	0.0040
	23-Jun-2018	0.80[#1]	< 0.00060	0.00098	0.063	< 0.0010	< 0.020	0.000066	31	0.0014	0.0011	0.0031[#1]	1.6[#1]	0.00089	< 0.020	9.5	0.038	0.0000030	0.0011	0.0043	< 0.10	1.0	0.00028	2.3	< 0.00010	7.3	0.20	< 0.00020	< 0.0010	0.010	0.00073	0.0026	0.011
	13-Aug-2018	0.73[#1]	< 0.00060	0.00083	0.057	< 0.0010	< 0.020	0.000087	35	< 0.0010	0.00072	0.0023[#1]	1.1[#1]	0.00060	< 0.020	11	0.028	0.0000039	0.0010	0.0034	< 0.10	1.0	0.00034	2.6	< 0.00010	9.2	0.26	< 0.00020	< 0.0010	0.015	0.00074	0.0021	0.011
	17-Oct-2018	0.12[#1]	< 0.00060	0.00029	0.041	< 0.0010	< 0.020	< 0.000020	29	< 0.0010	< 0.00030	0.00095	0.19	< 0.00020	< 0.020	10	0.0069	< 0.0000020	0.00075	0.0012	< 0.10	0.94	< 0.00020	1.6	< 0.00010	9.4	0.28	< 0.00020	< 0.0010	0.0020	0.00052	< 0.0010	< 0.0030
	03-Jun-2019	1.7[#1]	< 0.00060	0.0017	0.086	< 0.0010	< 0.020	0.00012[#1]	37	0.0031	0.0021	0.0048[#1]	4.0[#1]	0.0021[#1]	< 0.020	13	0.092	0.0000080	0.0012	0.0065	< 0.10	1.4	0.00039	3.7	< 0.00010	7.9	0.31	< 0.00020	< 0.0010	0.019	0.00076	0.0046	0.021
	28-Aug-2019	0.59[#1]	< 0.00060	0.00052	0.056	< 0.0010	< 0.020	0.000023	35	< 0.0010	0.00037	0.0015	0.86[#1]	0.00042	< 0.020	11	0.018	< 0.0000020	0.00091	0.0018	< 0.10	1.1	0.00032	2.9	< 0.00010	8.8	0.29	< 0.00020	< 0.0010	0.015[#2]	0.00069	0.0024	0.0044
	03-Oct-2019	0.38[#1]	< 0.00060	0.00064	0.054	< 0.0010	< 0.020	0.000031	33	< 0.0010	0.00039	0.0015	0.87[#1]	0.00041	< 0.020	10	0.015	0.0000020	0.00092	0.0023	< 0.10	1.1	0.00037	3.1	< 0.00010	8.9	0.27	< 0.00020	< 0.0010	0.0074	0.00060	0.0018	0.0051
AEMP-09	21-Aug-2017	3.2[#1]	< 0.00060	0.0033	0.12	< 0.0010	0.021	0.00021[#1]	48	0.0067	0.0040	0.0092[#1]	7.1[#1]	0.0040[#1]	< 0.020	16	0.16	0.000011	0.0015	0.013	0.18	1.6	0.00051	5.0	< 0.00010	8.8	0.28	< 0.00020	< 0.0010	0.030	0.0011	0.0087	0.034[#1]
	16-Sep-2017	0.24[#1]	< 0.00060	0.00057	0.052	< 0.0010	< 0.020	0.000033	34	< 0.0010	0.00032	0.0014	0.40[#1]	0.00038	< 0.020	11	0.028	0.0000022	0.00094	0.0017	< 0.10	0.94	0.00024	1.8	< 0.00010	10	0.24	< 0.00020	< 0.0010	0.0054	0.00076	0.0014	0.0032
	16-Oct-2017	2.5[#1]	< 0.00060	0.0024	0.14	< 0.0010	0.052	0.00020[#1]	45	0.0041	0.0029	0.0073[#1]	6.2[#1]	0.0031[#1]	< 0.020	15	0.21	< 0.0000020	0.0011	0.0090	0.11	1.8	0.00043	5.3	< 0.00010	28	0.26	< 0.00020	< 0.0010	0.028	0.00081	0.0081	0.026
	23-Jun-2018	1.8[#1]	< 0.00060	0.0023	0.083	< 0.0010	< 0.020	0.00012[#1]	34	0.0037	0.0025	0.0061[#1]	3.4[#1]	0.0024[#1]	< 0.020	11	0.082	0.0000069	0.0012	0.0083	< 0.10	1.2	0.00042	3.0	< 0.00010	7.5	0.18	< 0.00020	< 0.0010	0.019	0.00095	0.0059	0.024
	12-Aug-2018	0.74[#1]	< 0.00060	0.0010	0.062	< 0.0010	< 0.020	0.000073	36	0.0011	0.00079	0.0023[#1]	1.3[#1]	0.00076	< 0.020	11	0.038	0.0000043	0.0010	0.0034	< 0.10	1.1	0.00036	2.4	< 0.00010	10	0.26	< 0.00020	< 0.0010	0.019	0.00071	0.0024	0.010
	17-Oct-2018	0.87[#1]	< 0.00060	0.0013	0.087	< 0.0010	0.020	0.000091[#1]	32	0.0016	0.0011	0.0057[#1]	1.9[#1]	0.0012[#1]	< 0.020	11	0.058	0.0000043	0.0011	0.0039	< 0.10	1.2	0.00031	2.6	< 0.00010	12	0.27	< 0.00020	< 0.0010	0.061	0.00070	0.0025	0.011
	02-Jun-2019	3.7[#1]	0.0028	0.0035	0.13	< 0.0010	< 0.020	0.00020[#1]	43	0.0067	0.0045	0.011[#1]	8.9[#1]	0.0043[#1]	< 0.020	13	0.18	0.000015	0.0017	0.015	0.18	1.8	0.00048	5.7	< 0.00010	9.1	0.21	< 0.00020	< 0.0010	0.035	0.0010	0.011	0.074[#1]
	28-Aug-2019	0.72[#1]	< 0.00060	0.00050	0.062	< 0.0010	< 0.020	0.000032	34	< 0.0010	0.00046	0.0024[#1]	0.89[#1]	0.00049	< 0.020	11	0.022	< 0.0000020	0.0011	0.0018	< 0.10	1.1	0.00032	2.9	< 0.00010	9.4	0.24	< 0.00020	< 0.0010	0.016	0.00069	0.0027	0.0038
	03-Oct-2019	0.57[#1]	< 0.00060	0.00076	0.067	< 0.0010	< 0.020	0.000047	33	0.0011	0.00058	0.0028[#1]	1.4[#1]	0.00076	< 0.020	10	0.031	0.0000029	0.0011	0.0055	< 0.10	1.2	0.00033	2.9	< 0.00010	10	0.24	< 0.00020	< 0.0010	0.010	0.00062	0.0024	0.0086
AEMP-10	23-Jun-2018	0.93[#1]	< 0.00060	0.0011	0.061	< 0.0010	< 0.020	0.000080	32	0.0018	0.0012	0.0036[#1]	1.5[#1]	0.00093	< 0.020	8.7	0.031	0.0000033	0.0011	0.0050	< 0.10	1.1	0.00041	2.5	< 0.00010	6.1	0.15	< 0.00020	< 0.0010	0.024	0.00085	0.0027	0.011
	14-Aug-2018	1.6[#1]	< 0.00060	0.0013	0.077	< 0.0010	< 0.020	0.00015[#1]	40	0.0014	0.0016	0.0037[#1]	2.0[#1]	0.0012[#1]	< 0.020	12	0.052	0.0000068	0.0011	0.0057	< 0.10	1.3	0.00047	4.1	< 0.00010	7.8	0.24	< 0.00020	< 0.0010	0.029	0.00084	0.0035	0.021
(Duplicate)	14-Aug-2018	1.4[#1]	< 0.00060	0.0011	0.076	< 0.0010	< 0.020	0.00015[#1]	40	0.0016	0.0015	0.0036[#1]	2.1[#1]	0.0011[#1]	< 0.020	12	0.052	0.0000052	0.0011	0.0054	< 0.10	1.3	0.00042	3.8	< 0.00010	7.7	0.23	< 0.00020	< 0.0010	0.068	0.00086	0.0037	0.020
	18-Oct-2018	0.44[#1]	< 0.00060	0.00069	0.057	< 0.0010	< 0.020	0.000053	28	< 0.0010	0.00047	0.0016	0.89[#1]	0.00057	< 0.020	9.6	0.028	< 0.0000020	0.00079	0.0031	< 0.10	0.98	< 0.00020	1.9	< 0.00010	9.5	0.22	< 0.00020	< 0.0010	0.014	0.00057	0.0016	0.0055
	10-Jun-2019	2.0[#1]	0.00096	0.0021	0.098	< 0.0010	< 0.020	0.00015[#1]	38	0.0033	0.0024	0.0074[#1]	4.8[#1]	0.0026[#1]	< 0.020	10	0.11	0.0000090	0.0012	0.0081	0.11	1.5	0.00038	4.0	< 0.00010	6.2	0.18	< 0.00020	< 0.0010	0.028	0.00087	0.0056	0.042[#1]
	26-Aug-2019	1.7[#1]	< 0.00060	0.0013	0.076	< 0.0010	< 0.020	0.000083	40	0.0026	0.0010	0.0031[#1]	2.2[#1]	0.0011[#1]	< 0.020	11	0.042	< 0.0000020	0.0011	0.0043	< 0.10	1.5	0.00053	5.2	< 0.00010	8.1	0.24	< 0.00020	< 0.0010	0.028	0.00097	0.0048	0.013
	01-Oct-2019	1.6[#1]	< 0.00060	0.0011	0.085	< 0.0010	< 0.020	0.000086	37	0.0026	0.0010	0.0043[#1]	2.3[#1]	0.0014[#1]	< 0.020	11	0.028	0.0000061	0.0012	0.0051	< 0.10	1.4	0.00050	3.1	< 0.00010	8.9	0.24	< 0.00020	< 0.0010	0.039	0.00095	0.0050	0.012
AEMP-11	23-Jun-2018	0.88[#1]	< 0.00060	0.00099	0.066	< 0.0010	< 0.020	0.000085	32	0.0019	0.0014	0.0036[#1]	1.7[#1]	0.0010[#1]	< 0.020	9.3	0.042	0.0000036	0.00095	0.0049	< 0.10	1.1	0.00036	2.6	< 0.00010	6.6	0.16	< 0.00020	< 0.0010	0.018	0.00079	0.0028	0.011
	14-Aug-2018	1.2[#1]	< 0.00060	0.00086	0.065	< 0.0010	< 0.020	0.00013[#1]	37	0.0012	0.0013	0.0029[#1]	1.5[#1]	0.00097	< 0.020	11	0.043	0.0000043	0.00092	0.0044	< 0.10	1.2	0.00036	3.3	< 0.00010	7.6	0.22	< 0.00020	< 0.0010	0.017	0.00080	0.0031	0.016
	18-Oct-2018	1.0[#1]	< 0.00060	0.0011	0.071	< 0.0010	< 0.020	0.000071	32	0.0018	0.0011	0.0031[#1]	2.1[#1]	0.0012[#1]	< 0.020	11	0.049	0.0000038	0.00089	0.0040	< 0.10	1.2	0.00031	2.5	< 0.00010	9.9	0.27	< 0.00020	< 0.0010	0.016	0.00059	0.0035	0.012
	10-Jun-2019	2.1[#1]	0.00098	0.0023	0.10	< 0.0010	< 0.020	0.00016[#1]	38	0.0038	0.0027	0.0079[#1]	5.4[#1]	0.0028[#1]	< 0.020	11	0.12	0.0000092	0.0012	0.0086	0.13	1.6	0.00040	4.2	< 0.00010	6.4	0.18	< 0.00020	< 0.0010	0.032	0.00076	0.0063	0.038[#1]
	26-Aug-2019	1.5[#1]	< 0.00060	0.0010	0.074	< 0.0010	< 0.020	0.000063	39	0.0025	0.0011	0.0031[#1]	2.1[#1]	0.00098	< 0.020	11	0.039	0.0000036	0.0011	0.0046	< 0.10	1.4	0.00047	5.0	< 0.00010	8.0	0.24	< 0.00020	< 0.0010	0.043	0.0011	0.0050	0.0096
	01-Oct-2019	1.6[#1]	0.0015	0.0018	0.11	< 0.0010	0.023	0.00014[#1]	36	0.0028	0.0025	0.0078[#1]	6.7[#1]	0.0025[#1]	< 0.020	11	0.086	0.0000092	0.0014	0.0090	0.10	1.7	0.00048	3.9	< 0.00010	9.8	0.24	< 0.00020	< 0.0010	0.020	0.00098	0.0048	0.044[#1]
AEMP-12	23-Jun-2018	0.55[#1]	< 0.00060	0.00069	0.055	< 0.0010	< 0.020	0.000049	31	0.0010	0.00067	0.0024[#1]	0.96[#1]	0.00058	< 0.020	9.7	0.024	< 0.0000020	0.00081	0.0030	< 0.10	0.97	0.00026	2.2	< 0.00010	7.5	0.23	< 0.00020	< 0.0010	0.0081	0.00064	0.0019	0.0072
	14-Aug-2018	0.94[#1]	< 0.00060	0.0011	0.073	< 0.0010	< 0.020	0.000089	44	0.0013	0.0012	0.0029[#1]	1.9[#1]	0.00099	< 0.020	14	0.051	0.0000050	0.0011	0.0045	< 0.10	1.1	0.00097	2.6	< 0.00010	9.6	0.43	< 0.00020	< 0.0010	0.013	0.00081	0.0027	0.014
	17-Oct-2018	0.20[#1]	< 0.00060	0.00027	0.066	< 0.0010	0.023	0.000027	63	< 0.0010	< 0.00030	0.00086	0.48[#1]	0.00028	< 0.020	24	0.016	< 0.0000020	0.0016	0.0016	< 0.10	1.0	0.00023	2.1	< 0.00010	16	1.1	< 0.00020	< 0.0010	0.0057	0.0011	< 0.0010	0.0042
	03-Jun-2019	1.5[#1]	< 0.00060	0.0014	0.081	< 0.0010	< 0.020	0.000084	43	0.0025	0.0016	0.0040[#1]	3.0[#1]	0.0015[#1]	< 0.020	15	0.068	0.0000054	0.0013	0.0053	< 0.10	1.4	0.00025	3.2	< 0.00010	9.5	0.49	< 0.00020	< 0.0010	0.021	0.00086	0.0042	0.016
	28-Aug-2019	0.53[#1]	< 0.00060	0.00046	0.053	< 0.0010	< 0.020	0.000031	35	< 0.0010	0.00034	0.0013	0.65[#1]	0.00031	< 0.020	11	0.014	< 0.0000020	0.00074	0.0016	< 0.10	1.0	0.00034	2.5	< 0.00010	8.7	0.30	< 0.00020	< 0.0010	0.0097	0.00073	0.0019	0.0037
(Duplicate)	28-Aug-2019	0.61[#1]	< 0.00060	0.00051	0.054	< 0.0010	< 0.020	0.000025	35	< 0.0010	0.00036	0.0013	0.64[#1]	0.00030	< 0.020	11	0.014	< 0.0000020	0.0010	0.0016	< 0.10	1.0	0.00030	2.6	< 0.00010	8.9	0.31	< 0.00020	< 0.0010	0.0073	0.00067	0.0021	0.0036
	03-Oct-2019	0.34[#1]	0.00072	0.00057	0.051	< 0.0010	< 0.020	0.000025	32	< 0.0010	< 0.00030	0.0016	0.64[#1]	0.00036	< 0.020	10	0.013	< 0.0000020	0.00068	0.0022	< 0.10	1.1	0.00032	2.3	< 0.00010	9.0	0.27	< 0.00020	< 0.0010	0.0084	0.00060	0.0014	0.0043
AEMP-13	14-Aug-2018	1.8[#1]	< 0.00060	0.0017	0.099	< 0.0010	< 0.020	0.00024[#1]	48	0.0022	0.0020	0.0049[#1]	3.0[#1]	0.0017[#1]	< 0.020	15	0.090	0.0000071	0.0012	0.0074	< 0.10	1.3	0.00046	4.6	< 0.00010	8.4	0.26	< 0.00020	< 0.0010	0.026	0.00099	0.0055	0.030[#1]
	18-Oct-2018	0.42[#1]	< 0.00060	0.00063	0.067	< 0.0010	< 0.020	0.000075	43	< 0.0010	0.00048	0.0020[#1]	0.75[#1]	0.00053	< 0.020	12	0.064	< 0.0000020	0.0011	0.0030	< 0.10	1.1	0.00040	2.2	< 0.00010	11	0.29	< 0.00020	< 0.0010	0.011	0.00090	0.0015	0.0052
	02-Jun-2019	4.2[#1]	< 0.00060	0.0041	0.18	< 0.0010	< 0.020	0.00033[#1]	56	0.0075	0.0055	0.012[#1]	10[#1]	0.0052[#1]	< 0.020	17	0.22	0.0000068	0.0015	0.018	0.29	2.0	0.00051	6.2	< 0.00010	7.3	0.22	< 0.00020	< 0.0010	0.039	0.0012	0.012	0.056[#1]
	27-Aug-2019	1.3[#1]	< 0.00060	0.00093	0.085	< 0.0010	< 0.020	0.000055	48	0.0016	0.00073	0.0023[#1]	1.5[#1]	0.00052	< 0.020	14	0.091	< 0.0000020	0.0013	0.0038	< 0.10	1.5	0.00037	5.3	< 0.00010	9.1	0.30	< 0.00020	< 0.0010	0.035	0.00098	0.0039	0.0066
	02-Oct-2019	1.2[#1]	< 0.00060	0.00097	0.12	< 0.0010	< 0.020	0.00011[#1]	72	0.0019	0.0020	0.0029[#1]	3.6[#1]	0.00090	< 0.020	20	0.65	0.0000045	0.0015	0.0059	< 0.10	1.8	0.00037	3.6	< 0.00010	8.9	0.47	< 0.00020	< 0.0010	0.032	0.0010	0.0039	0.0091

Table 4

Surface Water Analytical Results: Total Metals and Trace Elements

PROJECT No.: 407011-00770

Monitoring Station	Date (dd-mmm-yyyy)	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (Total) (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Lithium (mg/L)	Magnesium (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Phosphorus (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silicon (mg/L)	Silver (mg/L)	Sodium (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Tin (mg/L)	Titanium (mg/L)	Uranium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
CCME CEQG Freshwater Aquatic Life #1		0.1	---	0.005	---	---	1.5	0.00009	---	0.0089	---	0.002	0.3	0.001	---	---	---	0.000026	0.073	0.025	---	---	0.001	---	0.00025	---	---	0.0008	---	---	0.015	---	0.03

NOTES:

1. --- in guideline row(s) denotes no criteria for that parameter.
2. --- in detail data row(s) denotes parameter not analyzed.
3. Highlighting indicates parameters above applied guideline/criteria.
4. Highlighting indicates non-detect parameters above applied guideline/criteria.
5. Highlighting indicates parameters at applied guideline/criteria.
6. Superscript #1 denotes values exceeding
   (CCME. 2018. Canadian Environmental Quality Guidelines Summary Table. Water Quality Guidelines for the Protection of Freshwater Aquatic Life. http://st-ts.ccme.ca/?chems=all&chapters=1 accessed Aug 22, 2018.)
   Aluminum:
   Standard varies with pH.
   pH < 6.5 = 0.005 mg/L
   pH >= 6.5 = 0.1 mg/L
   Boron:
   Guideline based on long term exposure
   Cadmium:
   Guideline based on long term exposure
   Chromium (Total):
   Limit is for Chromium(III).
   Copper:
   Guideline is hardness dependent. Presented guideline set to lower limit.
   Lead:
   Guideline is hardness dependent. Presented guideline set to lower limit.
   Mercury:
   Guideline for Inorganic mercury
   Nickel:
   Guideline is hardness dependent. Presented guideline set to lower limit.
   Silver:
   Guideline based on long term exposure
   Uranium:
   Guideline based on long term exposure
7. Superscript #2 - Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.

Appendix A
Limitation of Liability, Scope of Report, and Third-Party Reliance

Limitation of Liability, Scope of Report, and Third-Party Reliance

This report has been prepared and the work referred to in this report has been undertaken by Worley Canada Services Ltd., operating as Advisian (Advisian) for Imperial Oil Limited. It is intended for the sole and exclusive use of Imperial Oil Limited, its affiliated companies and partners and their respective [insurers], agents, employees, and advisors (collectively, "Imperial Oil"). Any use, reliance on or decision made by any person other than Imperial Oil based on this report is the sole responsibility of such other person. Imperial Oil and Advisian make no representation or warranty to any other person with regard to this report and the work referred to in this report and they accept no duty of care to any other person or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred by any other person as a result of the use of, reliance on, any decision made or any action taken based on this report or the work referred to in this report.

The investigation undertaken by Advisian with respect to this report and any conclusions or recommendations made in this report reflect Advisian's judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. This report has been prepared for the specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary.

Other than by Imperial Oil, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of Advisian. Nothing in this report is intended to constitute or provide a legal opinion.

Appendix B
Field Procedures

Scope The following procedure is applicable for field filtration of surface water quality samples.

1. SAFETY CONSIDERATIONS

This Preferred Operating Procedure (POP) does not address all of the safety issues associated with this task or with other activities that may be undertaken in conjunction with this task. Refer to the WorleyParsons safety management system and the site-specific hazard assessment to identify the potential hazards, mitigations, and controls.

2. MATERIALS AND EQUIPMENT

The following equipment is needed to complete this task:

- Disposable nitrile gloves.
- Sample containers.

Syringe Filtering

- Disposable filter disk (0.45 µm pore size).
- Disposable syringe compatible with filter disk.

Disposable Bailer Filtering

- Disposable capsule filters (0.45 µm pore size).
- Disposable bailer and spigot.
- Clean flexible tubing which fits inside the outlet of bailer or funnel.
- Waterra cutters.

3. PROCEDURES

Syringe Filtering

1) Put on clean nitrile gloves before handling sampling equipment.
2) Remove the syringe from packaging and rinse the barrel of the syringe three times with ambient surface water.
3) Fill the barrel of the syringe with sample water, and then screw the disposal filter disk firmly to the syringe tip.
4) Using the plunger of the syringe, force the sample water through the filter disk and into the sample container. Ensure that the sample container is filled to approximately 20% of capacity and the lid tightened securely. Shake the filtered sample water so that it comes in contact with the entire inside surface of the sample container. Discard filtered sample water rinsate downstream if in flowing waters, or on the opposite side of the boat/canoe in lakes or wetlands. Repeat three times.
5) Remove the filter disk and plunger, fill the barrel of the syringe with sample water, and use the plunger of the syringe to force sample water through the filter disk into the rinsed sample container. Repeat as needed until the sample container is filled. Ensure that the sample container lid is secured tightly, and that the container is labelled.
6) If required, preserve samples using laboratory-supplied preservatives according to laboratory instructions.

Disposable Bailer Filtering

1) Put on clean nitrile gloves before handling sampling equipment.
2) Use Watera cutters to cut the top half (approximately 50 cm) from the bailer to create a device that can be used as a funnel. Ensure that the portion with the ball, which prevents water from leaking from the bailer, is intact.
3) Rinse the bailer three times with sample water and discard rinsate downstream in flowing waters, or on the opposite side of the boat/canoe in lakes or wetlands.
4) Use Watera cutters to cut an appropriate length (5-10 cm) of clean PVC tubing. Attach one end of the PVC tubing to the extrusion on the curved end of the capsule filter. Place the other end firmly inside the spigot that accompanies the bailer. The open end of the spigot will be placed inside the outlet from the bailer.
5) Fill the bailer with sample water and run through filter apparatus once to rinse and ensure proper filter function. Water should be run through the filter apparatus for approximately 20 seconds.
6) Ensure that water discharging from the flat end of the capsule filter is used to fill the sample container.

7) Rinse the sample container three times with filtered sample water. Each time, ensure that the sample container is filled to approximately 20% capacity and the lid is tightened securely. Shake the filtered sample water so that it comes in contact with the entire inside surface of the sample container. Discard filtered sample water rinsate downstream if in flowing waters, or on the opposite side of the boat/canoe in lakes or wetlands.

8) Fill the bailer with sample water as many times as needed to fill the sample container using the surface water grab sampling POP. Ensure that the sample container lid is secured tightly and that the container is labelled.

9) If required, preserve samples using laboratory-supplied preservatives according to laboratory instructions.

4. TECHNICAL CONSIDERATIONS

- Ensure new clean equipment (e.g. bailer, tubing, and filter) is used for each new station. Keep PVC tubing in clean Ziploc bags.
- To avoid sample contamination, designate one crew member to handle and prepare the filter apparatus and bottles, and the other to collect the surface water samples and filter them.
- If using filter disks, ensure that plenty are available as several (i.e. more than five) may be required when filtering highly turbid samples.

5. ADDITIONAL REFERENCES

CCME (Canadian Council of Ministers of the Environment). 2011. Protocols Manual for Water Quality Sampling in Canada. PN 1461, ISBN 978-1-896997- 7-0. Section 5.0, pp 36–37.

6. CONTROL

This POP has been prepared and reviewed for use in the WorleyParsons Infrastructure & Environment Division. Any inquiries regarding this POP should be directed to the undersigned.

Prepared By:

Patrick Chahil, M.E.S.

Reviewed By:

M. Vander Meulen

Michael Vander Meulen, Ph.D. P.Biol.

Lucie Sliva

Lucie Sliva, M.Sc. P.Biol.

Scope The following procedure is applicable for surface water grab sampling.

1. SAFETY CONSIDERATIONS

This Preferred Operating Procedure (POP) does not address all of the safety issues associated with this task or with other activities that may be undertaken in conjunction with this task. Refer to the WorleyParsons safety management system and the site-specific hazard assessment to identify the potential hazards, mitigations, and controls.

2. MATERIALS AND EQUIPMENT

The following equipment is required for the completion of this task:

- Labels, pen, and Sharpie® permanent marker.
- Analytical schedule.
- Sample and QA/QC bottles (provided by the accredited laboratory).
- Field data sheets or log books.
- Meters for in situ measurement of field parameters.
- GPS unit.
- Disposable nitrile gloves.
- Coolers.
- Zip-lock bags.
- Ice in zip-lock bags/ice packs (for sampling at outside temperatures above freezing).
- Tinfoil.
- Bubble wrap.

3. PROCEDURES

1) Label sample bottles before sampling. At a minimum, include the site identifier. The date is also useful to include on the label, but not necessary.

2) Grab samples should be collected in a particular order. Preferably start with field blanks. These should be followed by ultra-clean samples (mercury or bacteria). For ultra-clean protocols (e.g. “clean-hands dirty-hands”) follow instructions provided by laboratory. Any remaining samples (nutrients, metals, PAHs, BTEX, etc.) and associated replicates can be sampled in any order.

3) It is best to have one person collect the grab samples, and the other person handing the bottles to the sampler. Both should wear clean gloves which need to be changed between stations. The person handing the bottles can ensure that the contents on the sample bottle label are correct, add the preservative to the sample, if applicable, and ensure that the lid is tightened securely on the sample container.

4) For watercourses (flowing water), the sampler will wade in and choose a suitable sampling location, preferably near the middle of the watercourse. Ensure that the sample location is away from any obstacles, such as rocks, debris, and sediment deposits. Once at the sampling location, minimize movement to prevent the agitation of substrate sediments. For waterbodies (standing water), carefully wade to the sample location, if possible. If sampling from a boat or canoe, lower the anchors and ensure that the boat does not drift. Sample on one side of the boat, away from the anchors, as that area was disturbed. Ensure that the other person is on the other side boat/canoe to provide balance.

5) Lower the sampling bottle to a depth of 30 cm, or mid-column if the depth is less than 30 cm, until it is completely submerged. For watercourses, ensure that the sample is taken upstream from the sampler to avoid sampling water that may have been disturbed while wading to the sampling location.

6) Triple rinse all plastic sample containers. Ensure that the sample container is filled to approximately 20% of capacity, the lid is tightened securely, and the water is shaken inside such that it comes in contact with the entire inside surface

of the sample container. Discard rinsate downstream if in flowing waters, or on the opposite side of the boat/canoe in lakes or wetlands. Repeat three times. Amber glass bottles do not need to be rinsed.

7) Lower the sample bottle to a depth of 30 cm, or mid-column if the depth is less than 30 cm, until it is completely submerged. Allow the bottle to fill with water sample until there are no air bubbles remaining. Samples requiring preservation must have some head space and do not need to be filled completely. Some sample bottles come pre-charged with a preservative capsule; ensure that the preservative is still in the sample bottle after sampling.

8) If a preservative is required, add it to the sample and tighten the cap securely. Otherwise, samples bottles can be capped underwater. Filter and/or add preservatives to appropriate bottles, immediately, or as soon as possible after sample collection. If samples are to be laboratory-filtered, ship them as soon as possible and ensure they arrive in the laboratory well within the specified hold time for un-filtered and un-preserved samples. Unfiltered chlorophyll a samples should be stored in dark amber bottles or plastic bottles wrapped in tinfoil to minimize light exposure.

9) Hold sample bottle caps lid-down while filling sample bottle and cap bottles immediately before and after filling and preserving. Avoid touching lids and mouths of bottles.

10) Place sampling bottles upright in cooler for transport. Ensure that glass bottles are wrapped in bubble wrap and do not contact each other directly.

11) During warmer seasons (e.g. summer), place ice bags in the cooler or shipping container immediately. As general guideline, the volume of sealed ice in a cooler should be equivalent to the volume of sampled water and greater during hot summer days or samples which require longer transport distances. In the winter, use bubble wrap to surround the samples bottles. The bubble wrap will act as an insulator and keep the temperature inside the cooler, warmer than the ambient air temperature.

4. TECHNICAL CONSIDERATIONS

1) BTEX and PAH samples require no head space. This can be achieved by capping the sample bottles under water.

2) Grab water samples can be taken by wading into the water, from a boat, bridge or dock, and from the floats on an airplane/helicopter during the open-water season. During the winter, samples may be taken through the ice.

3) Stream and ditch samples should be collected at mid-stream, unless otherwise specified in the study design. Specific sampling locations will be determined from site reconnaissance.

4) For multi-year/season programs, samples should be taken from the same location. GPS unit or marker can be used to identify the sampling location. If it is not possible for a sample to be taken at the original sampling location, document the change in location and the reason for the change.

5) Samples must arrive at the laboratory as close to 4°C as possible and within 48 hours of sampling.

6) It is a sampler's responsibility to collect samples as directed in the program/study design, note any unusual conditions at a site, and minimize field error by adhering to relevant POPs.

5. ADDITIONAL REFERENCES

AENV (Alberta Environment). 2006. Aquatic Ecosystems Field Sampling Protocols. Prepared by Alberta Environment. March 2006. W0605

CCME (Canadian Council of Ministers of the Environment). 2011. Protocols Manual for Water Quality Sampling in Canada. PN 1461, ISBN 978-1-896997- 7-0. 186 pp.

6. CONTROL

This POP has been prepared and reviewed for use in the WorleyParsons Infrastructure & Environment Division. Any inquiries regarding this POP should be directed to the undersigned.

Prepared By:

Patrick Chahil, M.E.S.

Reviewed By:

Michael B. Vander Meulen, Ph.D. P.Biol.

Lucie Sliva, M.Sc. P.Biol.

Scope The following procedure is applicable for low-level mercury sampling in surface waters.

1. SAFETY CONSIDERATIONS

This Preferred Operating Procedure (POP) does not address all of the safety issues associated with this task or with other activities that may be undertaken in conjunction with this task. Refer to the WorleyParsons safety management system and the site-specific hazard assessment to identify the potential hazards, mitigations, and controls.

2. MATERIALS AND EQUIPMENT

The following equipment is required for the completion of this task:

- Disposable nitrile gloves (powder less) or non-talc gloves.
- Sample bottles provided by the accredited laboratory; should be glass or Teflon (confirm with laboratory).
- Syringe (used when dissolved mercury analysis is required).
- Syringe filter disks (used when dissolved mercury analysis is required).
- Preservative (provided by the laboratory).
- Mercury-free de-ionized water (provided by the laboratory).

3. PROCEDURES

1) Pre-label the outer bag, at a minimum identifying the sampling site; additional information can be added later.
2) Designate one individual as ‘dirty hands’ and the other individual as ‘clean hands’. Both individuals must wear nitrile or non-talc gloves. ‘Clean hands’ touches only the inner bag and the sample bottle from this point on. If dissolved low-level mercury is required, ‘clean hands’ will also touch the syringe and filter (see steps 8 to 11).
3) ‘Dirty hands’ opens the sample cooler, removes a doubly-bagged sample container, and opens the outer re-sealable plastic bag. ‘Clean hands’ reaches into the outer bag, opens the inner Ziploc bag, removes the sample container, and folds down the inner bag. ‘Dirty hands’ then re-seals the outer bag to prevent entry of any contaminant before inner bag is replaced with sample.
4) ‘Clean hands’ removes the lid from the sample container and holds the lid in one hand. With the other hand ‘clean hands’ obtains the sample by submerging the sample container approximately 30 cm, or mid-column, of the water. Care should be taken to ensure hands are downstream from the inlet of the sample container. The sample container should be filled to capacity, leaving only a small headspace. ‘Clean hands’ will secure the lid tightly. If the sample is to be persevered in the field, ‘dirty hands’ will pour the preservative into the sample container, which is held by ‘clean hands’, being careful not to touch the sample container with any part of the vial holding the preservative; ‘clean hands’ will secure the lid tightly and mix the sample by inverting the sample container several times.
5) ‘Dirty hands’ retrieves the Ziploc bags and opens the outer bag.
6) ‘Clean hands’ reaches inside and places the sample container inside tine inner bag. The inner bag is sealed.
7) ‘Dirty hands’ seals the outer bags and places the bagged sample into the shipping cooler.
8) Repeat steps 2 to 8 for each sample site.
9) If dissolved low-level mercury concentration is required, follow the syringe procedure as outlined in the Field Filtration POP.
10) ‘Dirty hands’ opens the package container the syringe and filter disk. ‘Clean hands’ removes the syringe and filter disk. The filter disk is twisted onto the syringe tip.
11) Fill syringe with sample water and push volume through syringe filter to rinse.
12) ‘Clean hands’ opens sample bottle, fills the syringe with sample, and filters into sample container. Replace lid on bottle after each syringe is filtered. Repeat until sample container is full or filter becomes clogged. If filter becomes clogged, replace the filter with a clean filter and repeat. ‘Clean hands’ will secure the lid tightly. If the sample is to be persevered in the field, ‘dirty hands’ will pour the preservative into the sample container, which is held by ‘clean

hands', being careful not to touch the sample container with any part of the vial holding the preservative; 'clean hands' will secure the lid tightly and mix the sample by inverting the sample container several times.

4. TECHNICAL CONSIDERATIONS

- Two individuals are required to collect low-level mercury samples. One individual will be considered the 'dirty hands', and the second individual will be the 'clean hands'. The "clean hands" individual will be responsible for handling the sample container and filling the sample container from the sample source (river, ditch, lake, wetland, spigot, pump outlet, scooper, etc.). The "dirty hands" individual will be responsible for handling equipment and any other activities which do not involve direct contact with the sample or sample container.
- All sampling equipment and sample containers must be non-metallic and free of any material which might contain trace metals. Low-level mercury sample containers often are made of glass or Teflon. Other plastic bottles (other than Teflon or other fluoropolymers) are unacceptable as mercury may diffuse through, adhere to, or leach from the plastic surfaces.
- Sampling personnel will wear nitrile or non-talc disposable gloves. Gloves will be worn at all times when handling sample bottles or sampling equipment. Gloves will be removed when sample collection is complete, and new gloves will be used when a sample is collected from next the site.
- To prepare the field blank, the mercury-free water (which is provided by the laboratory) should contact all of the sampling equipment to be used for collecting normal samples (e.g. syringe barrel and plunger).
- Low-level mercury samples can be preserved at the laboratory or in the field. If preservation is to occur in the field, the laboratory will provide the proper preservatives.
- If samples are not field preserved, they must be express shipped to the laboratory so that they are received within 24 hours of sampling. If samples are field preserved, express shipping is not required.
- At least 200 ml of sample must be collected. Samples must be placed into double Ziploc bags immediately after collection following the 'Clean hands-Dirty hands' procedure, and only the outside bag should be labelled.
- Be careful not to breathe onto samples as detectible amounts of mercury can be emitted from certain tooth fillings.

5. ADDITIONAL REFERENCES

U.S. EPA., 1996. Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. 42 pp.

6. CONTROL

This POP has been prepared and reviewed for use in the WorleyParsons Infrastructure & Environment Division. Any inquiries regarding this POP should be directed to the undersigned.

Prepared By:

Patrick Chahil, M.E.S.

Reviewed By:

M. Vander Meulen

Michael Vander Meulen, Ph.D. P.Biol.

Lucie Sliva, M.Sc. P.Biol.

Appendix C
Seasonal Trends in Water Quality

Figure C-1 Total copper concentration, AEMP 2017-2019. Dashed red line gives CCME long-term guideline dependent on hardness – minimum hardness used for all

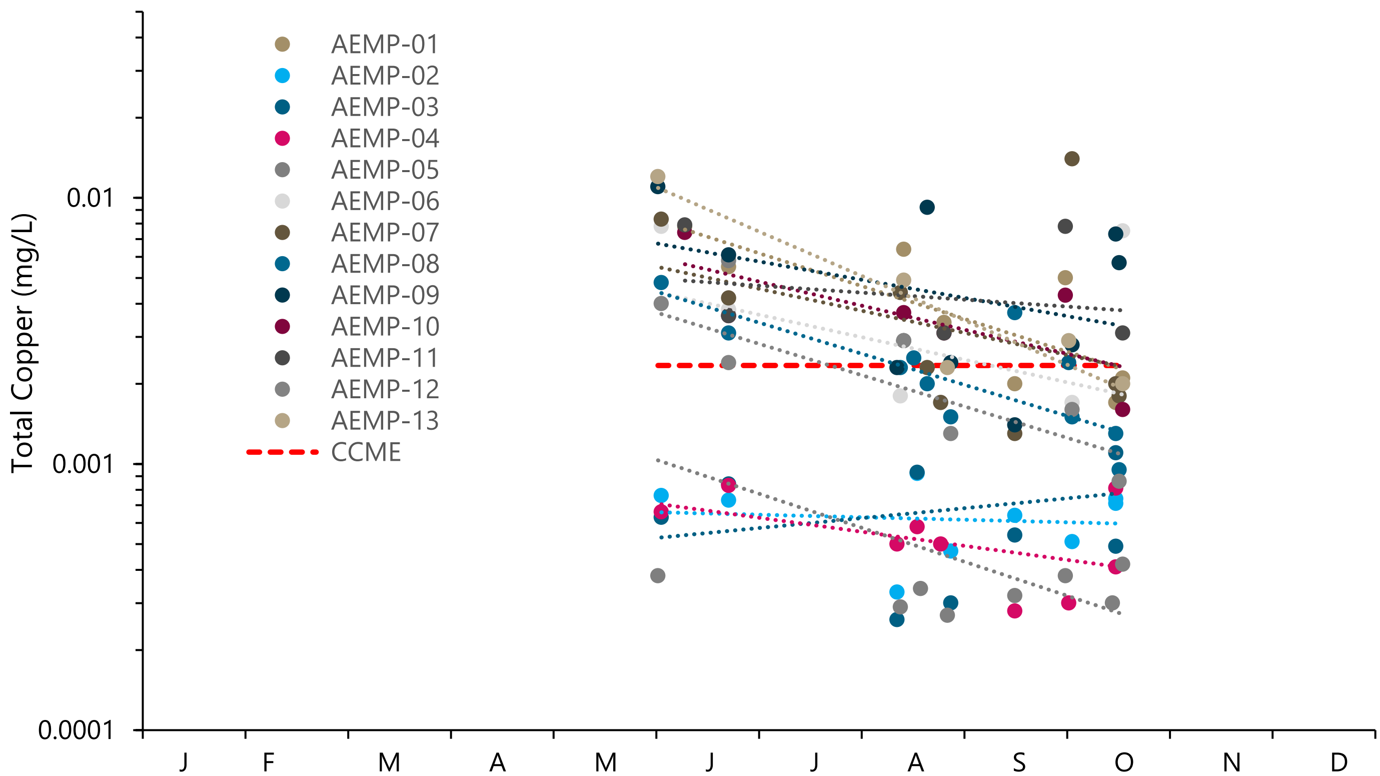


Table C-1 Regression parameters and power for seasonal trends in total copper concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.034	-0.00404	0.621	*	1.636539	0.751
2	0.001	-0.00031	0.012		0.012213	0.056
3	0.000	0.001219	0.039		0.04059	0.071
4	0.001	-0.00173	0.239		0.314187	0.232
5	0.005	-0.00419	0.233		0.303929	0.225
6	0.012	-0.00278	0.198		0.246873	0.19
7	0.014	-0.00272	0.141		0.164667	0.141
8	0.017	-0.00383	0.634	*	1.731878	0.901
9	0.015	-0.00224	0.121		0.137671	0.125
10	0.017	-0.00296	0.514		1.058568	0.367
11	0.007	-0.00086	0.047		0.049573	0.064
12	0.014	-0.00386	0.729	*	2.695251	0.73
13	0.075	-0.00547	0.862	*	6.223873	0.861

Figure C-2 Total iron concentration, AEMP 2017-2019. Dashed red line gives CCME long-term guideline

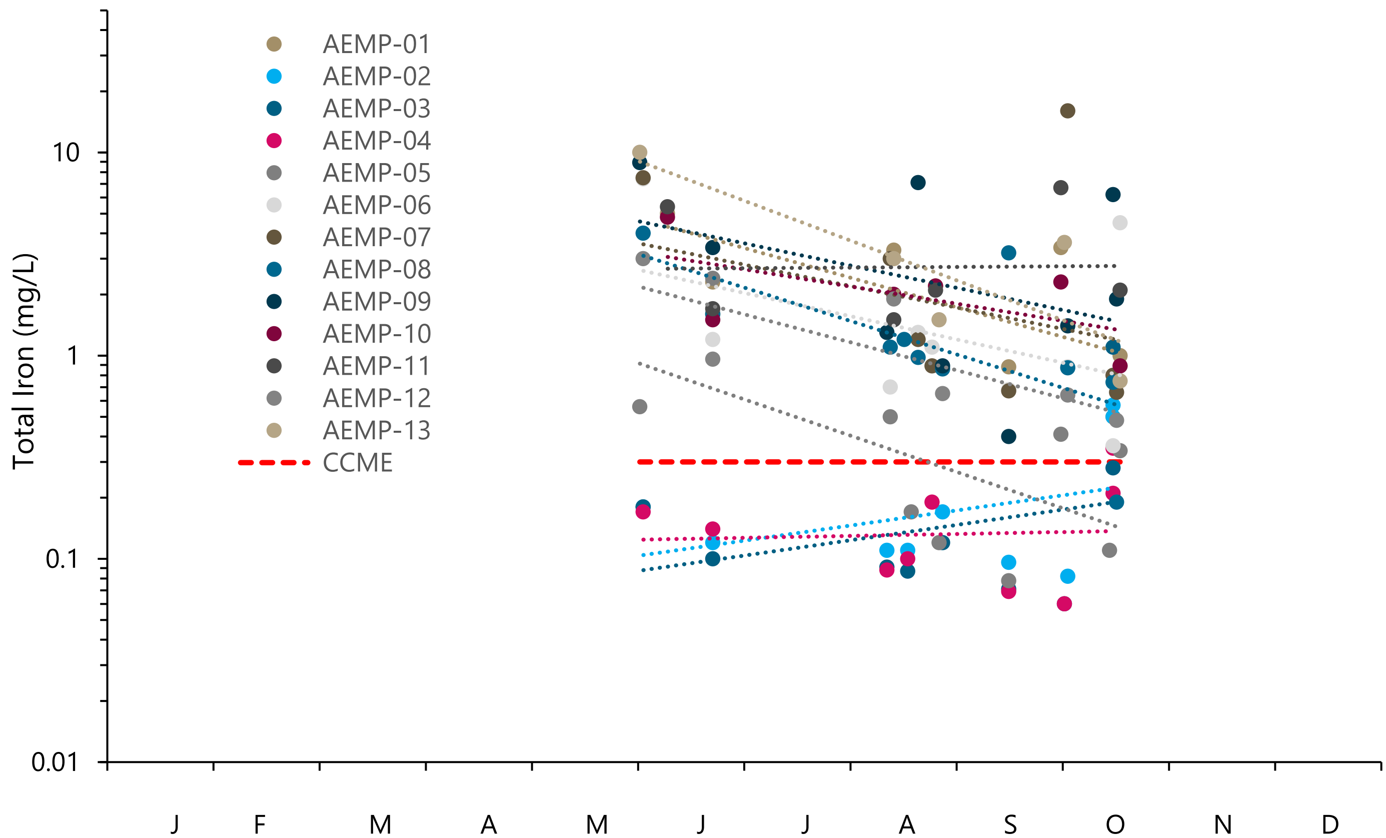


Table C-2 Regression parameters and power for seasonal trends in total iron concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	3.160	0.002052	5.418		0.903	0.492
2	3.448	0.002226	1.202		0.172	0.145
3	5.134	0.002943	0.706		0.101	0.104
4	2.978	0.001966	0.025		0.004	0.052
5	4.939	0.002873	4.153		0.593	0.402
6	5.023	0.002898	1.674		0.239	0.186
7	7.668	0.00366	0.891		0.127	0.119
8	3.190	0.002092	6.643		0.830	0.599
9	6.253	0.003291	1.186		0.169	0.144
10	2.681	0.001844	2.260		0.565	0.218
11	4.078	0.002628	0.002		0.000	0.050
12	2.557	0.001757	6.581		1.645	0.524
13	4.314	0.002628	5.969		1.990	0.436

Figure C-3 Total magnesium concentration, AEMP 2017-2019

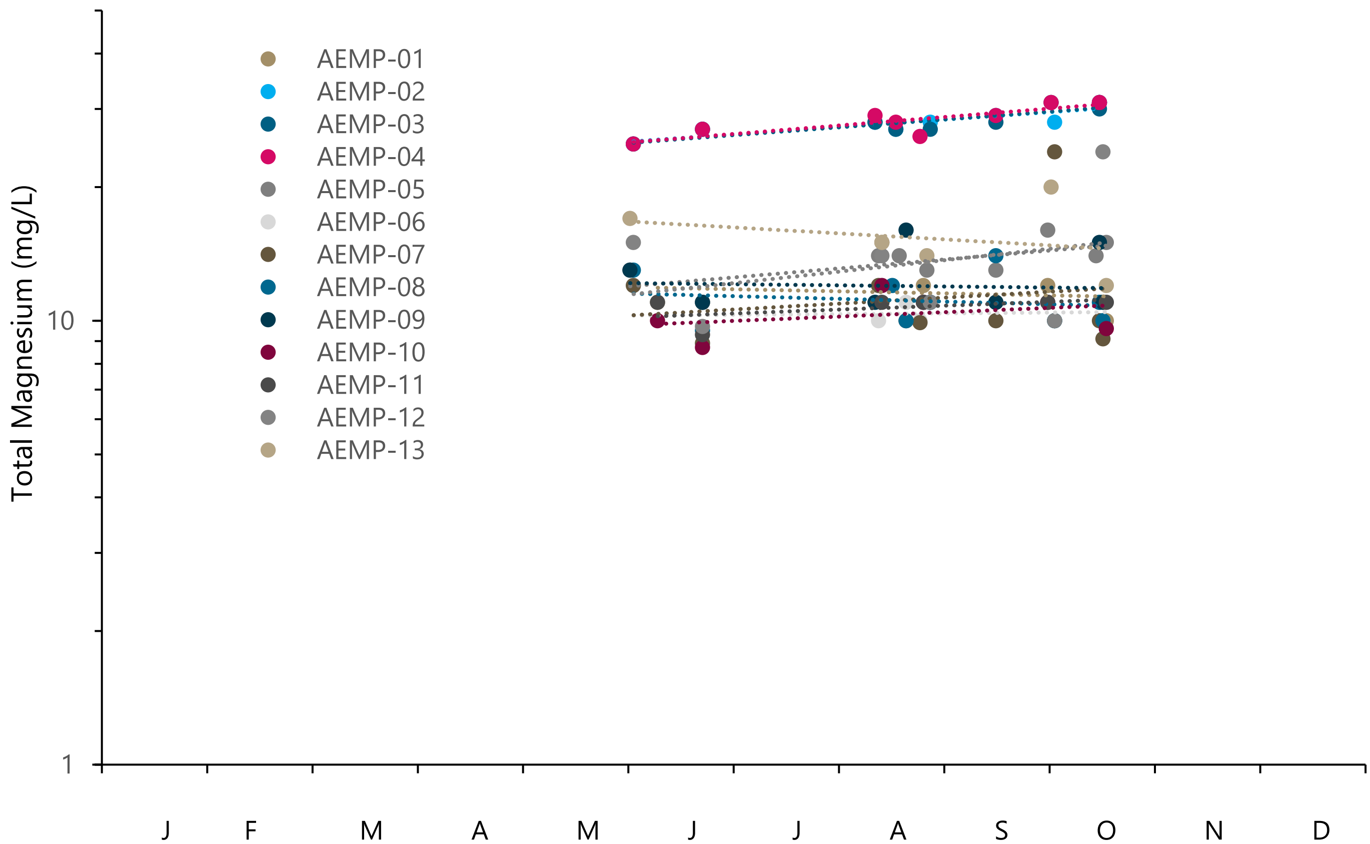


Table C-3 Regression parameters and power for seasonal trends in total magnesium concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	12.551	-0.00015	0.021		0.021	0.059
2	20.890	0.000547	0.790	*	3.768	0.993
3	20.518	0.00058	0.781	*	3.567	0.991
4	20.252	0.000625	0.753	*	3.051	0.979
5	9.473	0.000662	0.482		0.930	0.582
6	10.066	5.72E-05	0.005		0.005	0.053
7	8.812	0.000438	0.026		0.026	0.063
8	12.359	-0.0002	0.027		0.028	0.065
9	12.514	-8.2E-05	0.003		0.003	0.052
10	8.729	0.000321	0.112		0.126	0.085
11	9.209	0.000286	0.251		0.335	0.148
12	8.506	0.000847	0.096		0.106	0.08
13	19.554	-0.00044	0.080		0.087	0.067

Figure C-4 Total manganese concentration, AEMP 2017-2019

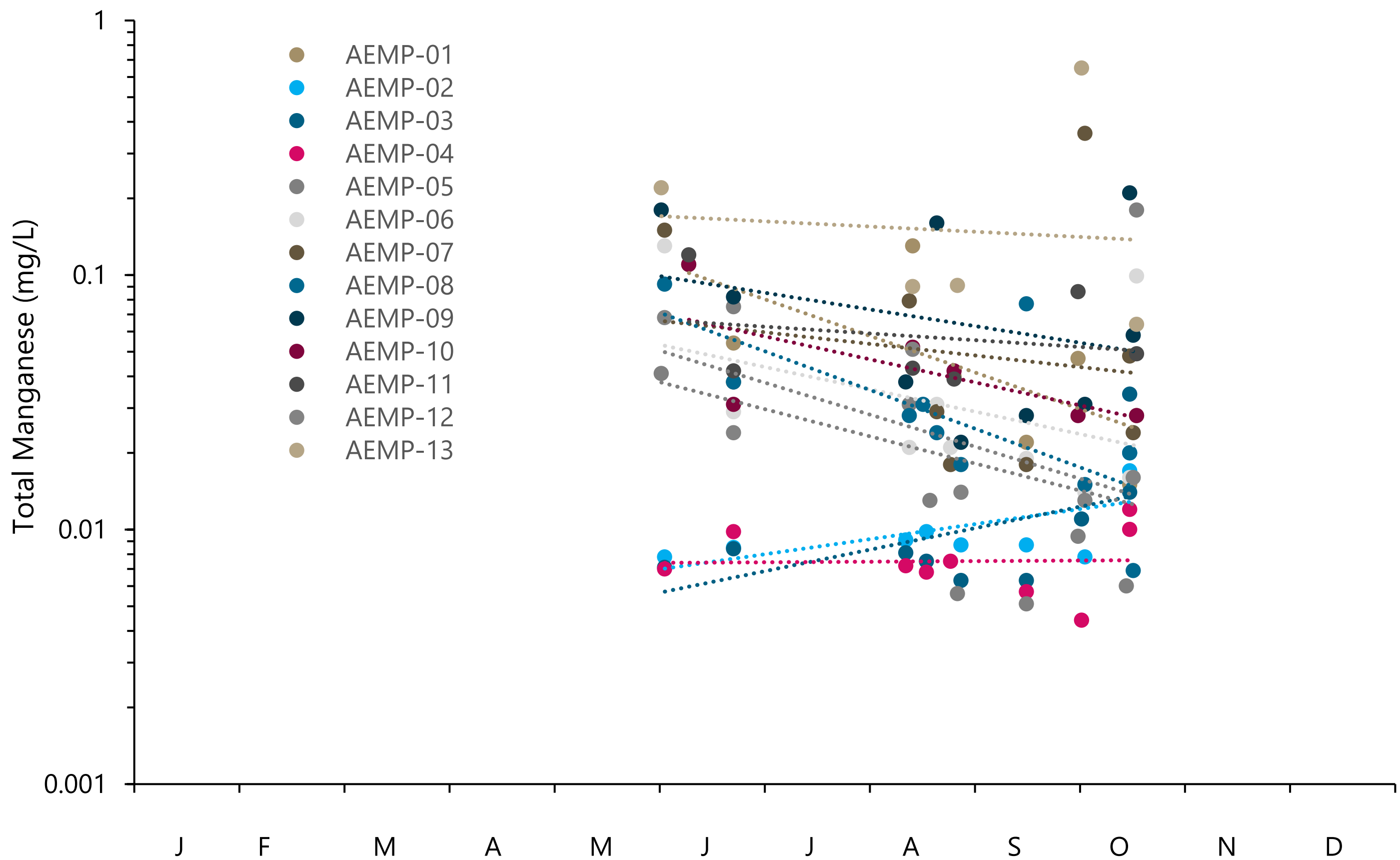


Table C-4 Regression parameters and power for seasonal trends in total manganese concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.584	-0.00471	0.520		1.084	0.569
2	0.004	0.001941	0.386		0.629	0.422
3	0.002	0.002768	0.324		0.478	0.333
4	0.007	7.53E-05	0.001		0.001	0.050
5	0.130	-0.00349	0.093		0.102	0.105
6	0.146	-0.00288	0.163		0.195	0.159
7	0.112	-0.00149	0.026		0.027	0.064
8	0.409	-0.00498	0.469		0.884	0.627
9	0.210	-0.00215	0.076		0.082	0.094
10	0.200	-0.00296	0.454		0.831	0.300
11	0.090	-0.00087	0.051		0.054	0.065
12	0.215	-0.00412	0.534		1.147	0.392
13	0.216	-0.00067	0.008		0.008	0.052

Figure C-5 Total molybdenum concentration, AEMP 2017-2019. CCME long-term guideline is 0.073 mg/L and not indicated because it exceeds monitoring results by more than an order of magnitude

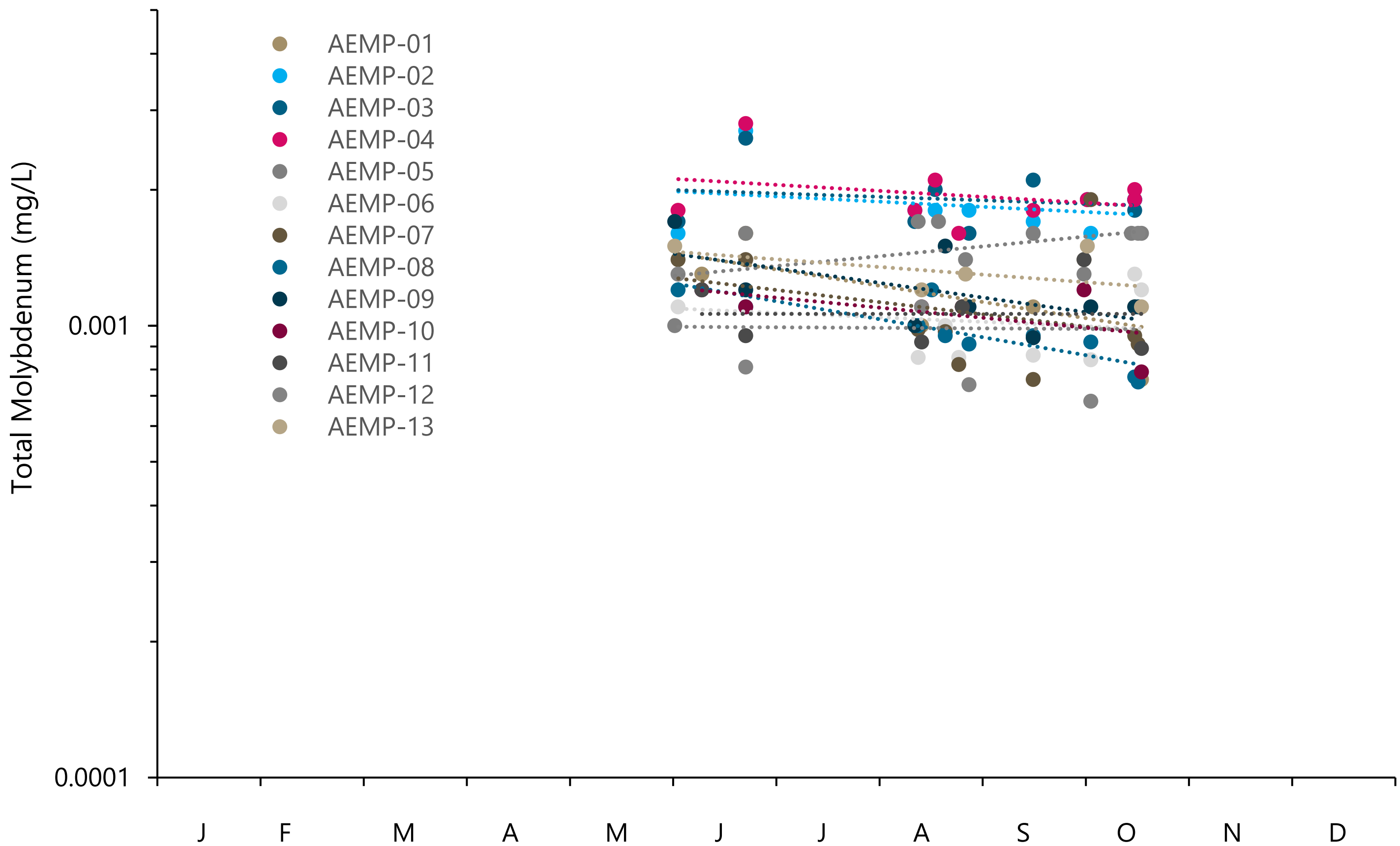


Table C-5 Regression parameters and power for seasonal trends in total molybdenum concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.002	-0.00118	0.354		0.548	0.321
2	0.002	-0.00038	0.071		0.077	0.090
3	0.002	-0.00025	0.036		0.037	0.069
4	0.002	-0.00043	0.094		0.103	0.105
5	0.001	0.000713	0.212		0.269	0.204
6	0.001	-0.00032	0.032		0.033	0.067
7	0.002	-0.00088	0.107		0.119	0.115
8	0.002	-0.00131	0.718	*	2.546	0.977
9	0.002	-0.00106	0.387		0.631	0.424
10	0.002	-0.00073	0.317		0.464	0.187
11	0.001	1.67E-06	0.000		0.000	0.050
12	0.001	-3.9E-05	0.000		0.000	0.050
13	0.002	-0.00055	0.250		0.334	0.117

Figure C-6 Total sodium concentration, AEMP 2017-2019

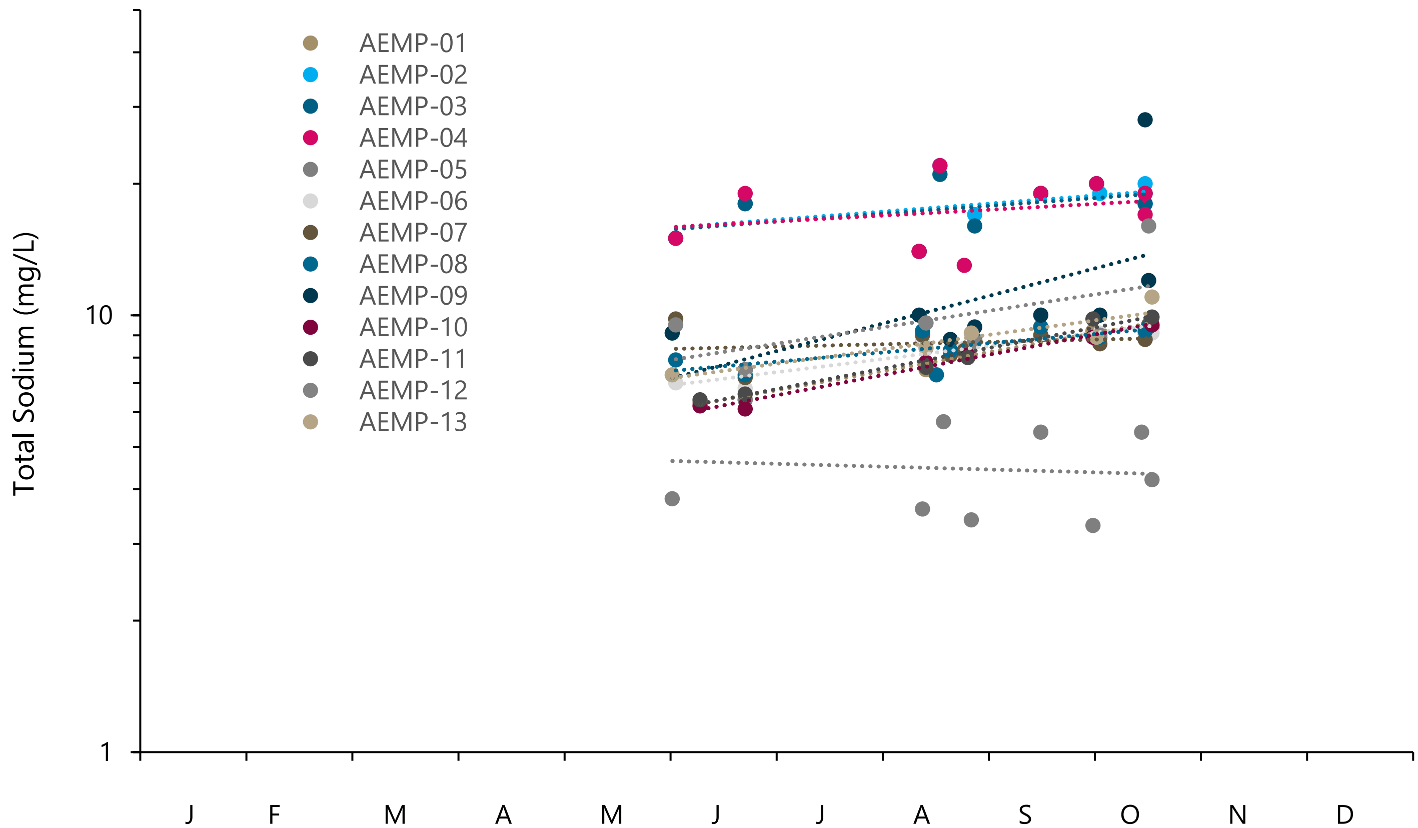


Table C-6 Regression parameters and power for seasonal trends in total sodium concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	13.098	-0.00452	0.427		0.745	0.419
2	0.022	0.001842	0.057		0.061	0.082
3	0.019	0.001759	0.034		0.035	0.068
4	0.081	-0.001	0.015		0.015	0.058
5	2.419	-0.00748	0.015		0.504	0.348
6	7.100	-0.00405	0.335		0.456	0.319
7	8.360	-0.00397	0.313		0.264	0.201
8	10.058	-0.00527	0.209	*	1.300	0.798
9	8.974	-0.00376	0.565		0.268	0.203
10	3.816	-0.00215	0.207		0.261	0.125
11	1.738	-0.00052	0.038		0.040	0.061
12	6.677	-0.00478	0.697		2.304	0.664
13	41.589	-0.00625	0.870	*	6.687	0.882

Figure C-7 Total nickel concentration, AEMP 2017-2019. Dashed red line gives CCME long-term guideline dependent on hardness – minimum hardness used for all

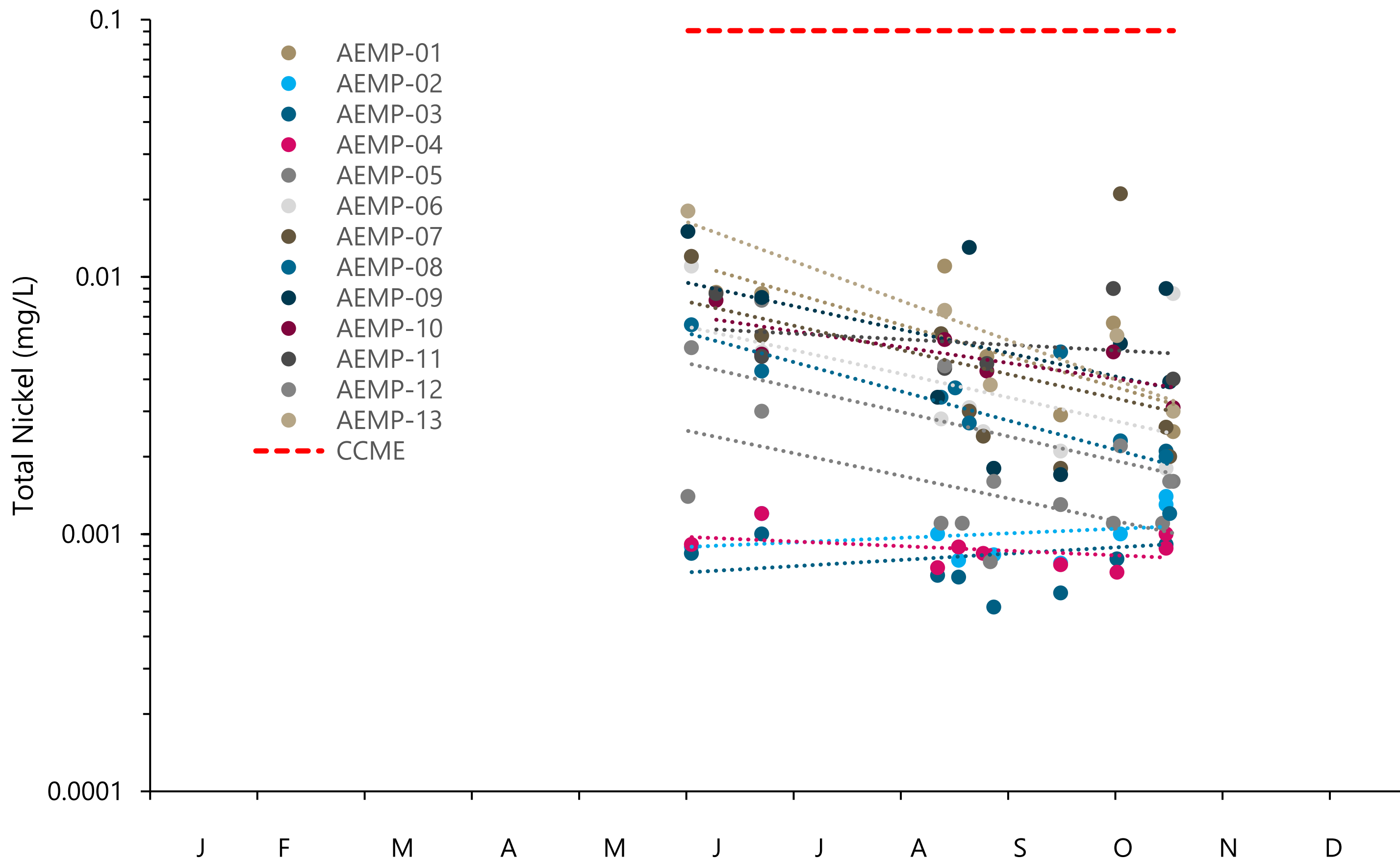


Table C-7 Regression parameters and power for seasonal trends in total nickel concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.046	-0.00398	0.582	*	1.393	0.680
2	0.001	0.000579	0.085		0.093	0.100
3	0.001	0.000797	0.047		0.050	0.076
4	0.001	-0.00059	0.159		0.188	0.155
5	0.007	-0.00288	0.222		0.286	0.214
6	0.018	-0.00301	0.271		0.371	0.267
7	0.024	-0.00309	0.160		0.191	0.157
8	0.022	-0.00372	0.567	*	1.310	0.801
9	0.027	-0.00299	0.173		0.210	0.168
10	0.014	-0.00202	0.588		1.425	0.468
11	0.008	-0.00072	0.058		0.061	0.067
12	0.014	-0.00311	0.572		1.336	0.445
13	0.096	-0.00503	0.798		3.952	0.698

Figure C-8 Total strontium concentration, AEMP 2017-2019

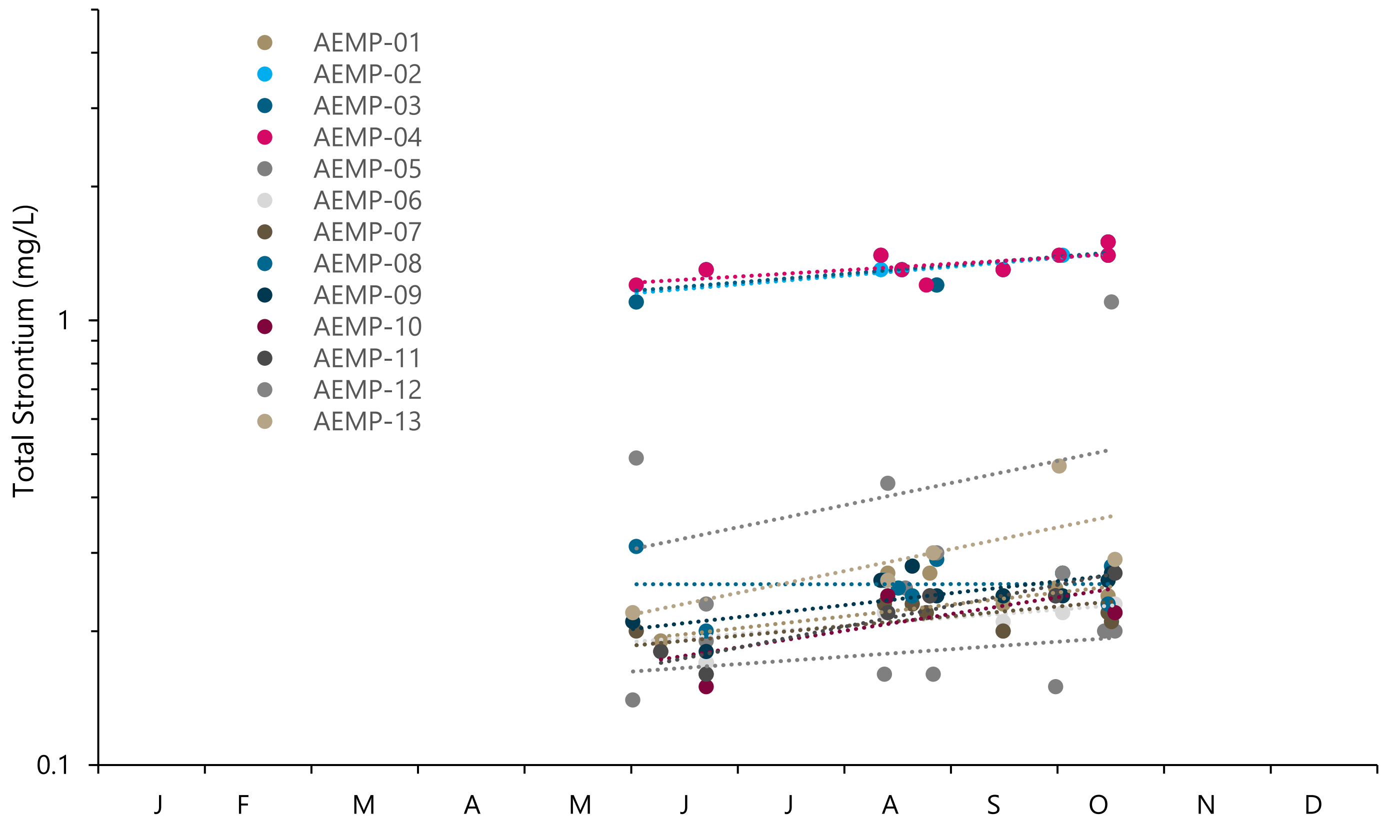


Table C-8 Regression parameters and power for seasonal trends in total strontium concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.140	0.000879	0.375		0.601	0.348
2	0.915	0.000653	0.637	*	1.757	0.854
3	0.933	0.000631	0.558	*	1.261	0.718
4	1.031	0.000468	0.474		0.901	0.568
5	0.134	0.00055	0.111		0.125	0.118
6	0.154	0.000595	0.493		0.971	0.601
7	0.144	0.000722	0.320		0.470	0.328
8	0.255	3.18E-06	0.000		0.000	0.050
9	0.148	0.000883	0.513		1.052	0.636
10	0.109	0.001234	0.570		1.327	0.442
11	0.096	0.001544	0.879	*	7.256	0.985
12	0.172	0.001633	0.129		0.148	0.092
13	0.124	0.001612	0.499		0.994	0.251

Figure C-9 Total titanium concentration, AEMP 2017-2019

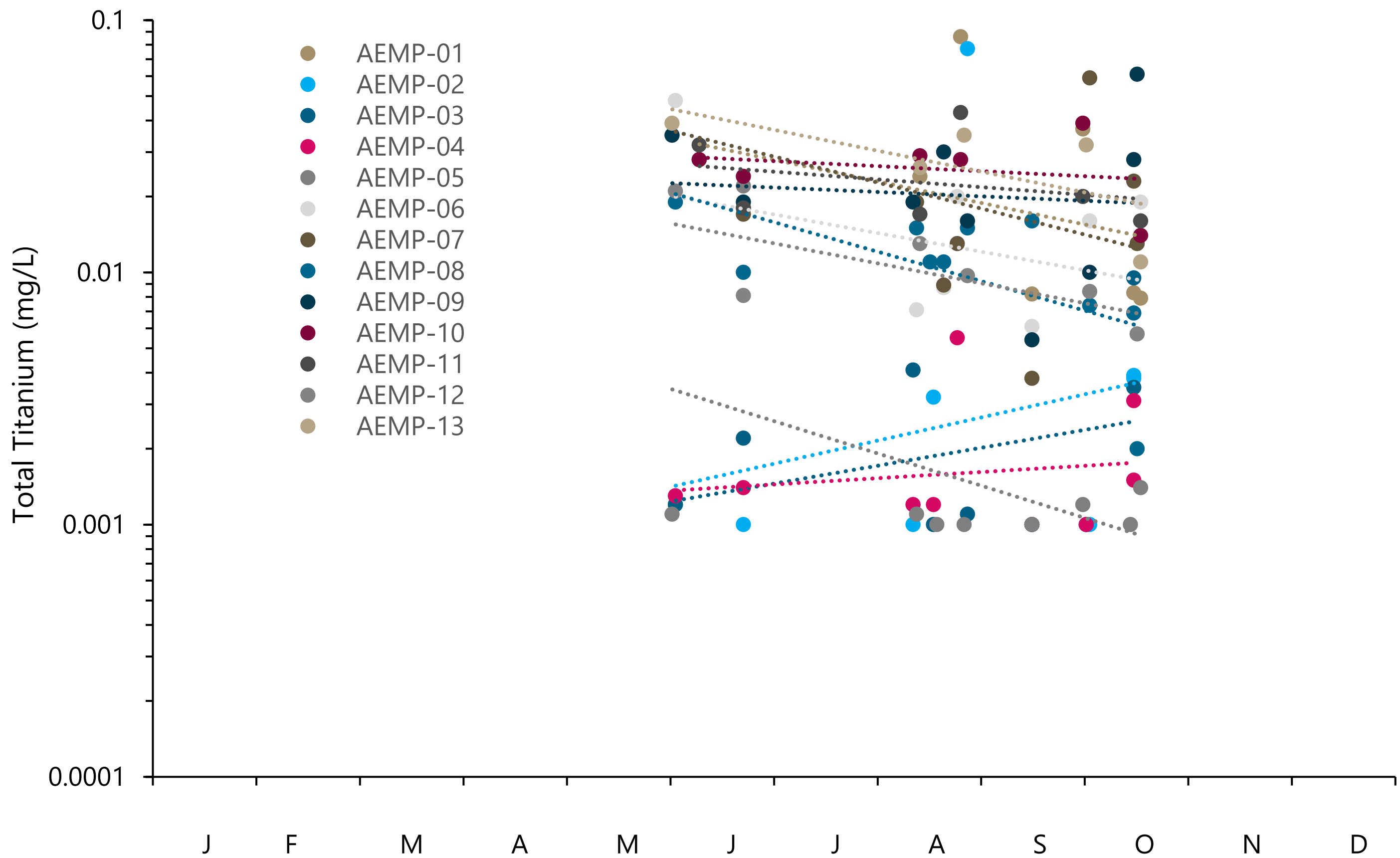


Table C-9 Regression parameters and power for seasonal trends in total titanium concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.091	-0.00281	0.142		0.165	0.126
2	0.000	0.003007	0.055		0.058	0.081
3	0.001	0.002327	0.099		0.110	0.109
4	0.001	0.000807	0.024		0.025	0.063
5	0.015	-0.00419	0.213		0.271	0.205
6	0.047	-0.00242	0.159		0.189	0.155
7	0.120	-0.00338	0.137		0.159	0.138
8	0.079	-0.00383	0.381		0.616	0.472
9	0.028	-0.00057	0.008		0.008	0.054
10	0.036	-0.00065	0.054		0.057	0.066
11	0.038	-0.001	0.090		0.099	0.078
12	0.039	-0.00259	0.517		1.071	0.371
13	0.115	-0.00271	0.434		0.767	0.206

Figure C-10 Total uranium concentration, AEMP 2017-2019. CCME long-term guideline is 0.015 mg/L and not indicated because it exceeds monitoring results by more than an order of magnitude

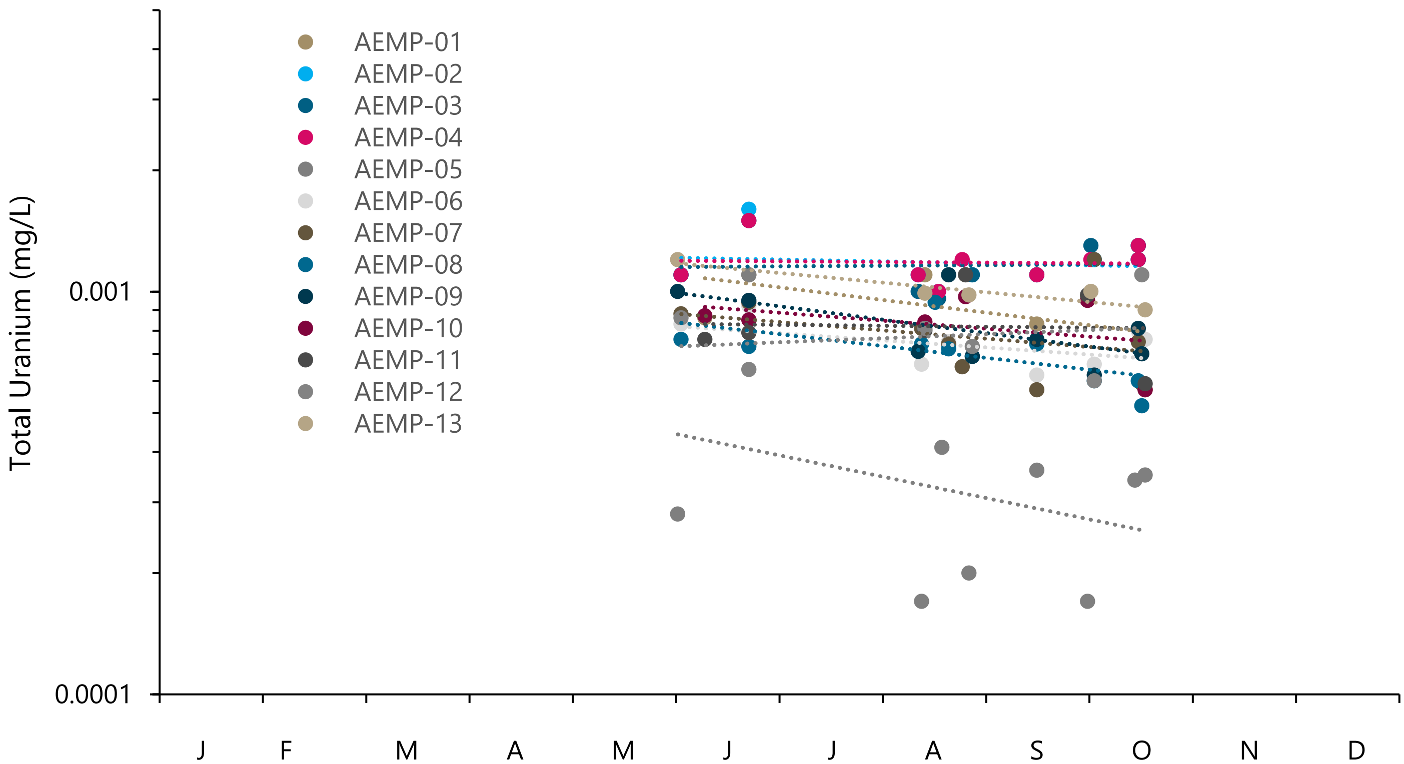


Table C-10 Regression parameters and power for seasonal trends in total uranium concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	0.002	-0.00103	0.271		0.372	0.231
2	0.001	-0.00015	0.015		0.015	0.058
3	0.001	5.08E-05	0.002		0.002	0.051
4	0.001	-5.2E-05	0.002		0.002	0.051
5	0.001	-0.00174	0.112		0.126	0.119
6	0.001	-0.00058	0.233		0.303	0.225
7	0.001	-0.00068	0.100		0.112	0.110
8	0.001	-0.00096	0.383		0.622	0.475
9	0.001	-0.0011	0.394		0.650	0.435
10	0.001	-0.00065	0.164		0.195	0.106
11	0.001	-7.8E-05	0.002		0.002	0.051
12	0.001	0.000333	0.036		0.037	0.060
13	0.002	-0.00079	0.854	*	5.859	0.842

Figure C-11 Chloride concentration, AEMP 2017-2019. CCME long-term guideline is 120 mg/L and not indicated because it exceeds monitoring results by an order of magnitude

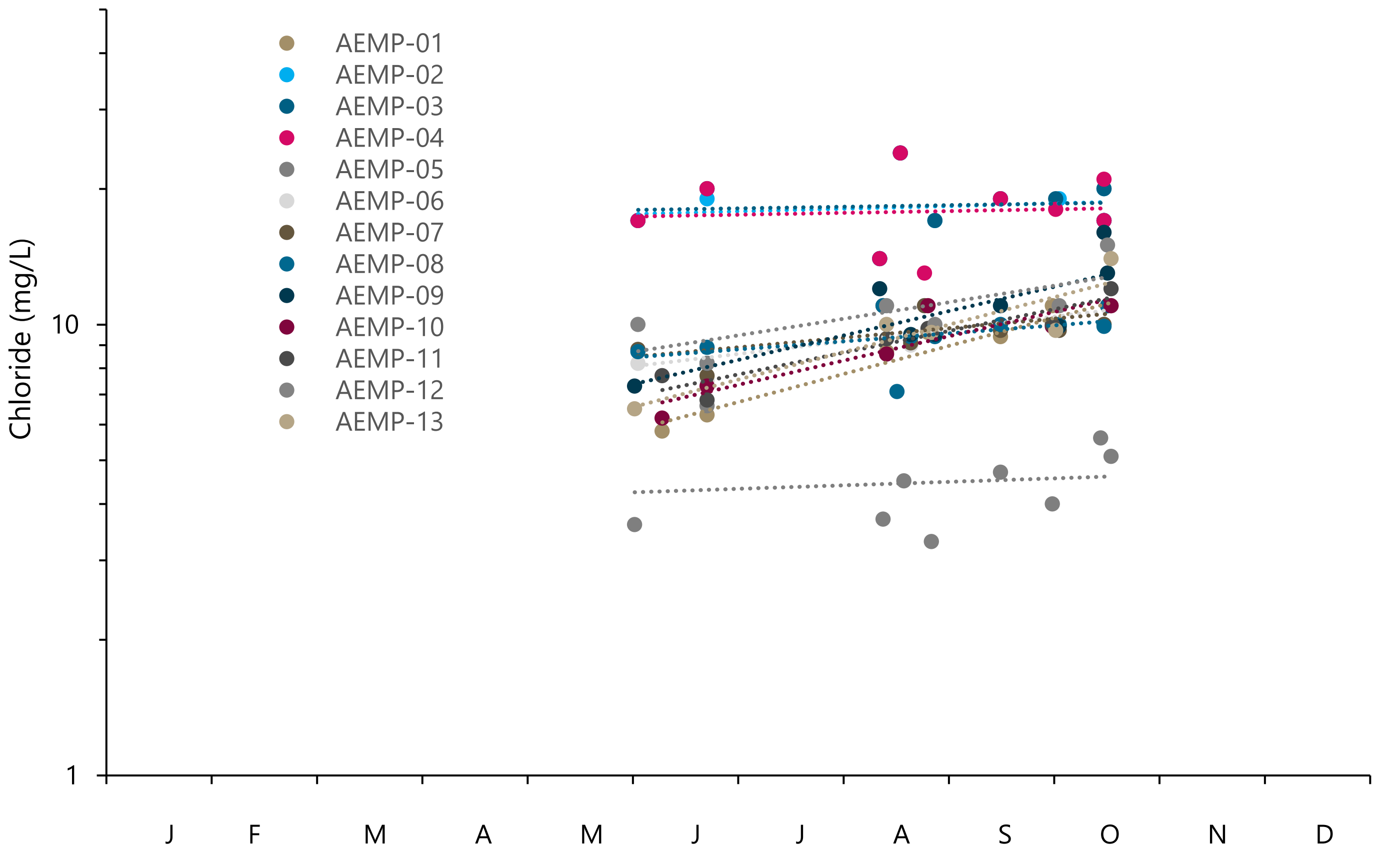


Table C-11 Regression parameters and power for seasonal trends in chloride concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	2.846	0.002043	0.927	*	12.670	1.000
2	16.445	0.000192	0.021		0.021	0.061
3	17.244	0.000116	0.007		0.007	0.054
4	16.589	0.000131	0.006		0.006	0.053
5	3.884	0.000254	0.016		0.016	0.058
6	5.885	0.000903	0.540	*	1.176	0.687
7	6.649	0.000694	0.411		0.697	0.461
8	6.888	0.000584	0.229		0.297	0.251
9	3.958	0.001772	0.679	*	2.116	0.912
10	3.491	0.001767	0.829	*	4.845	0.927
11	3.989	0.001578	0.879	*	7.283	0.985
12	5.693	0.001206	0.579		1.375	0.455
13	3.255	0.001998	0.825	*	4.719	0.767

Figure C-12 Sulphate concentration, AEMP 2017-2019

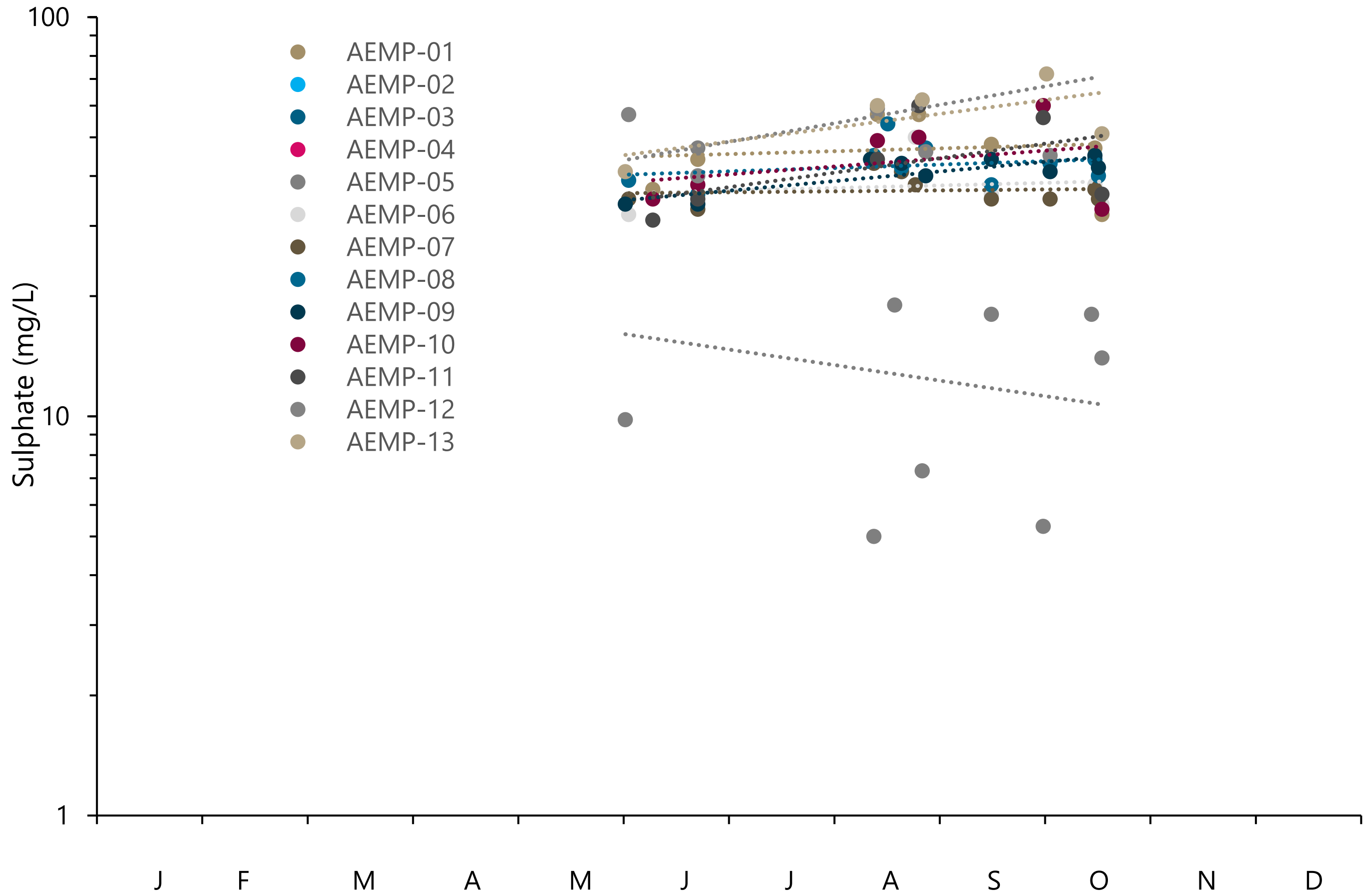


Table C-12 Regression parameters and power for seasonal trends in sulphate concentration

AEMP location	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
1	41.180	0.000231	0.014		0.015	0.056
2	93.746	0.000741	0.718	*	2.543	0.954
3	92.828	0.000744	0.595	*	1.469	0.784
4	102.884	0.000574	0.570	*	1.325	0.740
5	25.177	-0.00128	0.039		0.040	0.071
6	33.622	0.000212	0.028		0.029	0.065
7	35.246	7.72E-05	0.010		0.010	0.055
8	36.542	0.000278	0.062		0.066	0.090
9	26.346	0.00079	0.679	*	2.113	0.912
10	30.685	0.000651	0.110		0.123	0.085
11	22.727	0.001189	0.282		0.394	0.165
12	25.716	0.001517	0.229		0.297	0.136
13	30.276	0.001134	0.427		0.746	0.201

Appendix D
Seasonal Trends Across Sampling Locations

Advisian
Worley Group

Imperial

Figure D-1 Summary of regression slopes for sampling locations – spatial differences in seasonal total aluminum concentration

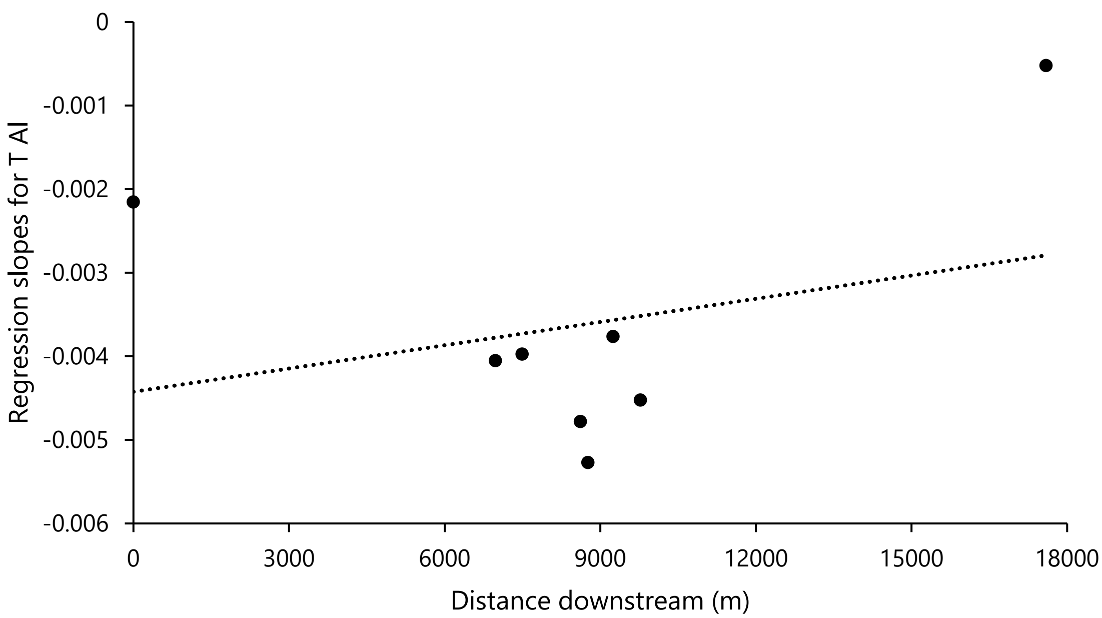


Figure D-2 Summary of regression slopes for sampling locations – spatial differences in seasonal total iron concentration

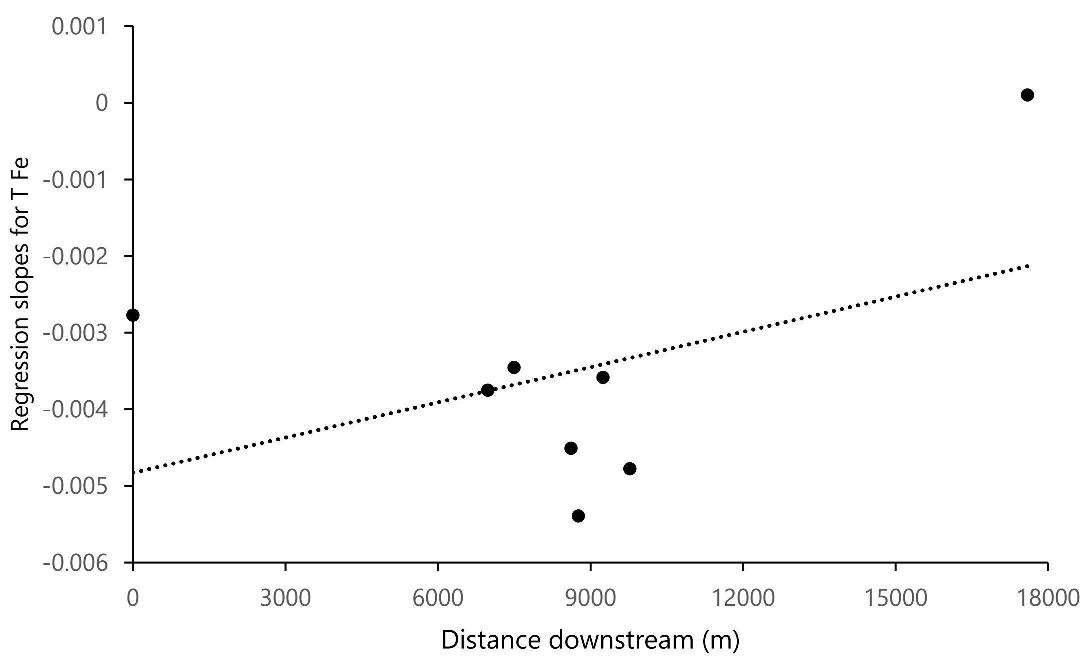


Figure D-3 Summary of regression slopes for sampling locations – spatial differences in seasonal total magnesium concentration

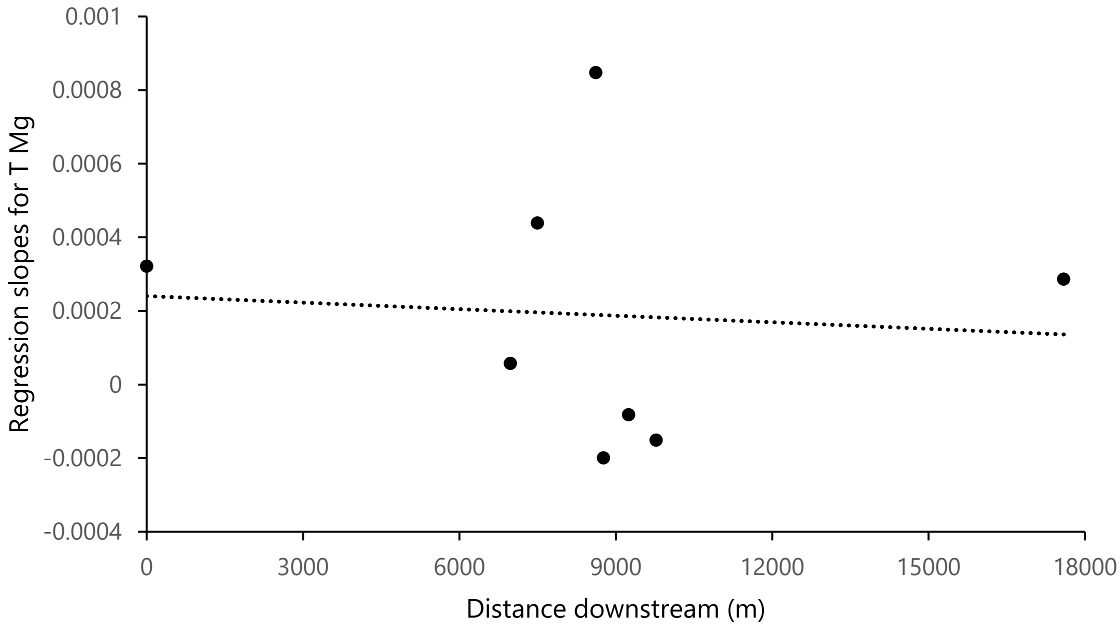


Figure D-4 Summary of regression slopes for sampling locations – spatial differences in seasonal total manganese concentration

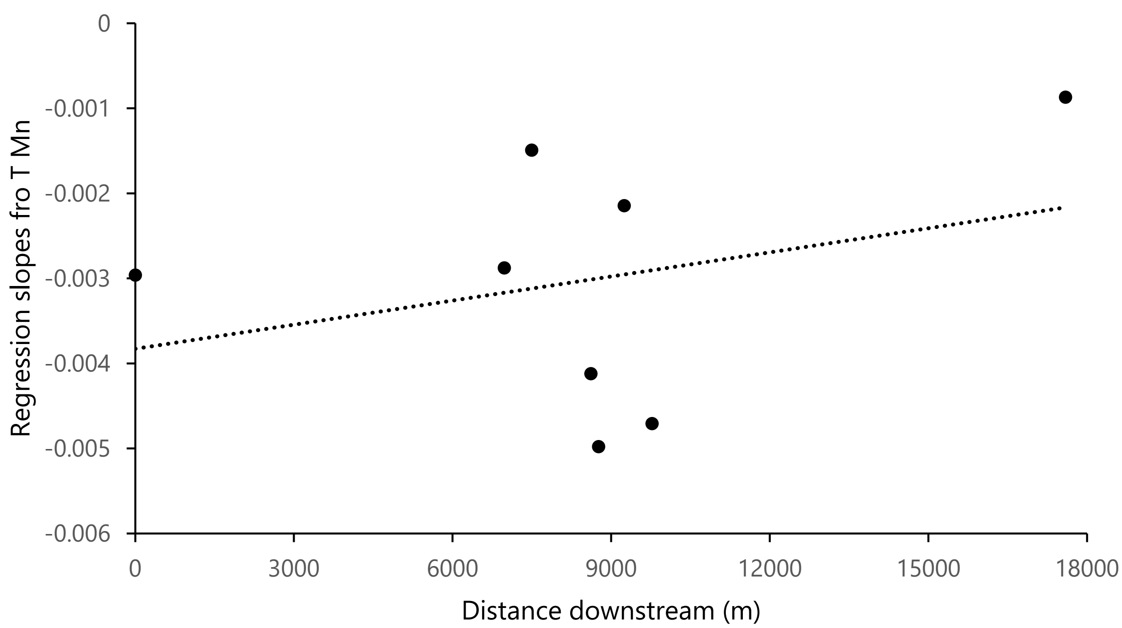


Figure D-5 Summary of regression slopes for sampling locations – spatial differences in seasonal total molybdenum concentration

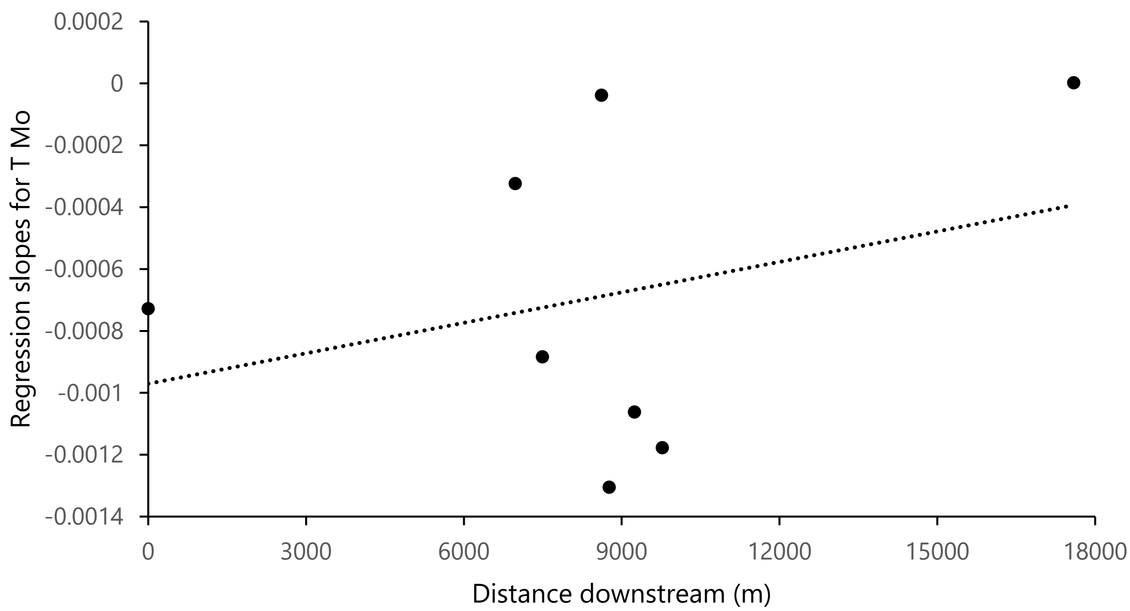


Figure D-6 Summary of regression slopes for sampling locations – spatial differences in seasonal total sodium concentration

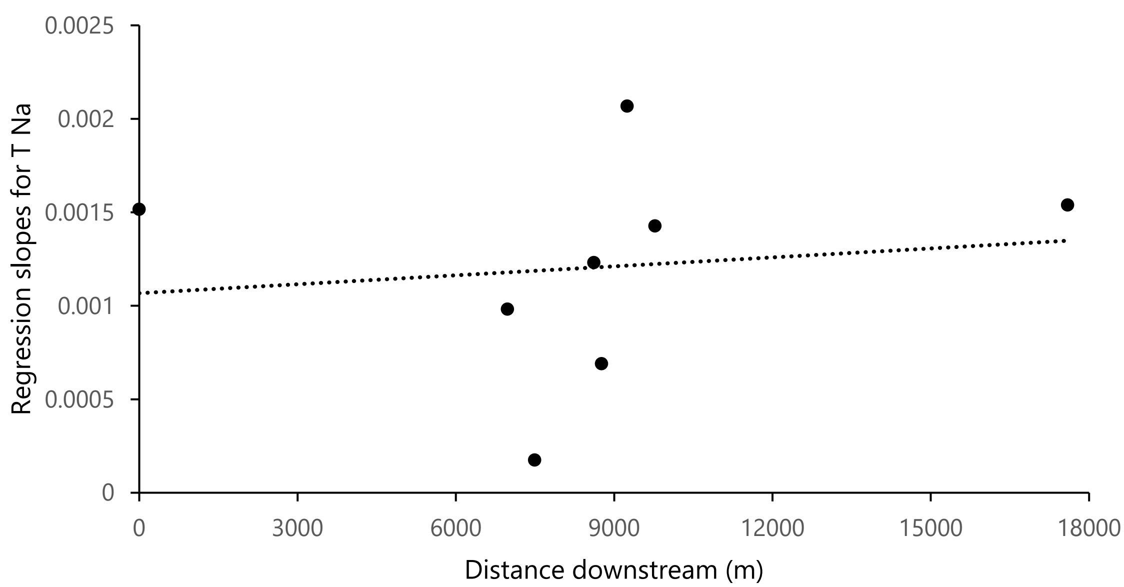


Figure D-7 Summary of regression slopes for sampling locations – spatial differences in seasonal total nickel concentration

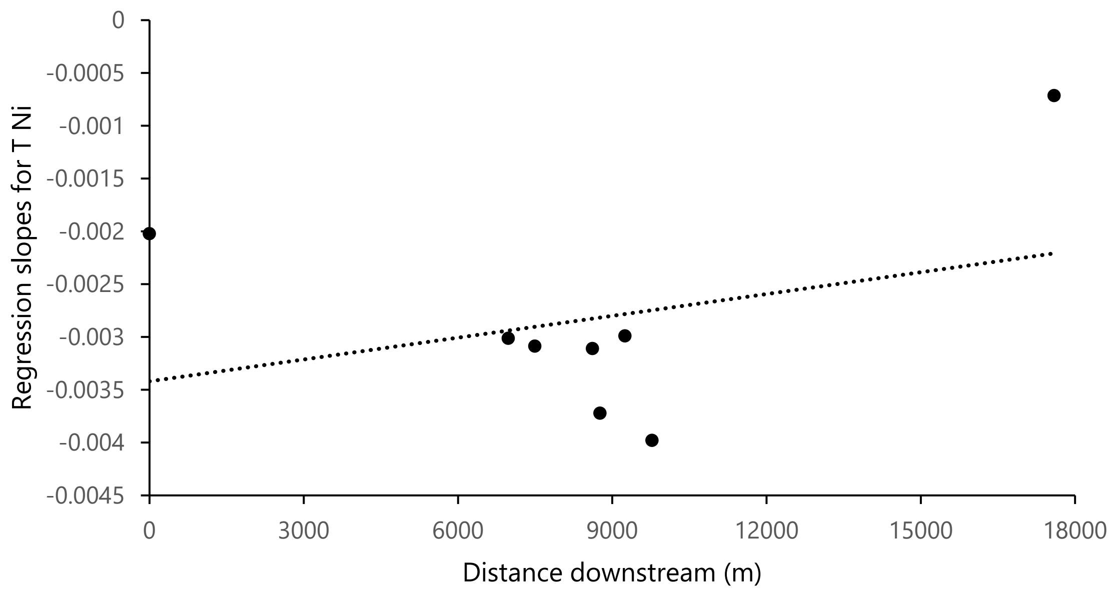


Figure D-8 Summary of regression slopes for sampling locations – spatial differences in seasonal total strontium concentration

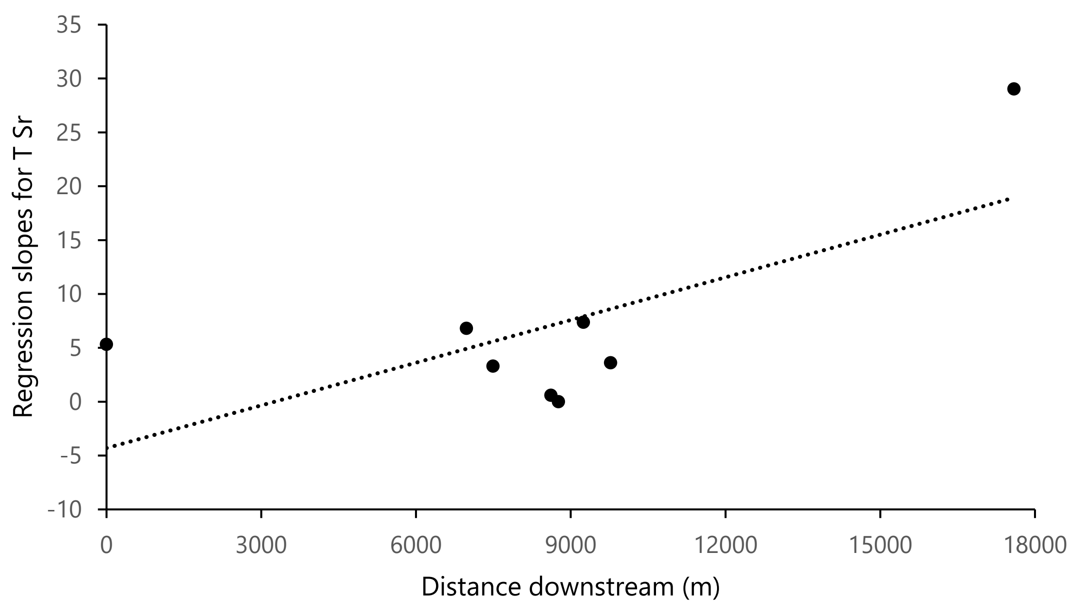


Figure D-9 Summary of regression slopes for sampling locations – spatial differences in seasonal total titanium concentration

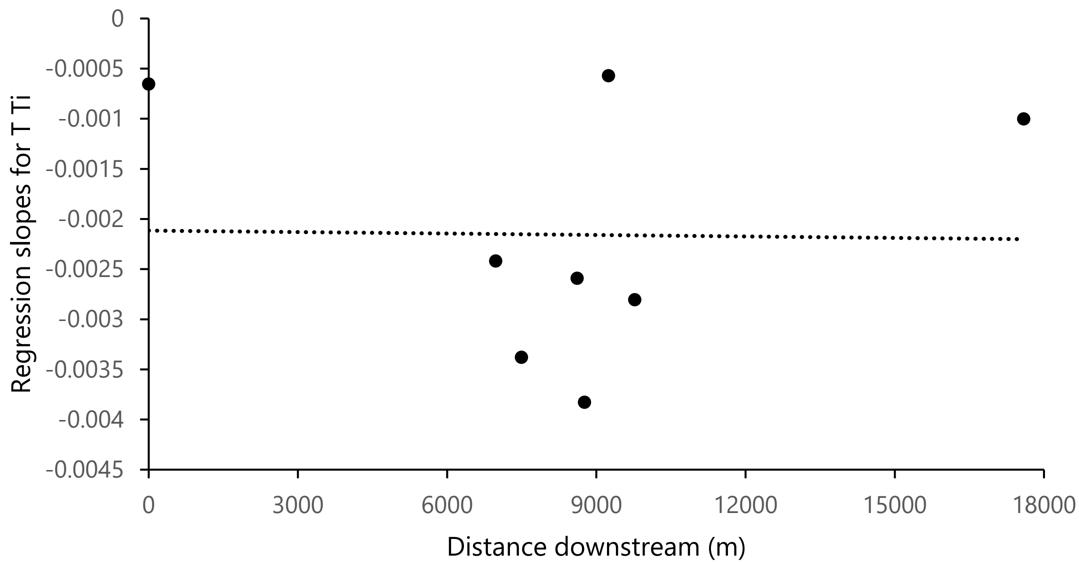


Figure D-10 Summary of regression slopes for sampling locations – spatial differences in seasonal total uranium concentration

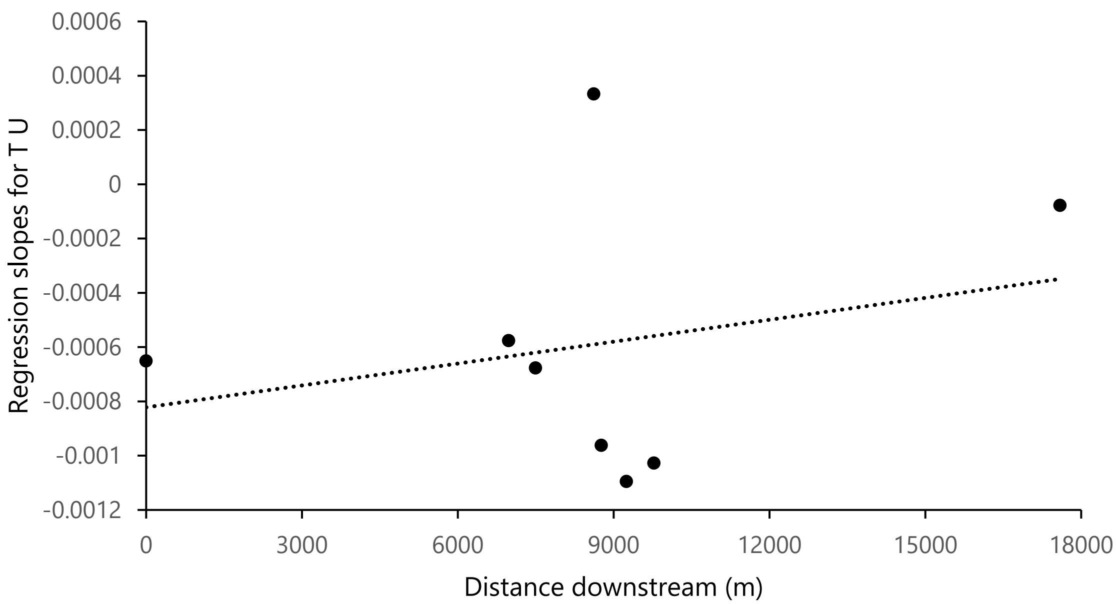


Figure D-11 Summary of regression slopes for sampling locations – spatial differences in seasonal total chloride concentration

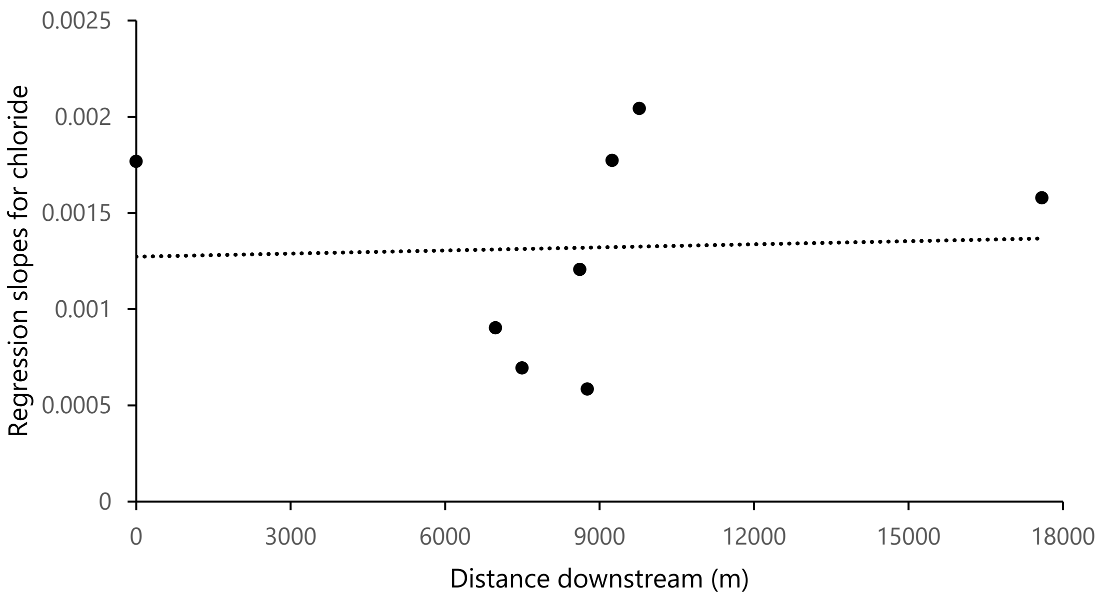
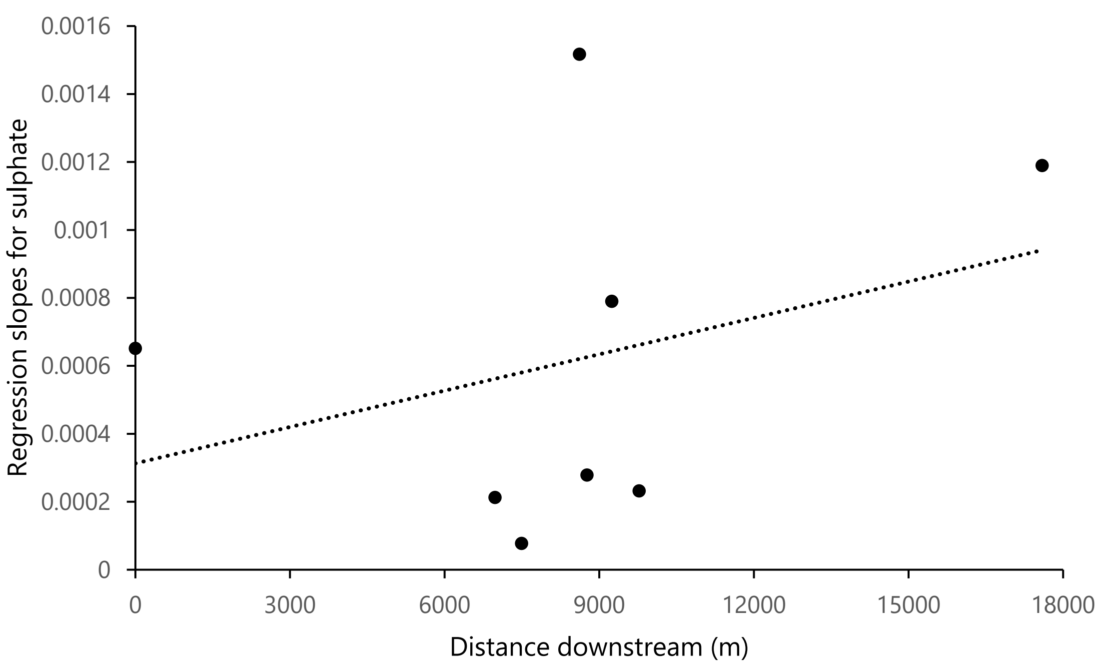


Figure D-12 Summary of regression slopes for sampling locations – spatial differences in seasonal total sulphate concentration



Appendix E
Spatial Trends in Water Quality

Figure E-1 Total copper concentration, AEMP spatial trends. Dashed red line gives CCME long-term guideline dependent on hardness – minimum hardness used for all

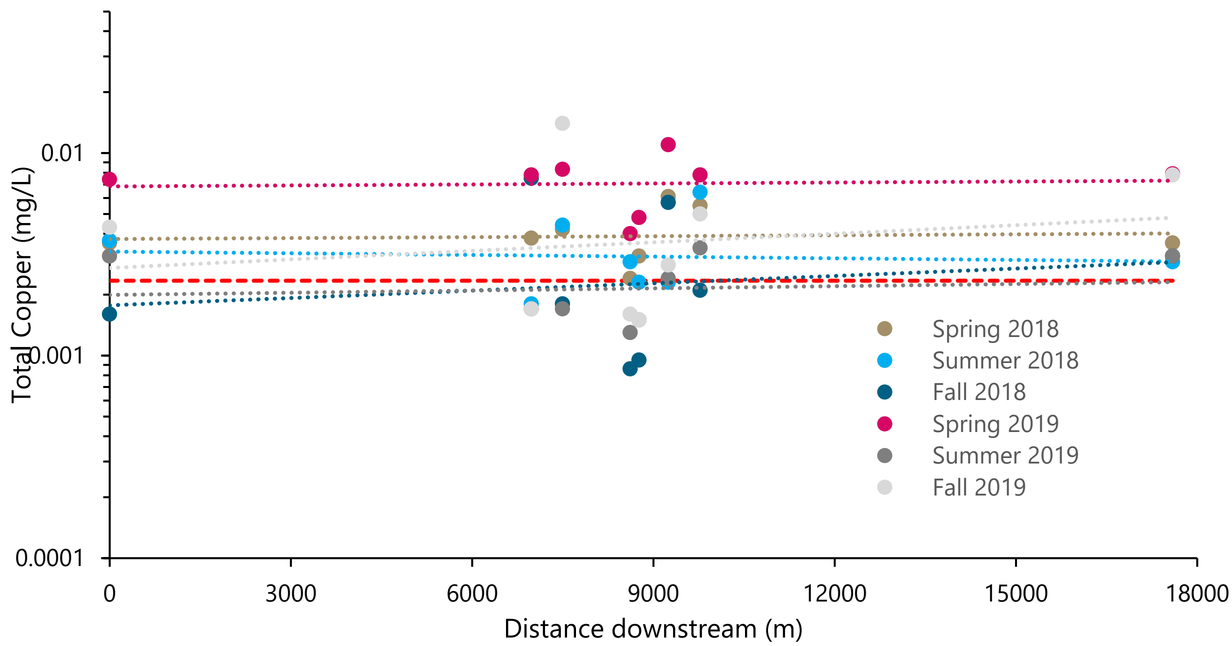


Table E-1 Regression parameters and power for spatial trends in total copper concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	3.765E-03	1.555E-06	0.0033		0.0033	0.0509
Summer 2018	3.264E-03	-2.758E-06	0.0056		0.0056	0.0515
Fall 2018	1.772E-03	1.210E-05	0.0293		0.0302	0.0583
Spring 2019	6.847E-03	1.618E-06	0.0031		0.0031	0.0508
Summer 2019	1.995E-03	3.585E-06	0.0111		0.0113	0.0531
Fall 2019	2.710E-03	1.409E-05	0.0365		0.0378	0.0604

Figure E-2 Total iron concentration, AEMP spatial trends. Dashed red line gives CCME long-term guideline

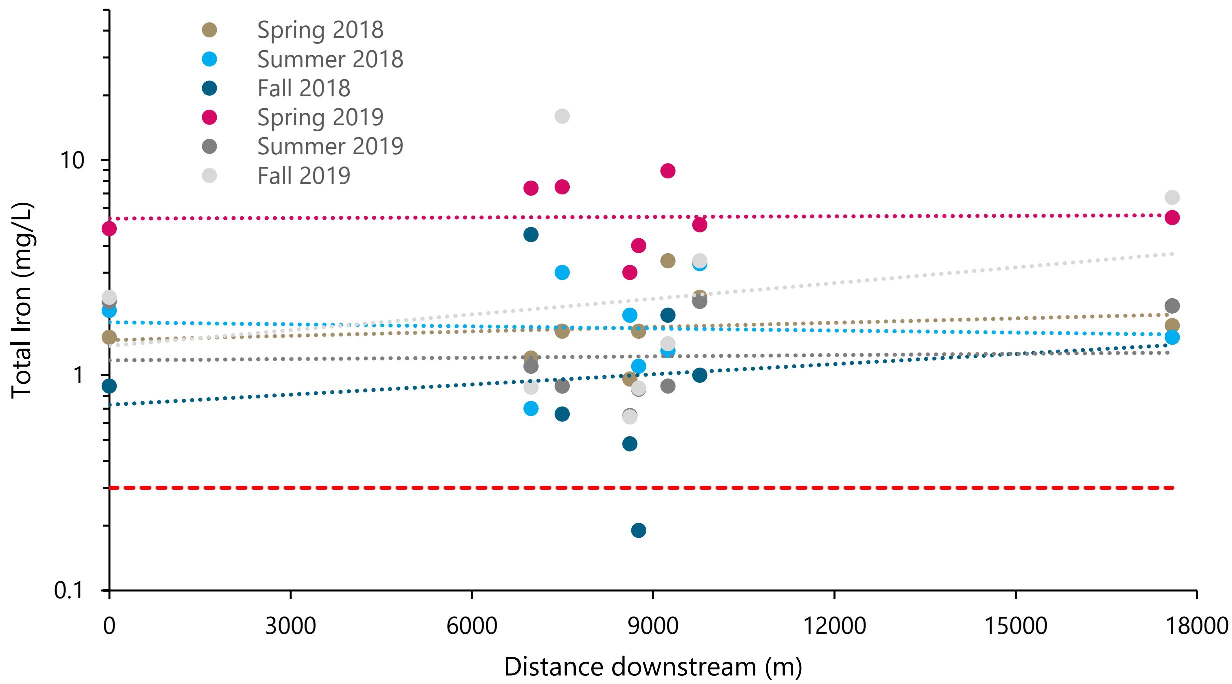


Table E-2 Regression parameters and power for spatial trends in total iron concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	1.458	6.722E-06	0.0370		0.0384	0.0606
Summer 2018	1.764	-3.206E-06	0.0047		0.0047	0.0513
Fall 2018	0.729	1.577E-05	0.0315		0.0326	0.0589
Spring 2019	5.350	8.543E-07	0.0007		0.0007	0.0502
Summer 2019	1.173	2.033E-06	0.0020		0.0021	0.0506
Fall 2019	1.371	2.429E-05	0.0571		0.0605	0.0667

Figure E-3 Total magnesium concentration, AEMP spatial trends

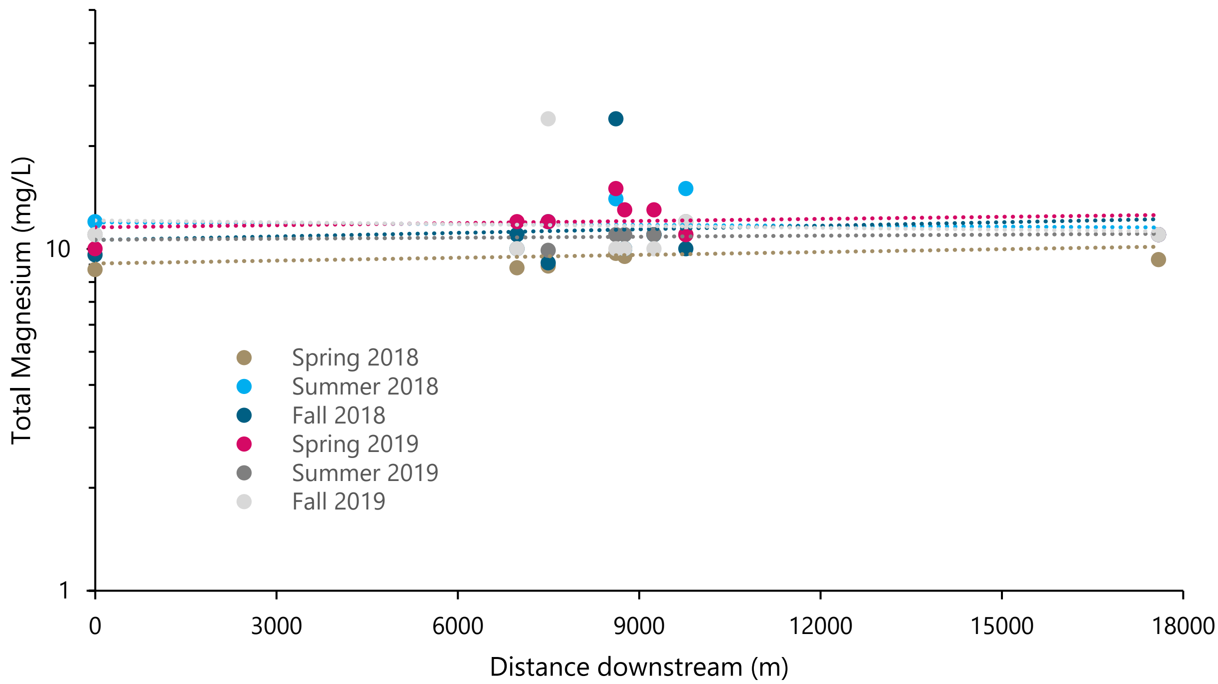


Table E-3 Regression parameters and power for spatial trends in total magnesium concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	9.06	2.790E-06	0.1082		0.1213	0.0840
Summer 2018	11.96	-8.525E-07	0.0041		0.0041	0.0511
Fall 2018	10.62	3.454E-06	0.0151		0.0153	0.0542
Spring 2019	11.57	2.037E-06	0.0318		0.0329	0.0590
Summer 2019	10.63	9.966E-07	0.0323		0.0334	0.0592
Fall 2019	12.11	-1.796E-06	0.0044		0.0044	0.0512

Figure E-4 Total manganese concentration, AEMP spatial trends

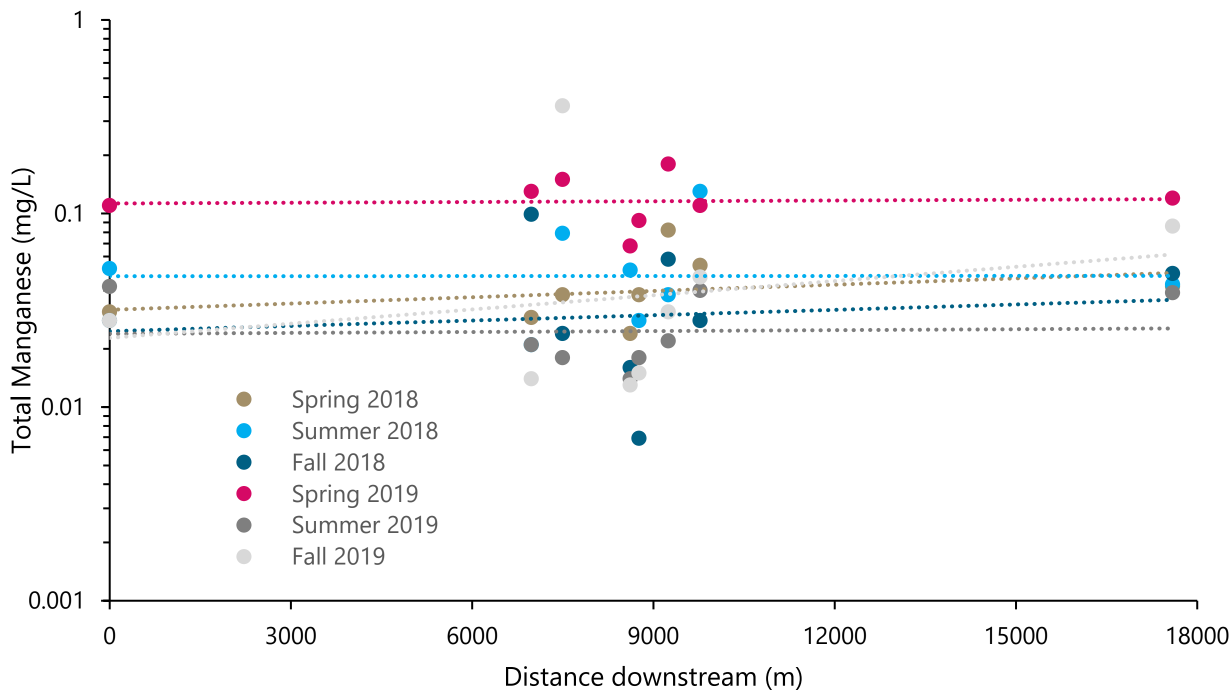


Table E-4 Regression parameters and power for spatial trends in total manganese concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	0.0318	1.083E-05	0.0960		0.1061	0.0796
Summer 2018	0.0475	1.111E-07	0.0000		4.58E-06	0.0500
Fall 2018	0.0247	9.220E-06	0.0153		0.0156	0.0543
Spring 2019	0.1128	1.263E-06	0.0022		0.0022	0.0506
Summer 2019	0.0239	1.582E-06	0.0017		0.0017	0.0505
Fall 2019	0.0228	2.448E-05	0.0572		0.0607	0.0668

Figure E-5 Total molybdenum concentration, AEMP spatial trends

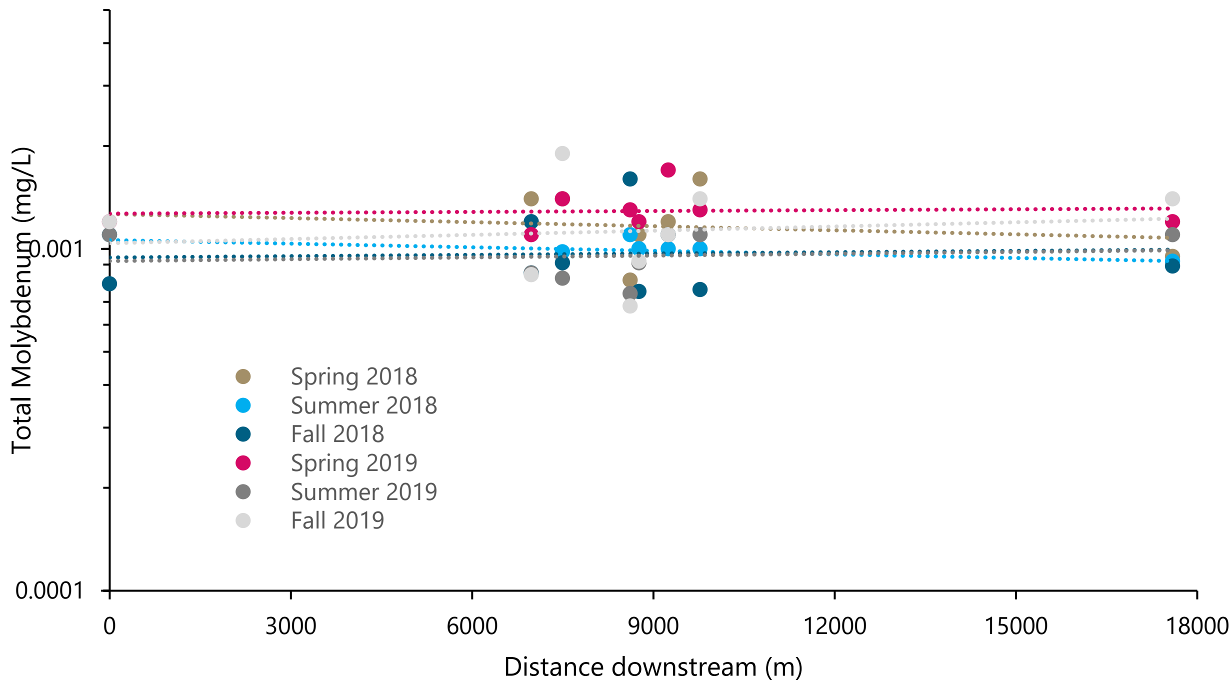


Table E-5 Regression parameters and power for spatial trends in total molybdenum concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	1.265E-03	-3.962E-06	0.0382		0.0398	0.0609
Summer 2018	1.061E-03	-3.478E-06	0.2010		0.2515	0.1223
Fall 2018	9.436E-04	1.291E-06	0.0029		0.0029	0.0508
Spring 2019	1.268E-03	8.523E-07	0.0050		0.0050	0.0514
Summer 2019	9.213E-04	1.780E-06	0.0146		0.0149	0.0541
Fall 2019	1.039E-03	4.080E-06	0.0188		0.0191	0.0552

Figure E-6 Total sodium concentration, AEMP spatial trends

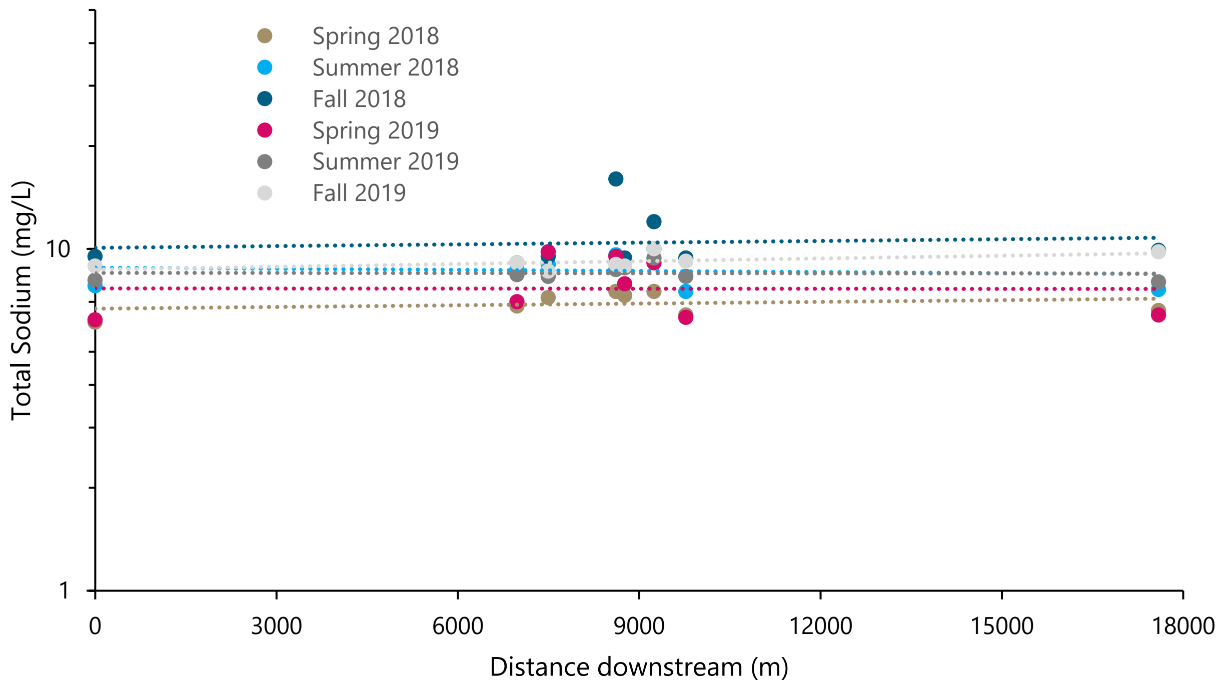


Table E-6 Regression parameters and power for spatial trends in total sodium concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	6.68	1.66E-06	0.0559		0.0592	0.0663
Summer 2018	8.81	-1.06E-06	0.0112		0.0113	0.0531
Fall 2018	10.07	1.67E-06	0.0090		0.0091	0.0525
Spring 2019	7.66	-9.18E-08	2.75E-05		2.75E-05	0.0500
Summer 2019	8.51	-1.15E-07	0.0006		0.0006	0.0502
Fall 2019	8.70	2.69E-06	0.3366		0.5075	0.2004

Figure E-7 Total nickel concentration, AEMP spatial trends. Dashed red line gives CCME long-term guideline dependent on hardness – minimum hardness used for all

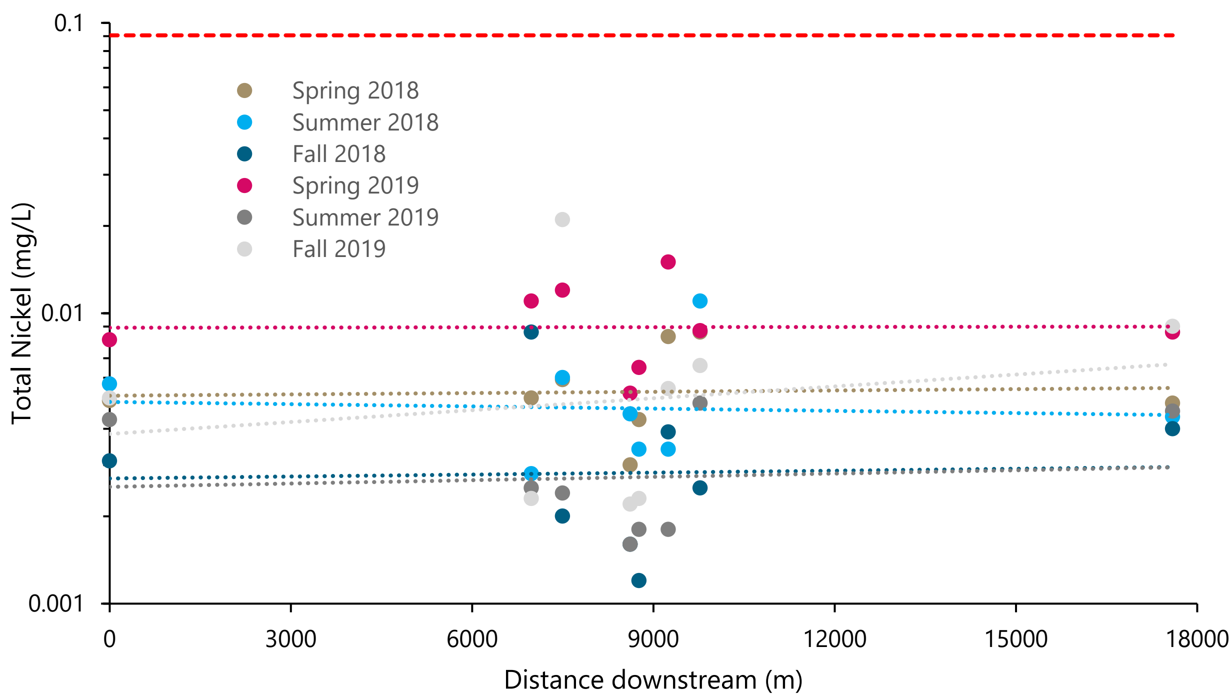


Table E-7 Regression parameters and power for spatial trends in total nickel concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	0.0052	1.509E-06	0.0023		0.0024	0.0506
Summer 2018	0.0050	-2.560E-06	0.0043		0.0043	0.0512
Fall 2018	0.0027	2.222E-06	0.0016		0.0016	0.0504
Spring 2019	0.0089	2.191E-07	0.0001		0.0001	0.0500
Summer 2019	0.0025	3.816E-06	0.0084		0.0085	0.0523
Fall 2019	0.0038	1.363E-05	0.0362		0.0375	0.0603

Figure E-8 Total strontium concentration, AEMP spatial trends

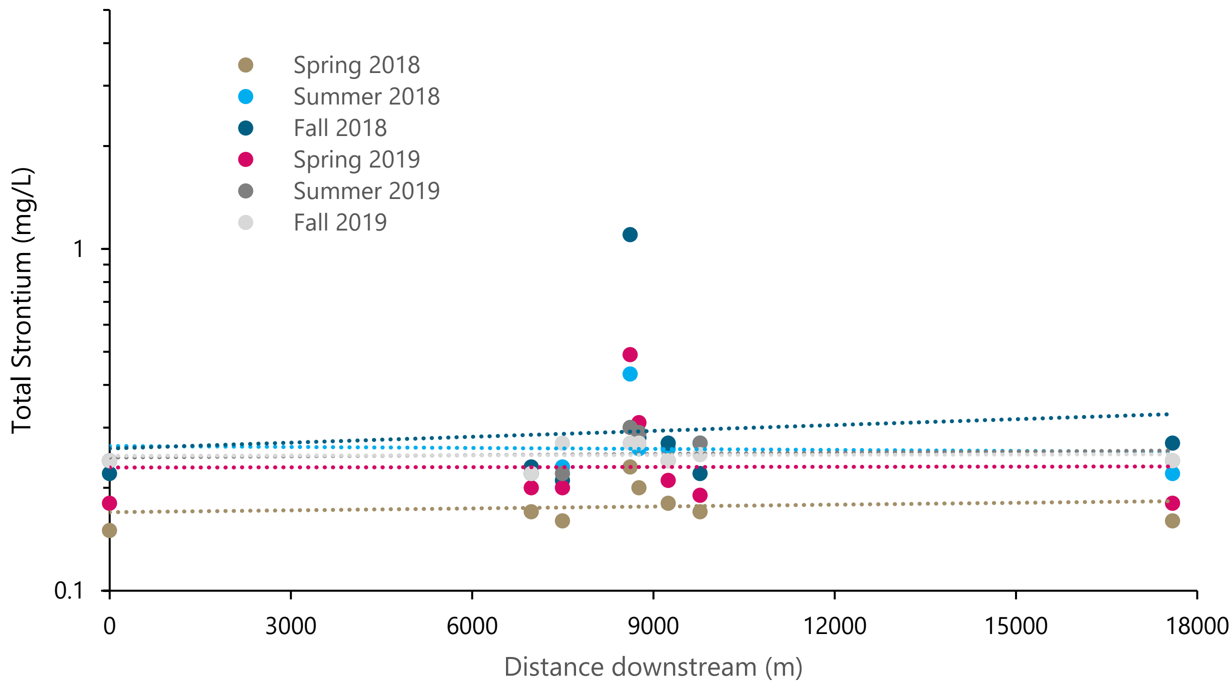


Table E-8 Regression parameters and power for spatial trends in total strontium concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	0.1697	1.835E-06	0.0213		0.0217	0.0559
Summer 2018	0.2651	-9.606E-07	0.0024		0.0024	0.0506
Fall 2018	0.2607	5.718E-06	0.0133		0.0134	0.0537
Spring 2019	0.2293	1.695E-07	2.83E-05		2.83E-05	0.0500
Summer 2019	0.2453	1.149E-06	0.0114		0.0115	0.0531
Fall 2019	0.2482	2.510E-07	0.0014		0.0014	0.0504

Figure E-9 Total titanium concentration, AEMP spatial trends

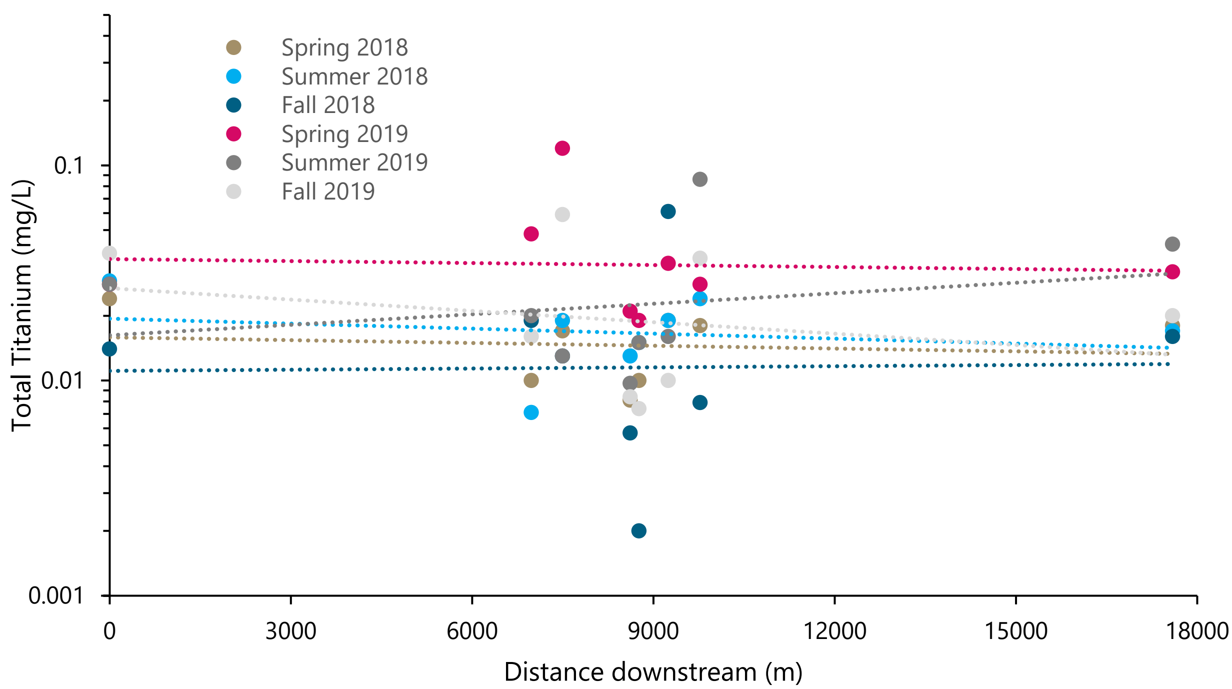


Table E-9 Regression parameters and power for spatial trends in total titanium concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	0.0159	-4.336E-06	0.0151		0.0153	0.0542
Summer 2018	0.0194	-7.727E-06	0.0398		0.0415	0.0614
Fall 2018	0.0111	1.810E-06	0.0004		0.0004	0.0501
Spring 2019	0.0367	-3.070E-06	0.0034		0.0034	0.0509
Summer 2019	0.0162	1.627E-05	0.0631		0.0674	0.0686
Fall 2019	0.0269	-1.758E-05	0.0619		0.0660	0.0683

Figure E-10 Total uranium concentration, AEMP spatial trends. CCME long-term guideline is 0.015 mg/L and not indicated because it exceeds monitoring results by more than an order of magnitude

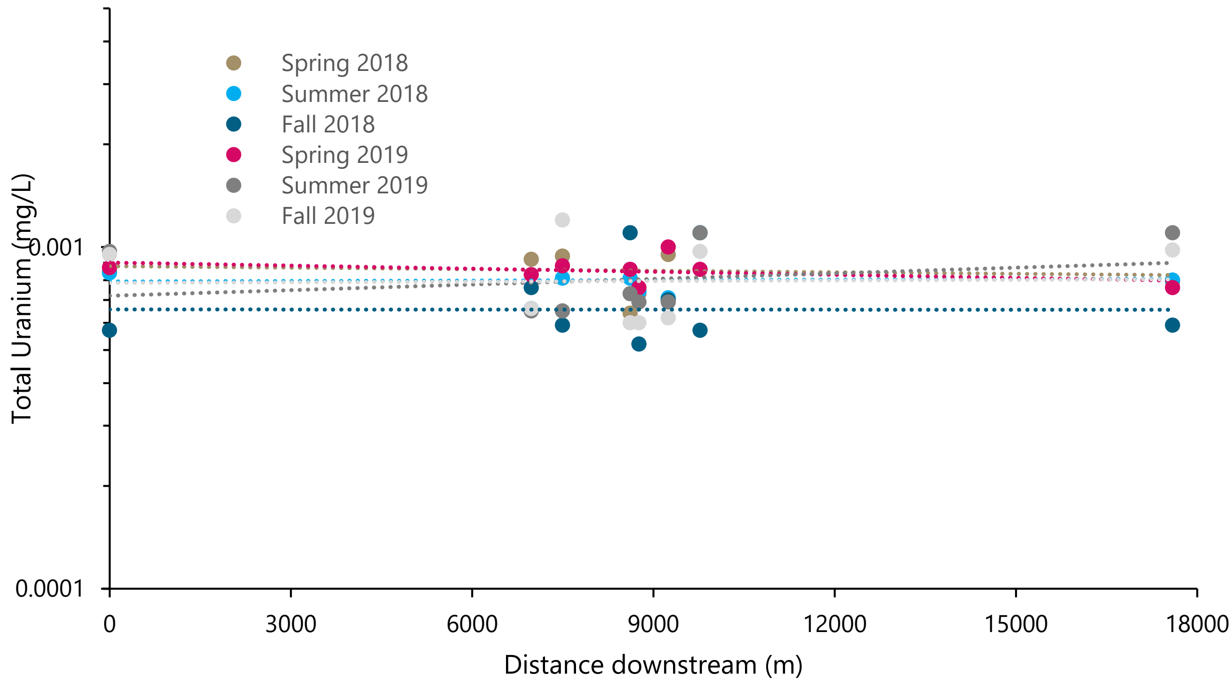


Table E-10 Regression parameters and power for spatial trends in total uranium concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	8.797E-04	-1.491E-06	0.0093		0.0094	0.0525
Summer 2018	7.933E-04	4.409E-07	0.0010		0.0010	0.0503
Fall 2018	6.569E-04	-5.071E-08	5.35E-06		5.35E-06	0.0500
Spring 2019	9.012E-04	-2.992E-06	0.1409		0.1641	0.0964
Summer 2019	7.205E-04	5.484E-06	0.0677		0.0726	0.0701
Fall 2019	7.858E-04	5.924E-07	0.0006		0.0006	0.0502

Figure E-11 Chloride concentration, AEMP spatial trends. CCME long-term guideline is 120 mg/L and not indicated because it exceeds monitoring results by an order of magnitude.

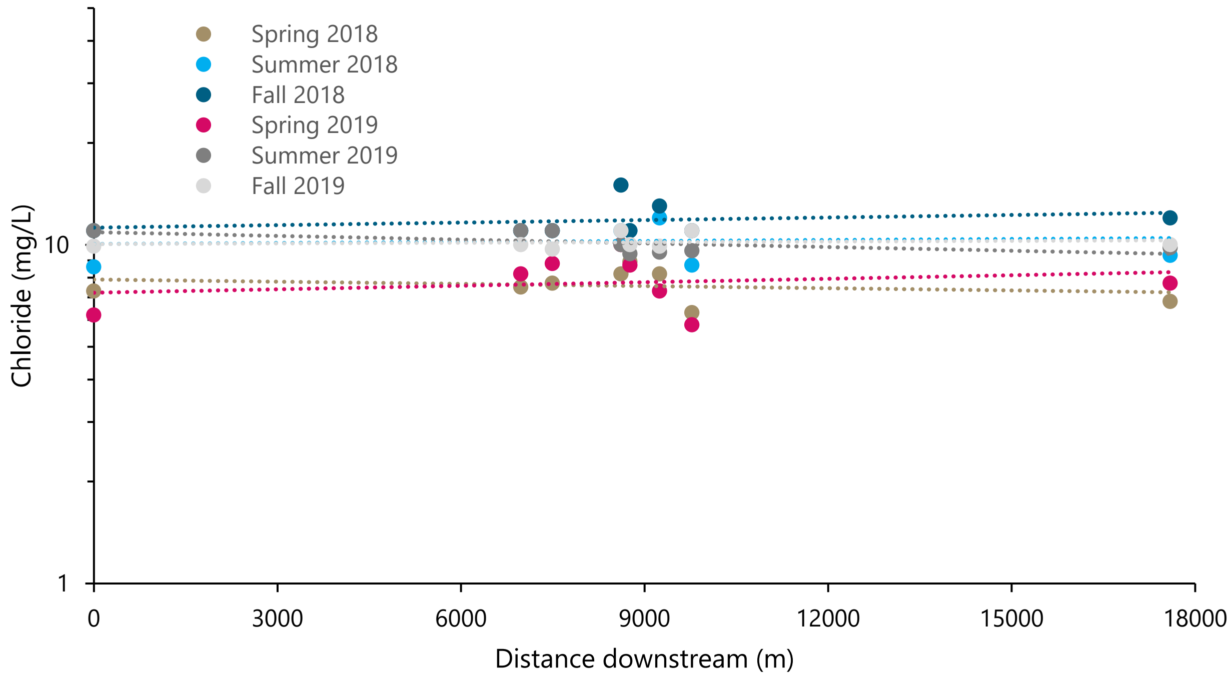


Table E-11 Regression parameters and power for spatial trends in chloride concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	7.90	-2.144E-06	0.0455		0.0477	0.0631
Summer 2018	10.06	9.860E-07	0.0074		0.0074	0.0520
Fall 2018	11.24	2.487E-06	0.0573		0.0607	0.0668
Spring 2019	7.22	3.442E-06	0.0429		0.0448	0.0623
Summer 2019	10.90	-3.647E-06	0.3306		0.4939	0.1963
Fall 2019	10.05	6.302E-07	0.0201		0.0205	0.0556

Figure E-12 Sulphate concentration, AEMP spatial trends

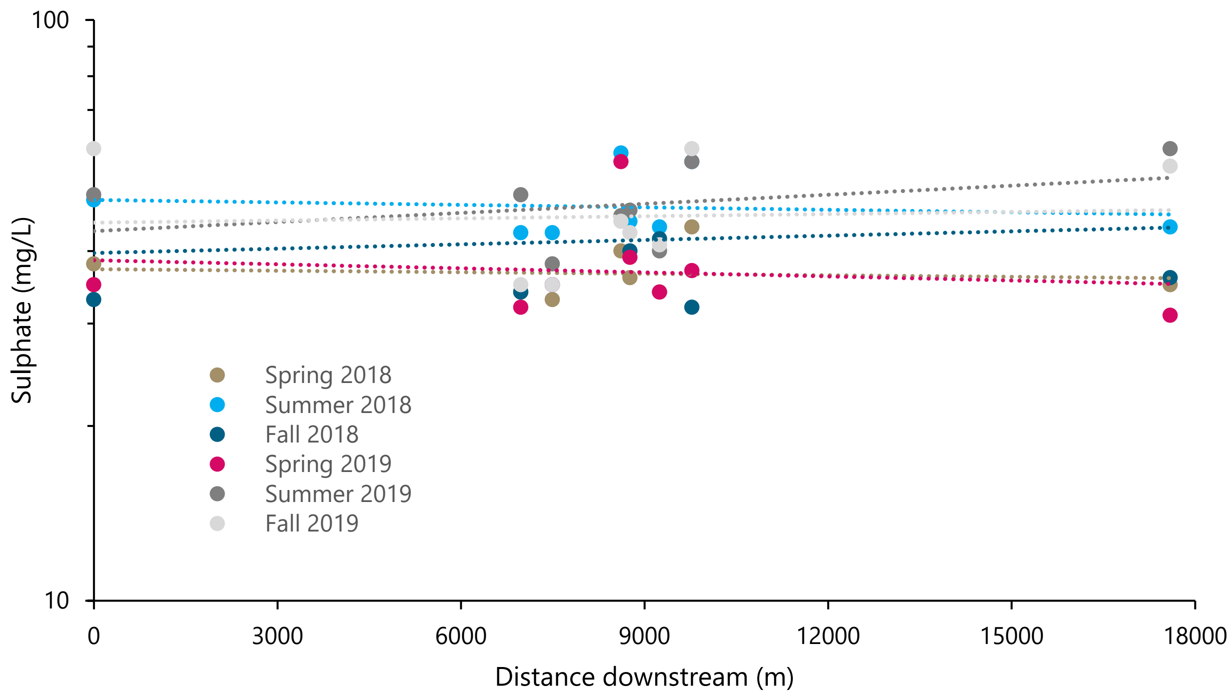


Table E-12 Regression parameters and power for spatial trends in sulphate concentration

Date	Intercept	Slope	Coefficient of determination, r^2	Significance (*<0.05)	Effect size, f2	Power
Spring 2018	3.765E-03	1.555E-06	0.003289		0.0033	0.0509
Summer 2018	3.264E-03	-2.758E-06	0.005572		0.0056	0.0515
Fall 2018	1.772E-03	1.210E-05	0.029285		0.0302	0.0583
Spring 2019	6.847E-03	1.618E-06	0.003055		0.0031	0.0508
Summer 2019	1.995E-03	3.585E-06	0.011127		0.0113	0.0531
Fall 2019	2.710E-03	1.409E-05	0.036464		0.0378	0.0604