Appendix G

2019 Waste Rock and Ore Monitoring Report, Boston Camp, Hope Bay Project

2019 Waste Rock and Ore Monitoring Report, Boston Camp, Hope Bay Project

Prepared for

TMAC Resources Inc.

Prepared by

SRK Consulting (Canada) Inc.
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2019 Waste Rock and Ore Monitoring Report, Boston Camp, Hope Bay Project

March 2020

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Appendix A – 2019 Boston Seepage Monitoring

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1 Introduction

At the Boston site, ore and waste rock were generated as part of a 1996-1997 BHP Billiton underground exploration program. The ore was placed in a number of stockpiles on the camp pad and the waste rock was used to construct a camp pad, roads, and an airstrip at Boston. Prior to TMAC Resources Inc.'s ownership, ore was subsequently used to resurface areas of the camp pad and airstrip. This practice does not continue under TMAC's ownership.

The seepage and ephemeral streams sampling programs are conducted annually in the context of the Boston waste rock and ore management and closure plans. A survey of rinse pH and conductivity of the ore is carried out every ten years as part of these plans and was last completed in 2018 (SRK 2019). This report presents results from the 2019 seepage and ephemeral streams monitoring at the Boston site, and complies with Part D "Conditions applying to Construction and Operation" Item 8 of Water Licence 2BB-BOS1835 (Nunavut Water Board 2018).

The report is organized as follows:

- A summary of the monitoring requirements is provided in Section 2.
- Results of the monitoring of seepage at the Boston site are summarized in Section 3.
- Results of the monitoring of ephemeral streams are summarized in Section 4.
- Detailed technical memorandum on each of these subjects are provided in Appendices A and B.

2 Monitoring Requirements

As a condition of Water Licence 2BB-BOS1727 (Part E, Item 2), TMAC is required to implement a water and ore/waste rock management plan that addresses the acid rock drainage (ARD) and metal leaching (ML) potential of the materials at the site (NWB 2017). TMAC acquired the Hope Bay project including the Boston site in 2013 and has maintained the Boston site in care and maintenance since.

2.1 Ore Stockpile

Geochemical characterization of waste rock and ore materials has indicated that all waste rock and most of the ore is non-acid generating with some of the ore classified as having an uncertain potential for ARD (SRK 2009a). Based on the uncertain classifications, the ore/waste rock management plan (SRK 2017) includes a commitment to monitor the oxidation of the ore by carrying out a survey of rinse pH and conductivity every ten years. This monitoring was conducted in 2018 and was not a requirement in 2019.

2.2 Seepage Monitoring

The objective of the seepage monitoring is to provide an indication of water quality from the waste rock (camp pad) and ore stockpiles. There are two seepage monitoring programs, SNP seepage monitoring at station BOS-8 and a freshet seepage survey along the north and east sides of the camp pad, and the southern end of the airstrip.

As stipulated in Water License 2AM-BOS1835 (Nunavut Water Board 2018), TMAC monitors the seepage station BOS-8A, BOS-8B, BOS-8C, and BOS-8D. In summary, sampling of water quality station BOS-8 and any opportunistic seeps, is required initially during spring thaw and at a minimum frequency of monthly whenever flow is observed. Samples collected at BOS-8 are to be analysed for pH, electrical conductivity (EC), total suspended solids (TSS), major anions (sulphate, chloride, ammonia), and total trace metals through an ICP scan.

A freshet seepage survey along the north and east sides of the camp pad and the full extent of the airstrip is to be completed in accordance with Section 5.2.1 of the Boston Water and Ore/Waste Rock Management Plan (SRK 2017). In summary, these areas of the pad are to be surveyed for seepage during freshet and samples collected opportunistically. The seepage monitoring program was executed in 2019.

2.3 Ephemeral Streams

As outlined in the Hope Bay Project Water and Ore/Waste Rock Management Plan for the Boston Site (SRK 2017), five ephemeral streams (A to E) within the catchments of the Boston camp pad are monitored during spring freshet. The objectives of the program are to monitor drainage from the Boston ore stockpiles and camp pad before entering Aimaokatalok Lake and the natural attenuation of the tundra. The ephemeral streams monitoring program was executed in 2019.

3 Monitoring of Boston Seepage

Details of the 2019 seepage monitoring programs are presented in Appendix A.

3.1 Sampling and Testing Program

A total of three opportunistic seepage samples were collected as part of the two seepage monitoring programs.

3.1.1 Airstrip and Camp Pad Seepage Survey

The freshet seep survey at Boston was conducted by TMAC on June 29, 2019. The survey included walking the north and east sides of the camp pad and the full extent of the airstrip, as outlined in the Water and Ore/Waste Rock Management Plan (SRK 2017).

Two seeps were identified and sampled, one on the eastern side of the camp pad, and the other located adjacent to the access road to the airstrip. No seepage was observed along the northern extent of the pad or along the airstrip. Field measurements of EC, pH, oxidation-reduction potential (ORP), temperature and flow rates (where possible) were measured at this location.

The water quality samples were submitted by TMAC for laboratory testing at ALS Environmental (ALS) in Burnaby, British Columbia for pH, hardness, conductivity, total dissolved solids (TDS), total suspended solids (TSS), alkalinity, anions (sulphate, chloride, fluoride, and bromide), nutrients (nitrate, nitrite, ammonia and phosphorus) and dissolved metals.

3.1.2 SNP Seepage Monitoring

One sample was collected as part of the SNP seepage monitoring. The one sample was collected from SNP monitoring station BOS-8A (on June 29, 2019). No additional samples were collected in 2019 as no seepage was observed at SNP seepage monitoring stations after June 29. Field measurements of EC, pH, ORP, temperature and flow rates (where possible) were measured at each of these locations.

The water quality samples were submitted by TMAC for laboratory testing at ALS Environmental (ALS) in Burnaby, British Columbia for pH, hardness, conductivity, TDS, TSS, alkalinity, anions (sulphate, chloride, fluoride, and bromide), nutrients (nitrate, ammonia, nitrite and phosphorus) and dissolved metals.

3.2 Results

The results for samples taken as part of both the Airstrip and Camp Pad Seepage Survey (Section 3.1.1) and the SNP seepage monitoring (Section 3.1.2) are presented in this section.

The three seepage samples were pH neutral to slightly alkaline (7.6 to 7.9 s.u.). Sulphate concentrations for the two samples from the NE Pad (19-BOS-01 and BOS-8A) were within the range of historical concentrations (ranging from 400 to 630 mg/L). Compared to BOS-8A, concentrations at 19-BOS-01 were higher for arsenic (0.9 mg/L or 20 times higher than BOS-8A) , cobalt (1.2 mg/L or 50 times higher), nickel (1.6 mg/L or 16 times higher), manganese (0.27 mg/L or 9 times higher) and selenium (0.0027 mg/L or 6 times higher). Concentrations of copper (0.003 and 0.004 mg/L) and iron (0.089 and 0.010 mg/L) were roughly equivalent for 19-BOS-01 and BOS-8A. All concentrations for the aforementioned parameters are within the range of historical concentrations and no long-term trend was identified. Chloride and nitrate at 19-BOS-01 (220 and 4 mg/L, respectively) were similarly equivalent to previous measurements.

The seep located at the toe of the road (19-BOS-02) had nitrate, chloride, dissolved arsenic, nickel, and selenium concentrations one to two orders of magnitude lower than the seep samples located at the NE camp pad. Sulphate concentrations at the access road were four to six times lower than the NE Pad and dissolved copper and iron concentrations were roughly equivalent at the two locations.

Continued monitoring will allow for further trends in the seepage to be established.

4 Monitoring of Ephemeral Streams

Details of the 2019 Boston ephemeral streams monitoring program are presented in Appendix B.

4.1 Sampling and Testing Program

TMAC inspected ephemeral streams A to E for flow on June 29, 2019. In 2019 flow was observed and samples collected from A2, D2 and E2 for a total of 3 samples. Field measurements included pH, EC, ORP, and temperature. The water quality samples were submitted by TMAC for laboratory testing at ALS Environmental (ALS) in Burnaby, British Columbia for pH, hardness, conductivity, TDS, TSS, total alkalinity, anions (bromide, chloride, fluoride, and sulphate), nutrients (nitrate, nitrite, ammonia and phosphorus) and dissolved metals (field filtered).

4.2 Results

Contaminants of concern as identified by the 2009 water and load balance (Supporting Document B of SRK 2009) include nitrate, sulphate, arsenic, copper, iron, nickel and selenium.

The pH of ephemeral streams A2, D2 and E2 were neutral to slightly alkaline (7.7 to 8.0 s.u.). Sulphate values have oscillated for A2 and D2 whereas E2 has increased slightly since 2009. Chloride concentrations for ephemeral streams exhibit a decreasing trend. Nickel and arsenic values have oscillated for A2 and D2 whereas E2 has remained stable since the start of monitoring. Nitrate, copper, iron and selenium have stable trends.

Compared to SRK (Supporting Document B of 2009) model predictions, the 2019 monitoring data were below maximum predicted values for chloride, nitrate, arsenic, copper, iron, nickel and selenium at streams A2, D2 and E2. At D2 and E2, sulphate concentrations observed in 2019 exceeded the maximum modeled values (Supporting Document B of SRK 2009).

Sulphate concentrations at D2 and E2 were greater than the historical maximum observed in previous years (Figure 2). Sulphate values have oscillated for A2 and D2 whereas E2 has increased slightly since 2009. Higher sulphate concentrations were observed during periods of low flow resulting in lower sulphate loading rates (e.g. mg SO_4/s) compared to samples collected with higher flow rates and lower sulphate concentrations (e.g. D2 in 2011 and 2016), suggesting that concentration is related to dilution from surface waters. Future monitoring will establish sulphate trends.

Sulphate and chloride levels are not attenuated by the tundra and the concentrations measured in 2019 validate the 2009 water and load balance (Supporting Document B of SRK 2009). The 2009 water and load balance was developed specifically for the Boston camp pad to provide a conservative indication of the potential concentrations in drainage from the ore and waste rock before entering Aimaokatalok Lake and the natural attenuation of the tundra. The concentrations observed in the ephemeral streams indicate that the tundra continues to effectively attenuate contaminants of concern and the breakthrough of the effectiveness of the attenuation process has not occurred. SRK recommends continued monitoring of the ephemeral stream sampling sites as outlined in SRK (2017).

5 Conclusions

The seepage program monitors contact water from the camp pad and ore stockpiles while the ephemeral stream program monitors drainage from the Boston ore stockpiles and camp pad before entering Aimaokatalok Lake and the natural attenuation of the tundra.

In 2019, TMAC surveyed i) the northern and eastern edges of the camp pad and the full extent of the airstrip for opportunistic seepage samples and ii) the five ephemerals streams (A to E) within the catchment of the Boston camp pad. In total, TMAC collected two seepage samples along the eastern side of the camp pad, one seepage sample located adjacent to the access road to the airstrip and three ephemeral streams samples from streams A2, D2 and E2.

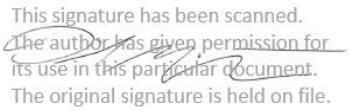
All seepage and ephemeral stream samples were pH neutral to slightly alkaline, indicating that the waste rock on the camp pad is not acidic.

Monitoring of the seepage from the camp pad and the ore stockpiles indicates that water quality for the contaminants of concern are within the range of the historical data.

The analysis of the water quality data for ephemeral streams A2, D2 and E2 indicated that concentrations were either decreasing or consistent with historical data except for sulphate at E2 which is increasing. For sulphate concentrations at D2 and E2, values were greater than the maximum predicted value but a loading assessment indicated that concentration is related to dilution from surface waters. Future monitoring will establish any trends.

SRK recommends continued annual monitoring according to the Water and Ore/Waste Rock Management Plan for the Boston Site (SRK 2017).

This report, 2019 Waste Rock and Ore Monitoring Report, was prepared by



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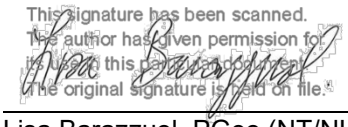

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

6 References

MEND. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1., December 2009.

[NWB] Nunavut Water Board, 2017. Water Licence No: 2BB-BOS1727. July 2017.

[NWB] Nunavut Water Board, 2018. Water Licence No: 2AM-BOS1835. December 2018.

SRK Consulting (Canada) Inc., 2009. Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut. Report 1CH008.022 for Hope Bay Mining Ltd. July 2009.

SRK Consulting (Canada) Inc. 2009b. Geochemical Characterization of Historic Waste Rock and Ore Stockpiles at the Boston Deposit, Hope Bay Project, Nunavut. Prepared for Hope Bay Mining Ltd. Project 1CH008.005.1700. April 2009.

SRK Consulting (Canada) Inc., 2017. Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut. Report 1CT022.009 for TMAC Resources Inc. January 2017.

SRK Consulting (Canada) Inc., 2019. 2018 Water Rock and Ore Monitoring Report, Boston Camp, Hope Bay Project, Nunavut. Report 1CT022.027 for TMAC Resources Inc. March 2019.

Appendix A – 2019 Boston Seepage Monitoring

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Memo

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From:	Derrick Midwinter, PGeo Lisa Barazzuol, PGeo	**Project No:**	1CT022.037
Cc:	Oliver Curran, TMAC Ashley Mathai, TMAC	**Date:**	March 17, 2020
Subject:	Results from the Boston Seepage Monitoring Program 2019		

1 Introduction

At the Boston site, ore and waste rock were generated as part of a 1996-1997 BHP Billiton underground exploration program. The ore was placed in a number of stockpiles on the camp pad and the waste rock was used to construct a camp pad, roads, and an airstrip at Boston. Since that time, the site has been primarily in care and maintenance, with periodic use of the camp and airstrip in support of exploration activities.

2019 seepage monitoring activities include:

- A freshet seepage survey along the north and east sides of the camp pad, and the full extent of the airstrip, as outlined in the Water and Ore/Waste Rock Management Plan (SRK 2017), and
- Surveillance Network Program (SNP) seepage monitoring at station BOS8.

This memo presents the results of all Boston seepage samples collected in 2019 and complies with Part D “Conditions Applying to Construction and Operation” Item 8 of Water Licence 2AM-BOS1835 (Nunavut Water Board 2018).

2 Methods

2.1 Sample Collection

2.1.1 Airstrip and Camp Pad Seepage Survey

The freshet seep survey at Boston was conducted on June 29, 2019 by TMAC Resources (TMAC) with guidance from SRK. The survey included walking the north and east sides of the camp pad and the full extent of the airstrip. Seep locations were established opportunistically by walking the toe of the survey areas to identify and sample seepage flowing out of the toe of the camp pad. Two seeps were identified and sampled, one (19-BOS-01) on the eastern side of the camp pad, and the other located adjacent to the access road to the airstrip (19-BOS-02, Figure

1). No seeps were observed along the airstrip or the northern extent of the camp pad. Field measurements of electrical conductivity (EC), pH, oxidation-reduction potential (ORP), temperature were measured at each of these locations.

Samples were collected by TMAC from all stations for laboratory analysis. The water quality samples were submitted by TMAC to ALS Environmental (ALS) in Burnaby, British Columbia for pH, EC, total dissolved solids (TDS), total suspended solids (TSS), alkalinity, anions (bromide, chloride, fluoride, and sulphate), nutrients (ammonia, nitrate, nitrite, and phosphorus) and dissolved metals. All samples were filtered and preserved in the field. In addition, one duplicate sample and two field blanks were collected and submitted for laboratory analysis.

2.1.2 SNP Seepage Monitoring (BOS-8)

As stipulated in Water License 2AM-BOS1835 (Nunavut Water Board 2018), TMAC monitors the seepage station BOS-8A, BOS-8B, BOS-8C, and BOS-8D. At minimum, monthly samples are to be collected if flowing seepage is observed. In 2019, TMAC collected one sample at BOS-8A on June 29, 2019. Field measurements of EC, pH, ORP, temperature and flow rates (where possible) were measured. No additional samples were collected in 2019 as no seepage was observed at these monitoring stations after June 29.

The sample was collected from the one station for laboratory analysis. The water quality sample was submitted by TMAC for laboratory testing at ALS Environmental (ALS) in Burnaby, British Columbia. The sample was analyzed for pH, EC, hardness, ammonia, sulphate, and total metals, as per the water licence.

7506000 7505800 7505600 7505400 7505200 7505000 7504800 7504600

441600 441400 441200 441000 440800

19-BOS-01 19-BOS-02 BOS8A

0 50 100 150 200
Meters

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Legend

- 2019 Seepage
- 2018 Seepage
- 2017 Seepage

	pH 6 to 7	pH 7 to 8	pH 7 to 8
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

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SRK JOB NO.: 1CT022.056

FILE NAME: 1CT022_056_Annual_Boston_Seepage_2019

TMAC RESOURCES

2019 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Boston Area

DATE: Jan 2020 | APPROVED: | FIGURE: 1

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2.2 Data Quality Assurance and Quality Control

2.2.1 2019 Data

SRK conducted a QA/QC review of the three June seepage samples including the duplicate and field blanks.

Laboratory and field values of pH and EC were compared, as well as TDS and lab conductivity. Conductivity values were near parity for all samples. Values of pH were similar between field and lab readings. For all samples, TDS demonstrated a strong positive correlation with lab conductivity.

Ion balances ranged from -1.8 to -1.2% for the seep samples 19-BOS-01 and 19-BOS-02. All samples complied with SRK's criteria of ±10%. The ion balance for the SNP sample BOS-8A could not be assessed due to an incomplete suite of anions. All parameters in the field blank samples passed the QA/QC criteria of being below two times the detection limit. The one set of field duplicate samples were assessed by relative percent difference (RPD), with all RPD values less than 30% with less than 10% of parameters failing.

SRK considered all data acceptable.

2.2.2 Historic Data

The historic seepage data set is comprised of 52 samples collected between 2008 and 2018, with the majority of samples analyzed for total metals rather than dissolved metals (Attachment 1). SRK collected three seepage samples in 2008 and based on QA/QC screening concluded that the data were acceptable (SRK 2009). All other historic samples were collected by Hope Bay Mining Ltd (HBML) or TMAC as part of the SNP water licence monitoring program or the seepage monitoring program (Attachment 2). SRK did not conduct QA/QC of the historic seepage data collected by HBML or TMAC prior to 2017 because the limited analytical suite precluded the calculation of ion balances and other QA/QC checks. SRK accepted all SNP monitoring data as-is.

3 Results

3.1 Field Observations

Field parameters for the three seeps sampled in 2019 are presented in Table 3-1. Field electrical conductivity varied from 410 to 1,900 µS/cm, with the minimum value at 19-BOS-02, and the maximum value at 19-BOS-01. The pH ranged from 7.6 to 7.9.

Table 3-1: 2019 Field Observations

Sample ID	Field pH *s.u.*	Field EC *µS/cm*	ORP *mV*	Temperature *°C*	Flow *L/s*	Comments
BOS-8A	7.6	1000	44	16	--	NE Camp Pad (SNP station)
19-B0S-01	7.8	1900	100	6.2	--	NE Camp Pad
19-B0S-02	7.9	410	120	12	--	Flowing out of access road to airstrip to the East

Source: X:\Projects\01_SITES\Hope.Bay\1CT022.037_2019 Geochem Compliance\Task 140 - Boston Seepage\1. Working file\1CT022.037-140_2019_BostonSeep_rev02_jce.xlsx

3.2 Laboratory Results

Table 3-2 and Table 3-3 present the 2019 Boston seepage data and compares the data to a statistical summary of historical Boston seepage samples (2008 to 2018). When available, dissolved metals data are presented in Table 3-3; however, total metals are also presented as they are analyzed as part of the seepage monitoring conducted as part of the Boston water licence. Figure 2 to Figure 9 present sulphate, chloride, nitrate and the dissolved and total arsenic, copper, iron, nickel and selenium concentrations observed since 2008.

The pH for two samples collected from the NE camp pad (19-BOS-01 and BOS-8A) were 7.8 and 8.0. Sulphate concentrations for 19-BOS-01 and BOS-8A were within the range of historical concentrations and ranged from 400 to 630 mg/L (Figure 2). Compared to BOS-8A, concentrations at 19-BOS-01 were higher for arsenic (0.9 mg/L or 20 times higher than BOS-8A) , cobalt (1.2 mg/L or 50 times higher), nickel (1.6 mg/L or 16 times higher), manganese (0.27 mg/L or 9 times higher) and selenium (0.0027 mg/L or 6 times higher). Concentrations of copper (0.003 and 0.004 mg/L) and iron (0.089 and 0.010 mg/L) were roughly equivalent for 19-BOS-01 and BOS-8A. All concentrations for the aforementioned parameters are within the range of historical concentrations. Chloride and nitrate at 19-BOS-01 (220 and 4 mg/L, respectively) were similarly equivalent to previous measurements.

For the seep at the access road (19-BOS-02) , concentrations of sulphate (97 mg/L) were four to six times lower than the seepage samples at the NE camp pad whereas nitrate (0.34 mg/L), chloride (22 mg/L), dissolved arsenic (0.0089 mg/L), nickel (0.016 mg/L), and selenium (0.00024 mg/L) were one to two orders of magnitude lower. Dissolved copper and iron concentrations were roughly equivalent at the two seepage monitoring locations.

Table 3-2: Summary of General Parameters, Anions and Nutrients, 2019 and Historical Seepage Samples

Sample ID	Sample Date	Anions and Nutrients						
		Conductivity	pH	Alkalinity, Total (as $CaCO_3$)	Ammonia	Nitrate	Chloride	Sulphate
		µS/cm	s.u.	mg/L as $CaCO_3$	mg/L as N	mg/L as N	mg/L	mg/L
BOS8A	2019-06-29	1000	7.8	-	0.0062	-	-	400
19-BOS-01	2019-06-29	1800	8.0	100	0.37	4.0	220	630
19-BOS-02	2019-06-29	390	8.0	71	<0.005	0.34	22	97
Historic Seepage data								
P5		400	7	26	0.011	0.07	20	81
P50		1300	7.8	83	0.05	3.3	150	340
P95		2700	8.1	180	8.3	45	1100	690
Number of samples		53	53	30	51	29	29	53

Source: X:\Projects\01_SITES\Hope.Bay\1CT022.037_2019 Geochem Compliance\Task 140 - Boston Seepage\1. Working file\1CT022.037-140_2019_BostonSeep_rev02_jce.xlsx

Table 3-3: Summary of Trace Elements, 2019 and Historical Seepage Samples

Dissolved Metals											
Sample ID	**Aluminum**	**Arsenic**	**Cadmium**	**Cobalt**	**Copper**	**Iron**	**Lead**	**Manganese**	**Nickel**	**Selenium**	**Zinc**
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BOS8A (total)	0.009	0.047	0.00002	0.024	0.0032	0.089	0.001	0.029	0.098	0.00041	0.005
19-BOS-01 (dissolved)	0.0025	0.90	0.000032	1.2	0.0041	0.01	0.00005	0.268	1.6	0.0027	0.0024
19-BOS-02 (dissolved)	0.0087	0.0089	0.0000069	0.0032	0.004	0.00001	0.00005	0.010	0.016	0.00024	0.001
Historic Seepage data											
Dissolved Metals											
P5	0.0023	0.034	0.0000094	0.018	0.0019	0.01	<0.00005	0.068	0.072	0.00047	0.0019
P50	0.0047	0.11	0.000031	0.25	0.0041	0.022	<0.00005	0.21	0.41	0.0026	0.0044
P95	0.028	0.85	0.00038	1.1	0.008	0.20	0.00043	0.91	1.6	0.0094	0.035
Maximum	0.034	0.99	<0.0005	1.1	0.0085	0.25	<0.0005	1.4	1.8	0.014	0.041
Number of samples	11	11	11	11	11	8	7	11	11	11	11
Total Metals											
P5	0.015	0.0027	0.000015	0.002	0.0014	0.034	0.0001	0.015	0.01	0.00039	0.0038
P50	0.099	0.12	0.00005	0.05	0.0049	0.3	0.0005	0.2	0.13	0.002	0.0057
P95	0.9	0.74	0.001	0.79	0.011	4.2	0.005	0.7	1.4	0.008	0.096
Maximum	6.9	5.6	0.002	1.4	0.045	16	0.022	2.0	4.0	0.017	0.10
Number of samples	43	41	45	43	45	45	45	43	45	41	43

Source: X:\Projects\01_SITES\Hope.Bay\1CT022.037_2019 Geochem Compliance\Task 140 - Boston Seepage\1. Working file\1CT022.037-140_2019_BostonSeep_rev02_jce.xlsx

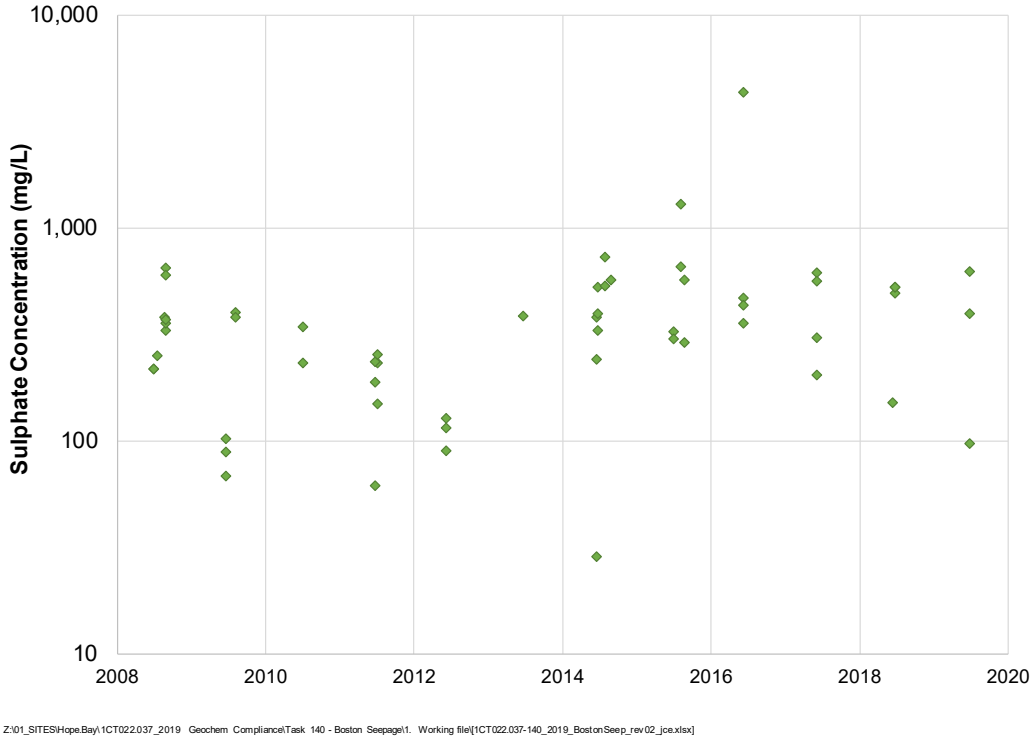


Figure 2: Sulphate Concentrations Observed in Seeps at the Boston Camp since 2008

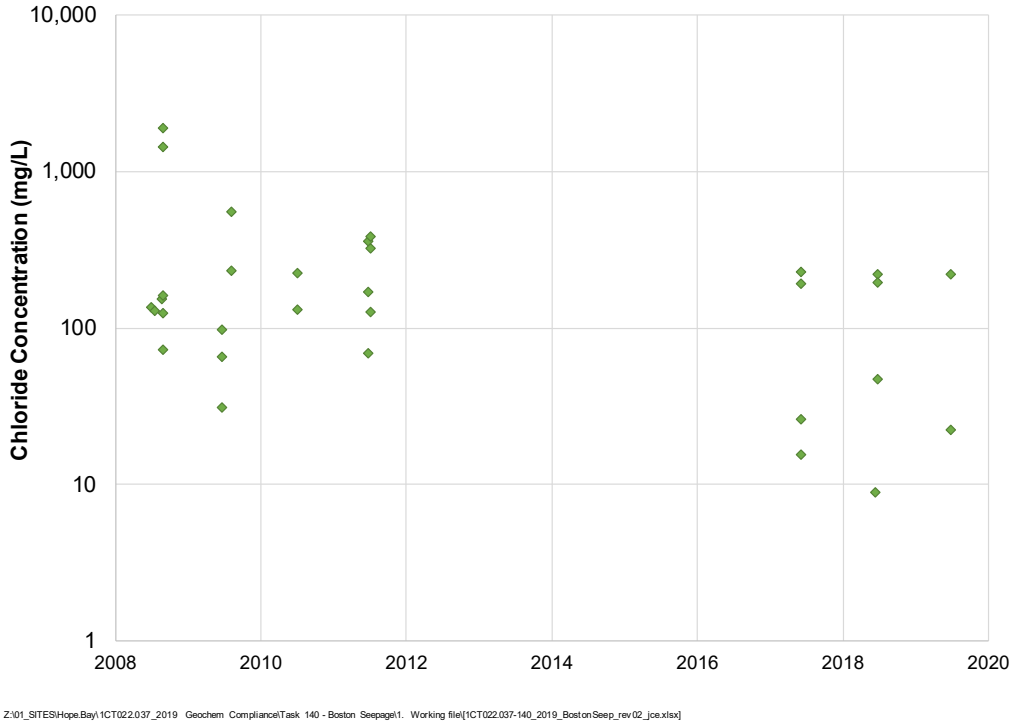


Figure 3: Chloride Concentrations Observed in Seeps at the Boston Camp since 2008

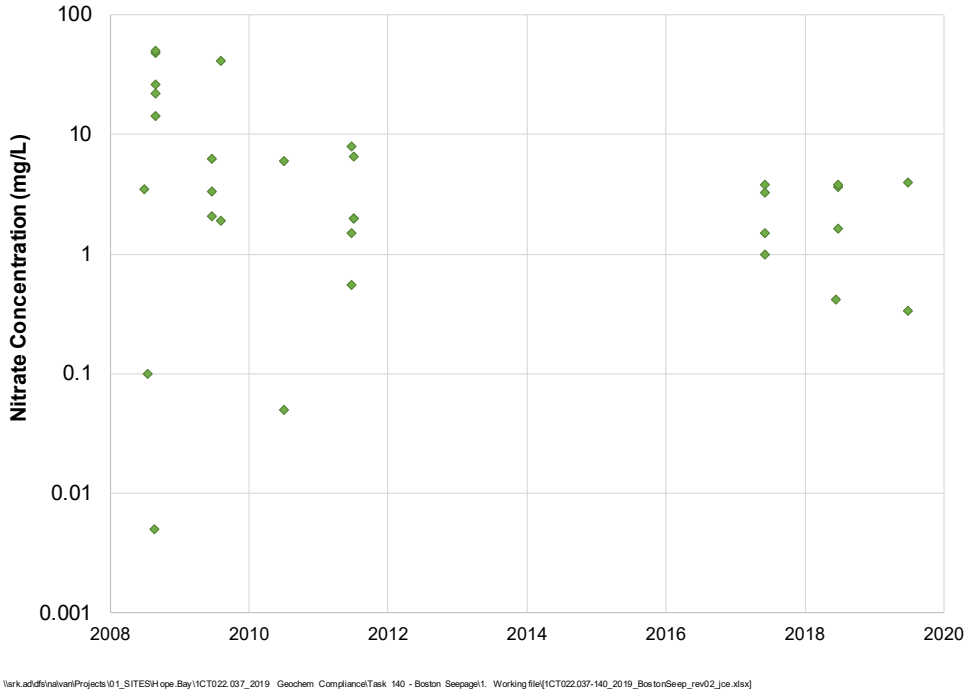


Figure 4: Nitrate Concentrations Observed in Seeps at the Boston Camp since 2008

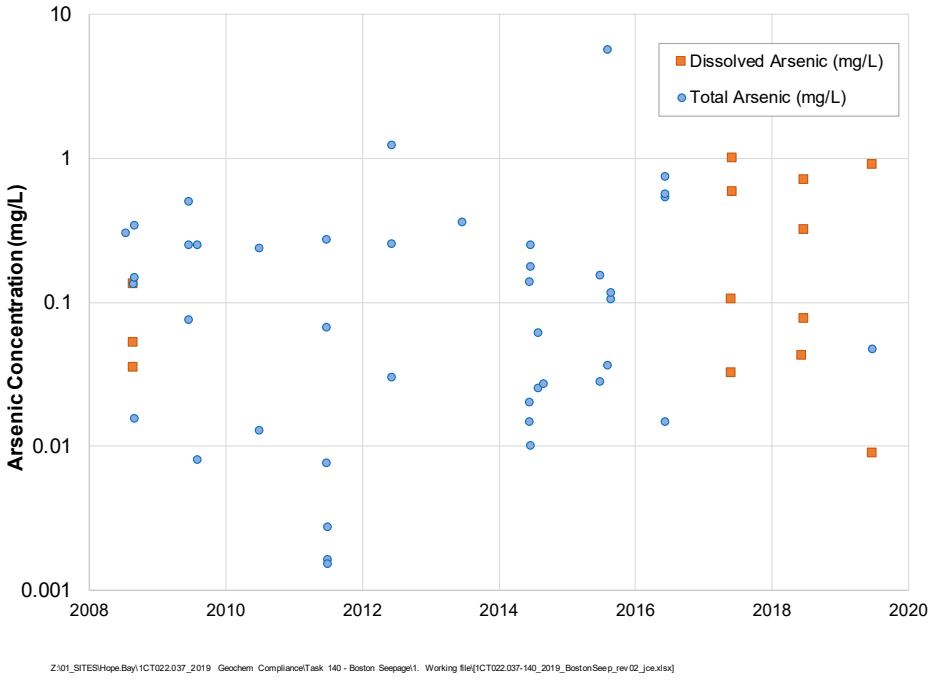


Figure 5: Arsenic Concentrations Observed in Seeps at the Boston Camp since 2008

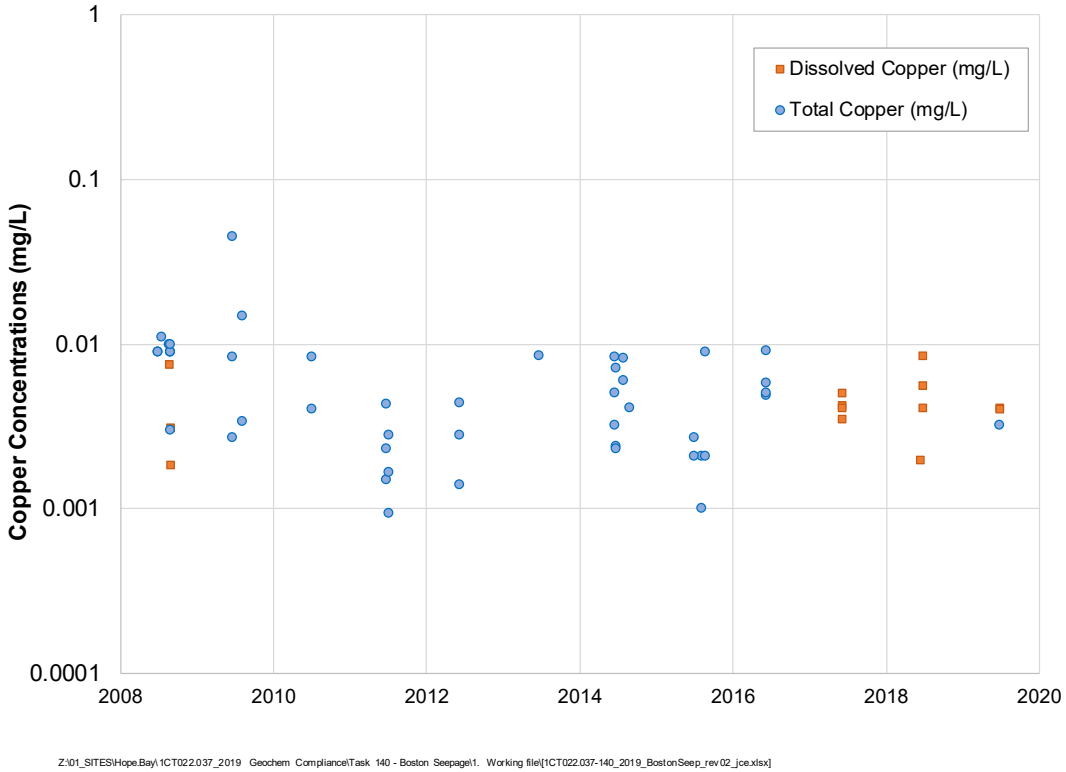


Figure 6: Copper Concentrations Observed in Seeps at the Boston Camp since 2008

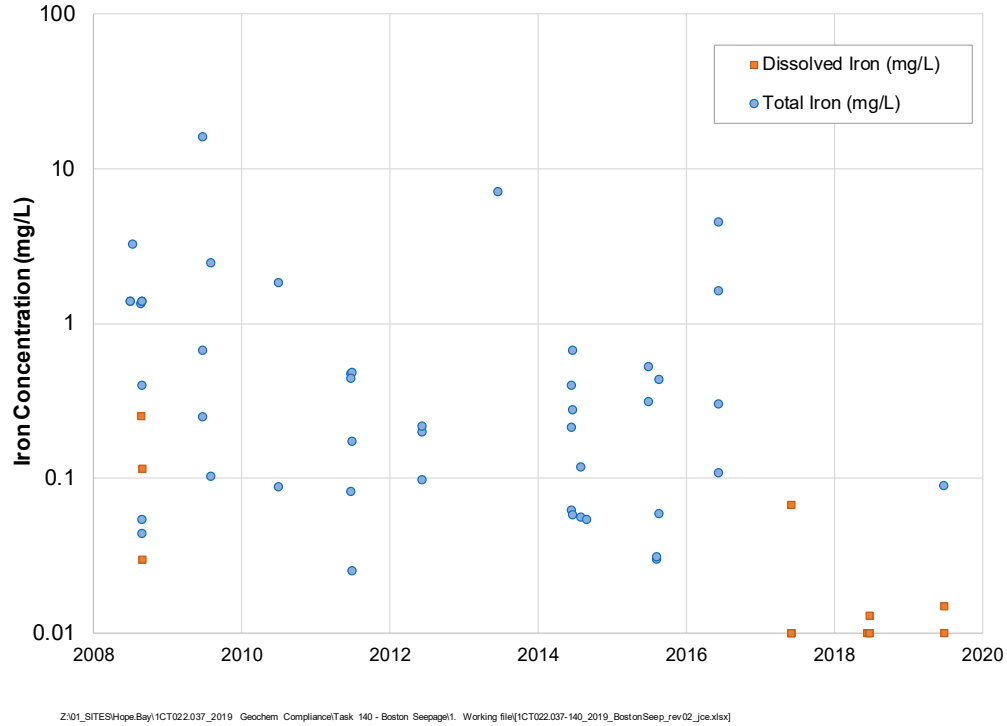


Figure 7: Iron Concentrations Observed in Seeps at the Boston Camp since 2008

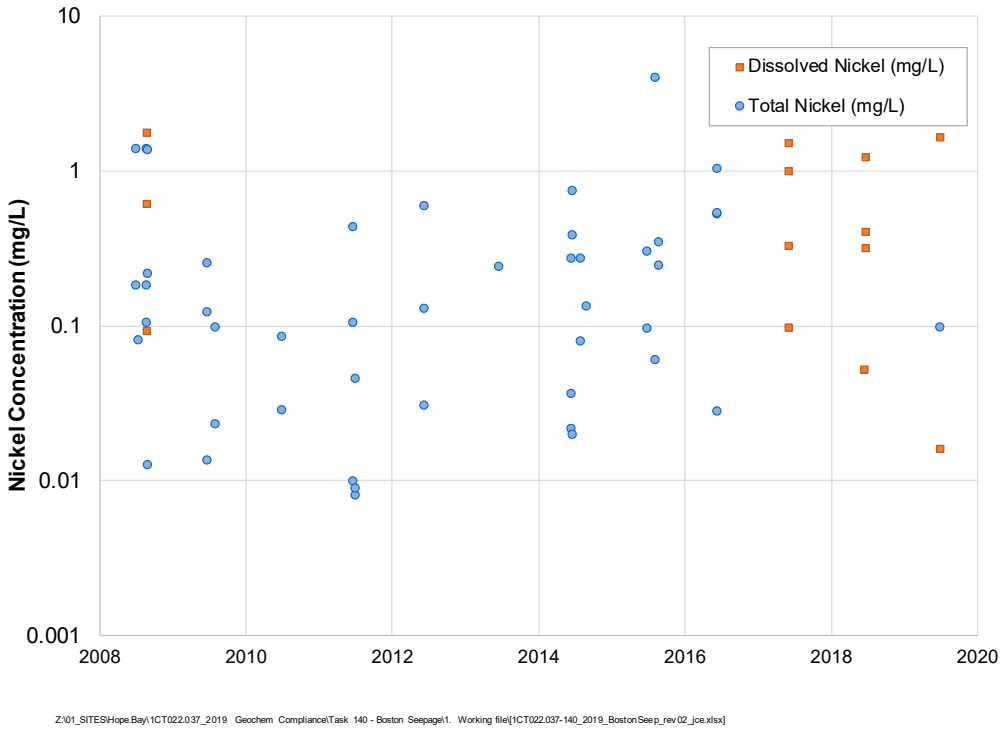


Figure 8: Nickel Concentrations Observed in Seeps at the Boston Camp since 2008

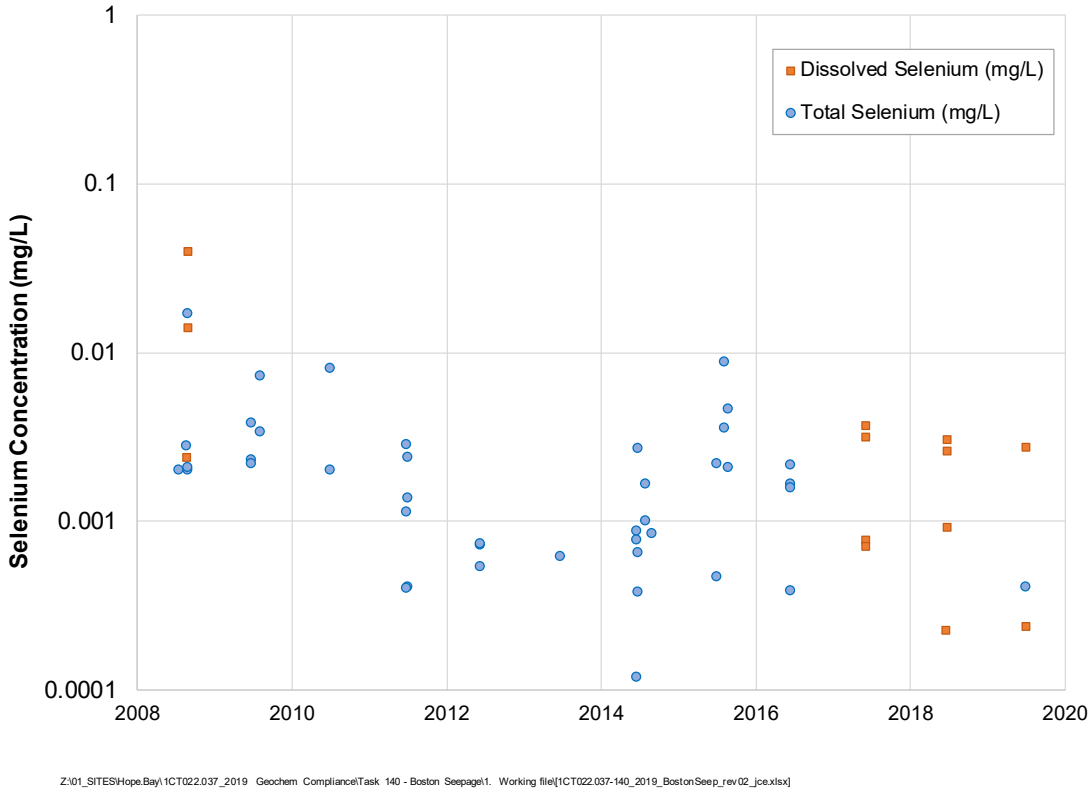


Figure 9: Selenium Concentrations Observed in Seeps at the Boston Camp since 2008

4 Conclusions and Recommendations

Seepage surveys in 2019 at Boston included i) the freshet survey of the north and east sides of the camp pad and the full extent of the airstrip and ii) monthly surveys of SNP station BOS-8. This memo presents the results from both seepage surveys. In 2019, a total of three opportunistic seepage samples were collected: two from the northeast side of the camp pad, and one along the road to the airstrip. No seepage was observed along the northern extent of the pad or along the airstrip.

All seepage samples were pH neutral to slightly alkaline (7.8 to 8.0). The seepage chemistry is summarized as follows:

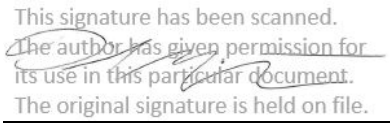
- Sulphate concentrations for the two samples from the NE Pad (19-BOS-01 and BOS-8A) were within the range of historical concentrations and ranged from 400 to 630 mg/L. Compared to BOS-8A, concentrations at 19-BOS-01 were higher for arsenic (0.9 mg/L or 20 times higher than BOS-8A) , cobalt (1.2 mg/L or 50 times higher), nickel (1.6 mg/L or 16 times higher), manganese (0.27 mg/L or 9 times higher) and selenium (0.0027 mg/L or 6 times higher). Concentrations of copper (0.003 and 0.004 mg/L) and iron (0.089 and 0.010 mg/L) were roughly equivalent for 19-BOS-01 and BOS-8A. All concentrations for the aforementioned parameters are within the range of historical concentrations and no long-term trend was identified. Chloride and nitrate at 19-BOS-01 (220 and 4 mg/L, respectively) were similarly equivalent to previous measurements.

- The seep located at the toe of the road (19-BOS-02) had nitrate, chloride, dissolved arsenic, nickel, and selenium concentrations one to two orders of magnitude lower than the seep samples located at the NE camp pad. Sulphate concentrations at the access road were four to six times lower than the NE Pad and dissolved copper and iron concentrations were roughly equivalent at the two locations.

Continued monitoring will allow for further trends in the seepage to be established.

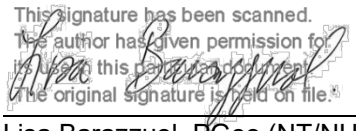
Regards,

SRK Consulting (Canada) Inc.



Derrick Midwinter, PGeo (ON)
Staff Consultant (Geochemistry)

Reviewed by



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Principal Consultant (Geochemistry)

5 References

CCME 1999. Canadian Council of Ministers of the Environment. 1999. Canadian water quality guidelines for the protection of aquatic life. In: Canadian environmental quality guidelines, 1999.

[NWB] Nunavut Water Board, 2018. Water Licence No: 2AM-BOS1835. December 2018.

SRK Consulting (Canada) Inc., 2009. Geochemical Characterization of Historic Waste Rock and Ore Stockpiles at the Boston Deposit, Hope Bay Project, Nunavut. Report 1CH008.005 for Hope Bay Mining Ltd. April 2009.

SRK Consulting (Canada) Inc., 2017. Water and Ore/Waste Rock Management Plan for the Boston Site, Hope Bay Project, Nunavut. Report 1CH008.022 for TMAC Resources Inc. January 2017.

Attachment 1: 2019 Field Observations and Water Quality Results

Sample ID	Unit	*Detection Limit*	BOS8A	BOS8A-DUP	FIELD BLANK2	19-BOS-01	19-BOS-01-DUP	19-BOS-02	FIELD BLANK3
Date			2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29
Time			2:20:00 PM	2:20:00 PM	2:20:00 PM	3:10:00 PM	3:10:00 PM	3:40:00 PM	3:10:00 PM
Easting			441272			441334		441318	
Northing			7505473			7505410		7505265	
ALS Sample ID			L2301937-1	L2301937-2	L2301937-3	L2301987-1	L2301987-2	L2301987-3	L2301987-4
Description			NE camp pad (?)			--		Flowing out of access Rd to airstrip to the East	
pH	pH units		7.6			7.8		7.9	
Temperature	ºC		16			6.2		12.2	
Conductivity	µS/cm		1018			1928		408	
ORP	mV		44			101		120	
Photos			Y (24-26)			Y (31-33)		Y (36-38)	
Flow	L/s		-			-		-	
Duplicate			Y			Y		N	
Blank			Y			Y		N	
Physical Tests (Water)									
Conductivity	uS/cm	2	1030	1040	2	1810	1820	394	2
Hardness (as CaCO3)	mg/L	0.5	544	541	0.5	1010	987	185	0.5
pH	pH	0.1	7.8	7.79	5.77	8.04	8.05	7.98	5.33
Total Suspended Solids	mg/L	3	3	3.5	3	3	3	11.9	3
Total Dissolved Solids	mg/L	10				1680	1770	299	10
Anions and Nutrients (Water)									
Acidity (as CaCO3)	mg/L	1	-	-	-	3.4	3.3	1.7	2
Alkalinity, Total (as CaCO3)	mg/L	1	-	-	-	100	104	70.5	1
Ammonia, Total (as N)	mg/L	0.005	0.0062	0.0057	0.005	0.372	0.385	0.005	0.005
Bromide (Br)	mg/L	0.05	-	-	-	0.5	0.56	0.05	0.05
Chloride (Cl)	mg/L	0.5	-	-	-	219	222	22.3	0.5
Fluoride (F)	mg/L	0.02	-	-	-	0.2	0.2	0.049	0.02
Nitrate (as N)	mg/L	0.005	-	-	-	3.99	4.03	0.335	0.005
Nitrite (as N)	mg/L	0.001	-	-	-	0.017	0.017	0.001	0.001
Phosphorus (P)-Total	mg/L	0.002	-	-	-	0.0302	0.0319	0.0078	0.002
Sulfate (SO4)	mg/L	0.3	395	397	0.3	629	636	97	0.3
Total Metals (Water)									
Aluminum (Al)-Total	mg/L	*0.005*	0.0090	0.0088	0.005	-	-	-	-
Antimony (Sb)-Total	mg/L	*0.0005*	0.00401	0.00413	0.0005	-	-	-	-
Arsenic (As)-Total	mg/L	*0.0005*	0.0471	0.0503	0.0005	-	-	-	-
Barium (Ba)-Total	mg/L	*0.02*	0.025	0.025	0.02	-	-	-	-
Beryllium (Be)-Total	mg/L	*0.0001*	0.0001	0.0001	0.0001	-	-	-	-
Boron (B)-Total	mg/L	*0.1*	0.10	0.10	0.1	-	-	-	-
Cadmium (Cd)-Total	mg/L	*0.000005*	0.0000222	0.0000245	0.000005	-	-	-	-
Calcium (Ca)-Total	mg/L	*0.1*	136	133	0.1	-	-	-	-
Chromium (Cr)-Total	mg/L	*0.001*	0.001	0.001	0.001	-	-	-	-
Cobalt (Co)-Total	mg/L	*0.0003*	0.0244	0.0286	0.0003	-	-	-	-
Copper (Cu)-Total	mg/L	*0.001*	0.0032	0.0031	0.001	-	-	-	-
Iron (Fe)-Total	mg/L	*0.03*	0.089	0.092	0.03	-	-	-	-
Lead (Pb)-Total	mg/L	*0.0005*	0.0005	0.0005	0.0005	-	-	-	-
Lithium (Li)-Total	mg/L	*0.001*	0.0068	0.0066	0.001	-	-	-	-
Magnesium (Mg)-Total	mg/L	*0.1*	49.5	50.8	0.1	-	-	-	-
Manganese (Mn)-Total	mg/L	*0.0003*	0.0286	0.0328	0.0003	-	-	-	-
Molybdenum (Mo)-Total	mg/L	*0.001*	0.0012	0.0012	0.001	-	-	-	-
Nickel (Ni)-Total	mg/L	*0.001*	0.0979	0.112	0.001	-	-	-	-
Potassium (K)-Total	mg/L	*2*	6.4	6.5	2	-	-	-	-
Selenium (Se)-Total	mg/L	*0.00005*	0.000411	0.000456	0.00005	-	-	-	-
Silver (Ag)-Total	mg/L	*0.00002*	0.00002	0.00002	0.00002	-	-	-	-
Sodium (Na)-Total	mg/L	*2*	21.1	21.7	2	-	-	-	-
Thallium (Tl)-Total	mg/L	*0.00001*	0.00001	0.00001	0.00001	-	-	-	-
Tin (Sn)-Total	mg/L	*0.0005*	0.0005	0.0005	0.0005	-	-	-	-
Titanium (Ti)-Total	mg/L	*0.01*	0.01	0.01	0.01	-	-	-	-
Uranium (U)-Total	mg/L	*0.0002*	0.0002	0.0002	0.0002	-	-	-	-

Sample ID	Unit	*Detection Limit*	BOS8A	BOS8A-DUP	FIELD BLANK2	19-BOS-01	19-BOS-01-DUP	19-BOS-02	FIELD BLANK3
Date			2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29	2019-06-29
Time			2:20:00 PM	2:20:00 PM	2:20:00 PM	3:10:00 PM	3:10:00 PM	3:40:00 PM	3:10:00 PM
Vanadium (V)-Total	mg/L	*0.0005*	0.00054	0.0005	0.0005	-	-	-	-
Zinc (Zn)-Total	mg/L	*0.005*	0.005	0.005	0.005	-	-	-	-
Dissolved Metals (Water)									
Aluminum (Al)-Dissolved	mg/L	*0.001*	-	-	-	0.0025	0.0020	0.0087	0.001
Antimony (Sb)-Dissolved	mg/L	*0.0001*	-	-	-	0.0338	0.0348	0.00278	0.0001
Arsenic (As)-Dissolved	mg/L	*0.0001*	-	-	-	0.903	0.901	0.00888	0.0001
Barium (Ba)-Dissolved	mg/L	*0.0001*	-	-	-	0.0176	0.0177	0.00950	0.0001
Beryllium (Be)-Dissolved	mg/L	*0.00002*	-	-	-	0.00002	0.00002	0.00002	0.00002
Bismuth (Bi)-Dissolved	mg/L	*0.00005*	-	-	-	0.00005	0.00005	0.00005	0.00005
Boron (B)-Dissolved	mg/L	*0.01*	-	-	-	0.189	0.183	0.045	0.01
Cadmium (Cd)-Dissolved	mg/L	*0.000005*	-	-	-	0.0000319	0.0000303	0.0000069	0.000005
Calcium (Ca)-Dissolved	mg/L	*0.05*	-	-	-	278	271	47.0	0.05
Chromium (Cr)-Dissolved	mg/L	*0.0001*	-	-	-	0.0001	0.0001	0.00010	0.0001
Cobalt (Co)-Dissolved	mg/L	*0.0001*	-	-	-	1.21	1.19	0.00320	0.0001
Copper (Cu)-Dissolved	mg/L	*0.0002*	-	-	-	0.00413	0.00412	0.00400	0.0002
Iron (Fe)-Dissolved	mg/L	*0.01*	-	-	-	0.01	0.01	0.015	0.01
Lead (Pb)-Dissolved	mg/L	*0.00005*	-	-	-	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	mg/L	*0.001*	-	-	-	0.0398	0.0385	0.0046	0.001
Magnesium (Mg)-Dissolved	mg/L	*0.1*	-	-	-	75.6	75.4	16.5	0.1
Manganese (Mn)-Dissolved	mg/L	*0.0001*	-	-	-	0.268	0.266	0.0102	0.0001
Mercury (Hg)-Dissolved	mg/L	*0.000005*	-	-	-	0.000005	0.0000055	0.0000055	0.0000160
Molybdenum (Mo)-Dissolved	mg/L	*0.00005*	-	-	-	0.00284	0.00289	0.000931	0.00005
Nickel (Ni)-Dissolved	mg/L	*0.0005*	-	-	-	1.64	1.62	0.0161	0.0005
Phosphorus (P)-Dissolved	mg/L	*0.05*	-	-	-	0.05	0.05	0.05	0.05
Potassium (K)-Dissolved	mg/L	*0.1*	-	-	-	13.5	13.4	2.31	0.1
Selenium (Se)-Dissolved	mg/L	*0.00005*	-	-	-	0.00273	0.00298	0.000238	0.00005
Silicon (Si)-Dissolved	mg/L	*0.05*	-	-	-	1.98	1.96	0.825	0.05
Silver (Ag)-Dissolved	mg/L	*0.00001*	-	-	-	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	mg/L	*0.05*	-	-	-	36.8	37.9	8.74	0.05
Strontium (Sr)-Dissolved	mg/L	*0.0002*	-	-	-	1.61	1.66	0.170	0.0002
Sulfur (S)-Dissolved	mg/L	*0.5*	-	-	-	211	209	32.1	0.5
Thallium (Tl)-Dissolved	mg/L	*0.00001*	-	-	-	0.00001	0.00001	0.00001	0.00001
Tin (Sn)-Dissolved	mg/L	*0.0001*	-	-	-	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	mg/L	*0.0003*	-	-	-	0.0003	0.0003	0.0003	0.0003
Uranium (U)-Dissolved	mg/L	*0.00001*	-	-	-	0.000257	0.000260	0.000042	0.00001
Vanadium (V)-Dissolved	mg/L	*0.0005*	-	-	-	0.00128	0.00128	0.0005	0.0005
Zinc (Zn)-Dissolved	mg/L	*0.001*	-	-	-	0.0024	0.0025	0.001	0.001
Zirconium (Zr)-Dissolved	mg/L	*0.0003*	-	-	-	0.0003	0.0003	0.0003	0.0003

*Note: Blue text indicates value below the limit of detection

Attachment 2: Boston Seepage Data 2008-2019

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Conductivity	Hardness (as CaCO3)	pH	Total Suspended Solids	Total Dissolved Solids	Acidity (as CaCO3)	Alkalinity, Total (as CaCO3)	Ammonia, Total (as N)	Bromide (Br)	Chloride (Cl)	Fluoride (F)
			Units	uS/cm	mg/L	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			LOR	2	0.5	0.1	3	10	1	1	0.005	0.05	0.5	0.02
2008	2008-BOS-001	2008-BOS-001	2008-08-23	1470	596	7.9	18.7	1110	12.2	162	0.155	<0.05	152	0.065
2008	2008-BOS-003	2008-BOS-003	2008-08-25	1890	901	7.71	<5	1490	6.4	76.7	6.04	<0.05	73	0.106
2008	BOS-8	BOS-8A	2008-08-25	6720	2740	6.9	19	8200	19.1	42.8	14.2	3.4	1890	1.3
2008	BOS-8A	BOS-8A	2008-06-30	1190	464	8	11	-	-	149	-	-	136	-
2008	BOS-8A	BOS-8A	2008-06-30	1190	464	8	11	-	-	149	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	1280	490	8.1	40	-	-	172	0.1	-	129	0.09
2008	BOS-8A	BOS-8A	2008-08-29	1330	548	8	-	-	-	130	0.05	-	124	-
2009	BOS-8A	BOS-8A	2009-06-21	483	161	8.04	19	260	-	111	1.41	-	30.9	0.073
2009	BOS-8A	BOS-8A	2009-08-04	1820	660	8.2	34	1110	-	188	0.138	-	231	0.061
2010	BOS-8A	BOS-8A	2010-07-01	1210	481	7.85	-	-	-	198	0.05	-	130	0.083
2011	BOS-8A	BOS-8A	2011-06-23	763	274	7.71	-	-	-	68.4	0.381	-	68.6	-
2011	BOS-8A	BOS-8A	2011-07-03	1050	362	7.99	-	-	-	72	0.05	-	127	-
2012	BOS-8A	BOS-8A	2012-06-10	394	149	7.78	3	-	-	-	0.127	-	-	-
2013	BOS-8A	BOS-8A	2013-06-21	1320	687	8.28	15	-	-	-	0.05	-	-	-
2008	BOS-8B	BOS-8B	2008-08-29	1560	571	7.9	-	-	-	128	0.05	-	160	-
2009	BOS-8B	BOS-8B	2009-06-21	724	209	7.71	4	387	-	63.8	2.12	-	96.8	0.054
2009	BOS-8B	BOS-8B	2009-08-04	2800	956	7.73	3	1640	-	38.6	0.05	-	548	0.05
2010	BOS-8B	BOS-8B	2010-07-01	1520	583	7.48	-	-	-	58.2	0.05	-	224	0.05
2011	BOS-8B	BOS-8B	2011-06-23	1690	635	6.87	-	-	-	10.1	0.0246	-	355	-
2011	BOS-8B	BOS-8B	2011-07-03	1850	708	7.6	-	-	-	38.4	0.05	-	383	-
2012	BOS-8B	BOS-8B	2012-06-10	462	168	7.73	3	-	-	-	0.142	-	-	-
2008	BOS-8C	BOS-8C	2008-08-29	4860	1890	7.4	-	-	-	47	10.6	-	1440	-
2009	BOS-8C	BOS-8C	2009-06-21	520	176	7.55	656	275	-	37.2	1.4	-	65.5	0.05
2011	BOS-8C	BOS-8C	2011-06-23	786	281	7.58	-	-	-	33.8	0.0139	-	171	-
2011	BOS-8C	BOS-8C	2011-07-03	1450	502	7.51	-	-	-	29.8	0.05	-	320	-
2012	BOS-8C	BOS-8C	2012-06-10	358	124	6.4	3	-	-	-	0.05	-	-	-
2014	BOS8-16JUN14a	BOS8	2014-06-16	683	346	7.93	<3	-	-	-	0.0149	-	-	-
2014	BOS8-16JUN14b	BOS8	2014-06-16	1040	461	7.86	3.2	-	-	-	0.013	-	-	-
2014	BOS8-16JUN14c	BOS8	2014-06-16	347	106	7.95	8.8	-	-	-	0.0421	-	-	-
2014	BOS8-23JUN14a	BOS8	2014-06-23	974	537	8.03	<3	-	-	-	0.0164	-	-	-
2014	BOS8-23JUN14b	BOS8	2014-06-23	1110	506	7.96	<3	-	-	-	0.0068	-	-	-
2014	BOS8-23JUN14c	BOS8	2014-06-23	2160	1040	7.75	9.5	-	-	-	0.194	-	-	-
2014	BOS8-31JUL14	BOS8	2014-07-31	1610	885	7.72	4.3	-	-	-	0.195	-	-	-
2015	BOS8A-09AUG15	BOS8	2015-08-09	1460	742	7.02	<3	-	-	-	0.0081	-	-	-
2016	BOS8A-12JUN16	BOS8	2016-06-12	951	416	7.72	<3	-	-	-	0.0308	-	-	-
2015	BOS8A-24AUG15	BOS8	2015-08-24	1490	721	7.16	12.1	-	-	-	0.0074	-	-	-
2015	BOS8A-29JUN15	BOS8	2015-06-29	944	426	8.03	<3	-	-	-	0.0134	-	-	-
2014	BOS8A-31JUL14	BOS8	2014-07-31	1320	669	7.18	<3	-	-	-	0.0305	-	-	-
2015	BOS8C-09AUG15	BOS8	2015-08-09	2620	1370	7.6	<3	-	-	-	16	-	-	-
2016	BOS8C-12JUN16	BOS8	2016-06-12	1610	739	7.9	28	-	-	-	0.0678	-	-	-
2015	BOS8C-24AUG15	BOS8	2015-08-24	1370	601	7.14	<3	-	-	-	0.33	-	-	-
2014	BOS8C-28AUG14	BOS8	2014-08-28	1500	762	7.6	<3	-	-	-	0.0146	-	-	-
2015	BOS8C-29JUN15	BOS8	2015-06-29	1220	529	7.49	<3	-	-	-	0.153	-	-	-
2016	BOS8D-12JUN16a	BOS8	2016-06-12	1470	668	7.91	9.8	-	-	-	0.0383	-	-	-
2016	BOS8D-12JUN16b	BOS8	2016-06-12	1470	669	7.94	10.1	-	-	-	0.017	-	-	-
2017	BOS8A-04JUN	BOS-8A	2017-06-04	811	0	7.61	<3.0	611	5.5	91.2	0.0145	<0.25	26.1	<0.10
2017	2017-BOS-001	2017-BOS-001	2017-06-04	577	0	7.09	32.8	428	8.1	61	0.0267	<0.050	15.6	0.032
2017	17-BOS-02	BOS-8B	2017-06-06	1830	968	8.03	6.7	1440	4.8	109	0.198	0	228	<0.20
2017	17-BOS-03	17-BOS-03	2017-06-06	1690	903	8.04	11.7	1250	4.6	108	0.122	0	192	<0.20
2018	18-BOS-01	BOS8	2018-06-16	401	-	7.31	12.7	288	4.3	22	0.0246	-	8.88	0.024
2018	18-BOS-01	BOS8	2018-06-25	1200	666	7.81	4.1	967	4.5	129	0.0239	-	47.2	<0.1
2018	18-BOS-02	18-BOS-02	2018-06-25	1840	916	8.04	3.7	1500	2.8	90.1	0.349	-	220	<0.2
2018	18-BOS-03	18-BOS-03	2018-06-25	1640	826	8.05	3.3	1370	4	88.8	0.0302	-	194	<0.1
2019	BOS8A	BOS-8A	2019-06-29	1030	544	7.8	<3	-	-	-	0.0062	-	-	-
2019	19-BOS-01	19-BOS-01	2019-06-29	1810	1010	8.04	<3	1680	3.4	100	0.372	<0.5	219	<0.2
2019	19-BOS-02	18-BOS-02	2019-06-29	394	185	7.98	11.9	299	1.7	70.5	<0.005	<0.05	22.3	0.049

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Nitrate (as N)	Nitrite (as N)	Phosphorus (P)-Total	Ortho Phosphate as P	Sulfate (SO4)	Dissolved Mercury Filtration Location	Dissolved Metals Filtration Location	Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved
			Units	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L	mg/L	mg/L	mg/L
			LOR	0.005	0.001	0.002	0.001	0.3	n/a	n/a	0.001	0.0001	0.0001	0.00005
2008	2008-BOS-001	2008-BOS-001	2008-08-23	<0.005	0.0019	-	-	380	-	-	0.0146	0.00437	0.0521	0.0314
2008	2008-BOS-003	2008-BOS-003	2008-08-25	47.6	0.542	-	-	650	-	-	<0.005	0.0142	0.0353	0.011
2008	BOS-8	BOS-8A	2008-08-25	49.7	0.261	-	-	603	-	-	0.023	0.0206	0.134	0.126
2008	BOS-8A	BOS-8A	2008-06-30	3.5	0.05	-	-	217	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	217	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	0.1	0.05	0.27	-	253	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-08-29	22.1	0.05	0.08	-	333	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-06-21	2.07	0.05	0.186	0.186	69	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-08-04	1.91	0.05	0.161	0.161	402	-	-	-	-	-	-
2010	BOS-8A	BOS-8A	2010-07-01	0.05	0.05	-	0.216	232	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-06-23	1.5	0.05	-	0.0593	188	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-07-03	1.96	0.05	-	0.02	233	-	-	-	-	-	-
2012	BOS-8A	BOS-8A	2012-06-10	-	-	-	-	90.1	-	-	-	-	-	-
2013	BOS-8A	BOS-8A	2013-06-21	-	-	-	-	387	-	-	-	-	-	-
2008	BOS-8B	BOS-8B	2008-08-29	14.3	0.05	0.02	-	358	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-06-21	6.26	0.071	0.102	0.102	103	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-08-04	41	0.05	0.02	0.02	384	-	-	-	-	-	-
2010	BOS-8B	BOS-8B	2010-07-01	5.95	0.05	-	0.103	343	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-06-23	7.87	0.05	-	0.0393	236	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-07-03	6.52	0.05	-	0.02	254	-	-	-	-	-	-
2012	BOS-8B	BOS-8B	2012-06-10	-	-	-	-	128	-	-	-	-	-	-
2008	BOS-8C	BOS-8C	2008-08-29	26.3	0.16	0.17	-	374	-	-	-	-	-	-
2009	BOS-8C	BOS-8C	2009-06-21	3.33	0.055	0.282	0.282	89.5	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-06-23	0.549	0.05	-	0.0156	61.6	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-07-03	1.98	0.05	-	0.02	150	-	-	-	-	-	-
2012	BOS-8C	BOS-8C	2012-06-10	-	-	-	-	116	-	-	-	-	-	-
2014	BOS8-16JUN14a	BOS8	2014-06-16	-	-	-	-	242	-	-	-	-	-	-
2014	BOS8-16JUN14b	BOS8	2014-06-16	-	-	-	-	383	-	-	-	-	-	-
2014	BOS8-16JUN14c	BOS8	2014-06-16	-	-	-	-	28.7	-	-	-	-	-	-
2014	BOS8-23JUN14a	BOS8	2014-06-23	-	-	-	-	333	-	-	-	-	-	-
2014	BOS8-23JUN14b	BOS8	2014-06-23	-	-	-	-	398	-	-	-	-	-	-
2014	BOS8-23JUN14c	BOS8	2014-06-23	-	-	-	-	526	-	-	-	-	-	-
2014	BOS8-31JUL14	BOS8	2014-07-31	-	-	-	-	733	-	-	-	-	-	-
2015	BOS8A-09AUG15	BOS8	2015-08-09	-	-	-	-	662	-	-	-	-	-	-
2016	BOS8A-12JUN16	BOS8	2016-06-12	-	-	-	-	359	-	-	-	-	-	-
2015	BOS8A-24AUG15	BOS8	2015-08-24	-	-	-	-	569	-	-	-	-	-	-
2015	BOS8A-29JUN15	BOS8	2015-06-29	-	-	-	-	325	-	-	-	-	-	-
2014	BOS8A-31JUL14	BOS8	2014-07-31	-	-	-	-	535	-	-	-	-	-	-
2015	BOS8C-09AUG15	BOS8	2015-08-09	-	-	-	-	1300	-	-	-	-	-	-
2016	BOS8C-12JUN16	BOS8	2016-06-12	-	-	-	-	468	-	-	-	-	-	-
2015	BOS8C-24AUG15	BOS8	2015-08-24	-	-	-	-	292	-	-	-	-	-	-
2014	BOS8C-28AUG14	BOS8	2014-08-28	-	-	-	-	575	-	-	-	-	-	-
2015	BOS8C-29JUN15	BOS8	2015-06-29	-	-	-	-	301	-	-	-	-	-	-
2016	BOS8D-12JUN16a	BOS8	2016-06-12	-	-	-	-	4350	-	-	-	-	-	-
2016	BOS8D-12JUN16b	BOS8	2016-06-12	-	-	-	-	434	-	-	-	-	-	-
2017	BOS8A-04JUN	BOS-8A	2017-06-04	1.48	<0.0050	0.0275	-	305	FIELD	-	0.0047	0.00691	0.105	0.0127
2017	2017-BOS-001	2017-BOS-001	2017-06-04	0.983	0.0028	0.0356	-	205	FIELD	-	0.0335	0.00407	0.0323	0.0106
2017	17-BOS-02	BOS-8B	2017-06-06	3.81	<0.010	0.0314	-	619	FIELD	-	0.0025	0.0363	0.989	0.0188
2017	17-BOS-03	17-BOS-03	2017-06-06	3.23	0.026	0.03	-	566	FIELD	-	0.0042	0.027	0.578	0.0256
2018	18-BOS-01	BOS8	2018-06-16	0.42	0.0071	0.0155	-	152	-	-	0.0044	0.0025	0.0427	0.00445
2018	18-BOS-01	BOS8	2018-06-25	1.62	<0.005	0.0384	-	493	-	-	0.0054	0.00648	0.0758	0.0191
2018	18-BOS-02	18-BOS-02	2018-06-25	3.62	0.012	0.0507	-	527	-	-	0.002	0.038	0.707	0.0156
2018	18-BOS-03	18-BOS-03	2018-06-25	3.79	0.0172	0.0213	-	527	-	-	0.0043	0.0244	0.315	0.0254
2019	BOS8A	BOS-8A	2019-06-29	-	-	-	-	395	-	-	-	-	-	-
2019	19-BOS-01	19-BOS-01	2019-06-29	3.99	0.017	0.0302	-	629	FIELD	FIELD	0.0025	0.0338	0.903	0.0176
2019	19-BOS-02	18-BOS-02	2019-06-29	0.335	<0.001	0.0078	-	97	FIELD	FIELD	0.0087	0.00278	0.00888	0.00950

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved	Calcium (Ca)-Dissolved	Chromium (Cr)-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			LOR	0.00002	0.00005	0.01	0.000005	0.05	0.0001	0.0001	0.0002	0.01	0.00005	0.001
2008	2008-BOS-001	2008-BOS-001	2008-08-23	<0.001	<0.001	0.147	<0.0001	137	0.0011	0.0113	0.00756	0.253	<0.0001	0.014
2008	2008-BOS-003	2008-BOS-003	2008-08-25	<0.0025	<0.0025	0.295	<0.00025	202	<0.0025	0.253	0.00183	<0.03	<0.00025	<0.025
2008	BOS-8	BOS-8A	2008-08-25	<0.005	<0.005	0.43	<0.0005	888	<0.005	1.02	0.0031	0.115	<0.0005	0.195
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-08-04	-	-	-	-	-	-	-	-	-	-	-
2010	BOS-8A	BOS-8A	2010-07-01	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8A	BOS-8A	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2013	BOS-8A	BOS-8A	2013-06-21	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8B	BOS-8B	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-08-04	-	-	-	-	-	-	-	-	-	-	-
2010	BOS-8B	BOS-8B	2010-07-01	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8B	BOS-8B	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8C	BOS-8C	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8C	BOS-8C	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8C	BOS-8C	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14a	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14b	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14c	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14a	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14b	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14c	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8A-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8A-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8C-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8C-28AUG14	BOS8	2014-08-28	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8D-12JUN16a	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8D-12JUN16b	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2017	BOS8A-04JUN	BOS-8A	2017-06-04	<0.00010	<0.000050	0.065	0.0000138	94.2	0.00014	0.141	0.00505	<0.010	<0.000050	0.005
2017	2017-BOS-001	2017-BOS-001	2017-06-04	<0.00010	<0.000050	0.087	0.0000367	62.2	0.00015	0.0716	0.00424	0.068	<0.000050	0.0012
2017	17-BOS-02	BOS-8B	2017-06-06	<0.000020	<0.000050	0.203	0.0000353	264	<0.00010	1.1	0.0035	<0.010	<0.000050	0.0524
2017	17-BOS-03	17-BOS-03	2017-06-06	<0.000020	<0.000050	0.205	0.0000299	239	<0.00010	0.754	0.00411	<0.010	<0.000050	0.0483
2018	18-BOS-01	BOS8	2018-06-16	<0.0001	<0.00005	0.025	<0.000005	50.8	<0.0001	0.0246	0.00198	<0.01	<0.00005	0.0022
2018	18-BOS-01	BOS8	2018-06-25	<0.00002	<0.00005	0.078	0.0000247	166	<0.0001	0.109	0.00848	0.013	<0.00005	0.0069
2018	18-BOS-02	18-BOS-02	2018-06-25	<0.00002	<0.00005	0.176	0.0000287	256	<0.0001	0.956	0.00555	<0.01	<0.00005	0.0456
2018	18-BOS-03	18-BOS-03	2018-06-25	<0.00002	<0.00005	0.178	0.0000313	226	<0.0001	0.345	0.00406	<0.01	<0.00005	0.0399
2019	BOS8A	BOS-8A	2019-06-29	-	-	-	-	-	-	-	-	-	-	-
2019	19-BOS-01	19-BOS-01	2019-06-29	<0.00002	<0.00005	0.189	0.0000319	278	<0.0001	1.21	0.00413	<0.01	<0.00005	0.0398
2019	19-BOS-02	18-BOS-02	2019-06-29	<0.00002	<0.00005	0.045	0.0000069	47.0	0.00010	0.00320	0.00400	0.015	<0.00005	0.0046

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Magnesium (Mg)-Dissolved	Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			LOR	0.1	0.0001	0.000005	0.00005	0.0005	0.05	0.1	0.00005	0.05	0.00001	0.05
2008	2008-BOS-001	2008-BOS-001	2008-08-23	62.1	0.135	<0.00005	0.00278	0.0928	<0.3	14.8	0.0024	0.588	<0.00002	85.9
2008	2008-BOS-003	2008-BOS-003	2008-08-25	96.6	0.374	<0.00005	0.00656	0.613	<0.3	17.9	0.014	1.21	<0.00005	50.5
2008	BOS-8	BOS-8A	2008-08-25	128	1.44	<0.00005	0.00385	1.75	<0.3	51	<0.04	3.88	<0.0001	182
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8A	BOS-8A	2009-08-04	-	-	-	-	-	-	-	-	-	-	-
2010	BOS-8A	BOS-8A	2010-07-01	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8A	BOS-8A	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8A	BOS-8A	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2013	BOS-8A	BOS-8A	2013-06-21	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8B	BOS-8B	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8B	BOS-8B	2009-08-04	-	-	-	-	-	-	-	-	-	-	-
2010	BOS-8B	BOS-8B	2010-07-01	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8B	BOS-8B	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8B	BOS-8B	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8C	BOS-8C	2008-08-29	-	-	-	-	-	-	-	-	-	-	-
2009	BOS-8C	BOS-8C	2009-06-21	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-06-23	-	-	-	-	-	-	-	-	-	-	-
2011	BOS-8C	BOS-8C	2011-07-03	-	-	-	-	-	-	-	-	-	-	-
2012	BOS-8C	BOS-8C	2012-06-10	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14a	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14b	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-16JUN14c	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14a	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14b	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-23JUN14c	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8A-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8A-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8A-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8C-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	-	-
2014	BOS8C-28AUG14	BOS8	2014-08-28	-	-	-	-	-	-	-	-	-	-	-
2015	BOS8C-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8D-12JUN16a	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2016	BOS8D-12JUN16b	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	-	-
2017	BOS8A-04JUN	BOS-8A	2017-06-04	40.3	0.112	<0.0000050	0.000868	0.326	<0.050	4.5	0.000781	1.36	<0.000010	14
2017	2017-BOS-001	2017-BOS-001	2017-06-04	28.4	0.285	<0.0000050	0.00074	0.0971	<0.050	5.53	0.000713	1.56	<0.000010	11.3
2017	17-BOS-02	BOS-8B	2017-06-06	75.2	0.3	<0.0000050	0.0024	1.51	<0.050	14.1	0.00367	2.33	0.000014	38.9
2017	17-BOS-03	17-BOS-03	2017-06-06	74.5	0.208	<0.0000050	0.00288	0.99	<0.050	13.7	0.00314	2.35	0.000019	37.1
2018	18-BOS-01	BOS8	2018-06-16	13	0.0241	<0.000005	0.00036	0.0519	<0.05	1.68	0.000226	0.246	<0.00001	4.11
2018	18-BOS-01	BOS8	2018-06-25	61.4	0.111	<0.000005	0.0011	0.315	<0.05	6.27	0.000927	2.11	0.000012	24.8
2018	18-BOS-02	18-BOS-02	2018-06-25	67.6	0.25	<0.000005	0.00313	1.23	<0.05	13.3	0.00305	1.93	0.000011	36.3
2018	18-BOS-03	18-BOS-03	2018-06-25	63.5	0.133	<0.000005	0.00401	0.406	<0.05	10.9	0.00261	1.88	0.000014	31.3
2019	BOS8A	BOS-8A	2019-06-29	-	-	-	-	-	-	-	-	-	-	-
2019	19-BOS-01	19-BOS-01	2019-06-29	75.6	0.268	<0.000005	0.00284	1.64	<0.05	13.5	0.00273	1.98	<0.00001	36.8
2019	19-BOS-02	18-BOS-02	2019-06-29	16.5	0.0102	0.0000055	0.000931	0.0161	<0.05	2.31	0.000238	0.825	<0.00001	8.74

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Strontium (Sr)-Dissolved	Sulfur (S)-Dissolved	Thallium (Tl)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved	Aluminum (Al)-Total	Antimony (Sb)-Total	Arsenic (As)-Total	Barium (Ba)-Total
			Units	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
			LOR	0.0002	0.5	0.00001	0.0001	0.0003	0.00001	0.0005	0.001	0.0003	0.001	0.0001	0.0001	0.00005
2008	2008-BOS-001	2008-BOS-001	2008-08-23	0.767	-	<0.0002	<0.0002	0.012	0.000186	<0.002	<0.002	-	0.377	0.00448	0.134	0.0342
2008	2008-BOS-003	2008-BOS-003	2008-08-25	0.553	-	<0.0005	<0.0005	0.012	0.000419	<0.005	0.0068	-	0.11	-	-	0.032
2008	BOS-8	BOS-8A	2008-08-25	7.26	-	<0.001	<0.001	<0.01	0.00019	<0.01	0.022	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	0.11	-	-	0.032
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	-	-	-	-	-	-	-	-	-	0.94	0.003	0.301	0.0304
2008	BOS-8A	BOS-8A	2008-08-29	-	-	-	-	-	-	-	-	-	0.15	0.0114	0.148	0.0281
2009	BOS-8A	BOS-8A	2009-06-21	-	-	-	-	-	-	-	-	-	0.268	0.00874	0.247	0.0127
2009	BOS-8A	BOS-8A	2009-08-04	-	-	-	-	-	-	-	-	-	0.426	0.00532	0.248	0.0598
2010	BOS-8A	BOS-8A	2010-07-01	-	-	-	-	-	-	-	-	-	0.08	0.00496	0.235	0.0341
2011	BOS-8A	BOS-8A	2011-06-23	-	-	-	-	-	-	-	-	-	0.167	0.0033	0.0664	0.0239
2011	BOS-8A	BOS-8A	2011-07-03	-	-	-	-	-	-	-	-	-	0.0461	0.00124	0.00274	0.0386
2012	BOS-8A	BOS-8A	2012-06-10	-	-	-	-	-	-	-	-	-	0.132	0.00884	0.253	0.0075
2013	BOS-8A	BOS-8A	2013-06-21	-	-	-	-	-	-	-	-	-	0.292	0.00322	0.359	0.0355
2008	BOS-8B	BOS-8B	2008-08-29	-	-	-	-	-	-	-	-	-	0.04	0.0116	0.0155	0.0428
2009	BOS-8B	BOS-8B	2009-06-21	-	-	-	-	-	-	-	-	-	0.155	0.00833	0.0749	0.0289
2009	BOS-8B	BOS-8B	2009-08-04	-	-	-	-	-	-	-	-	-	0.042	0.00318	0.00801	0.113
2010	BOS-8B	BOS-8B	2010-07-01	-	-	-	-	-	-	-	-	-	0.051	0.0045	0.0128	0.0442
2011	BOS-8B	BOS-8B	2011-06-23	-	-	-	-	-	-	-	-	-	0.099	0.0218	0.271	0.107
2011	BOS-8B	BOS-8B	2011-07-03	-	-	-	-	-	-	-	-	-	0.0145	0.00614	0.00164	0.0803
2012	BOS-8B	BOS-8B	2012-06-10	-	-	-	-	-	-	-	-	-	0.122	0.00287	0.03	0.0119
2008	BOS-8C	BOS-8C	2008-08-29	-	-	-	-	-	-	-	-	-	0.2	0.029	0.341	0.088
2009	BOS-8C	BOS-8C	2009-06-21	-	-	-	-	-	-	-	-	-	6.91	0.00672	0.495	0.0496
2011	BOS-8C	BOS-8C	2011-06-23	-	-	-	-	-	-	-	-	-	0.136	0.00073	0.00767	0.0382
2011	BOS-8C	BOS-8C	2011-07-03	-	-	-	-	-	-	-	-	-	0.0087	0.00214	0.00151	0.0612
2012	BOS-8C	BOS-8C	2012-06-10	-	-	-	-	-	-	-	-	-	0.181	0.00179	1.23	0.0077
2014	BOS8-16JUN14a	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	0.0311	0.00947	0.138	<0.02
2014	BOS8-16JUN14b	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	0.036	0.00252	0.0148	0.027
2014	BOS8-16JUN14c	BOS8	2014-06-16	-	-	-	-	-	-	-	-	-	0.0988	0.00105	0.02	0.034
2014	BOS8-23JUN14a	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	0.0233	0.00918	0.175	0.025
2014	BOS8-23JUN14b	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	0.0231	0.00201	0.01	0.032
2014	BOS8-23JUN14c	BOS8	2014-06-23	-	-	-	-	-	-	-	-	-	0.105	0.0294	0.247	0.041
2014	BOS8-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	0.0579	0.0121	0.0615	0.032
2015	BOS8A-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	0.0246	0.00498	0.0362	0.039
2016	BOS8A-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	0.0401	0.00139	0.0146	<0.02
2015	BOS8A-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	0.074	0.00548	0.105	0.025
2015	BOS8A-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	0.0148	0.00208	0.0281	<0.02
2014	BOS8A-31JUL14	BOS8	2014-07-31	-	-	-	-	-	-	-	-	-	0.0663	0.0032	0.0251	0.021
2015	BOS8C-09AUG15	BOS8	2015-08-09	-	-	-	-	-	-	-	-	-	0.0167	0.118	5.62	<0.02
2016	BOS8C-12JUN16	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	0.541	0.0353	0.739	<0.02
2015	BOS8C-24AUG15	BOS8	2015-08-24	-	-	-	-	-	-	-	-	-	0.021	0.0102	0.116	0.033
2014	BOS8C-28AUG14	BOS8	2014-08-28	-	-	-	-	-	-	-	-	-	0.0216	0.00317	0.0272	0.021
2015	BOS8C-29JUN15	BOS8	2015-06-29	-	-	-	-	-	-	-	-	-	0.0285	0.0113	0.154	0.027
2016	BOS8D-12JUN16a	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	0.116	0.03	0.534	<0.02
2016	BOS8D-12JUN16b	BOS8	2016-06-12	-	-	-	-	-	-	-	-	-	1.24	0.0291	0.56	0.021
2017	BOS8A-04JUN	BOS-8A	2017-06-04	0.25	111	<0.000010	<0.00010	<0.00030	0.000145	<0.00050	0.0044	<0.000060	-	-	-	-
2017	2017-BOS-001	2017-BOS-001	2017-06-04	0.215	75.4	<0.000010	<0.00010	0.00079	0.000033	<0.00050	0.0056	0.00016	-	-	-	-
2017	17-BOS-02	BOS-8B	2017-06-06	1.56	215	<0.000010	<0.00010	<0.00030	0.000284	0.00142	0.0028	<0.00030	-	-	-	-
2017	17-BOS-03	17-BOS-03	2017-06-06	1.43	207	<0.000010	<0.00010	<0.00030	0.000295	0.00076	0.0407	<0.00030	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-16	0.108	50.5	<0.00001	<0.0001	<0.0003	0.000035	<0.0005	0.0017	<0.00006	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-25	0.42	160	<0.00001	<0.0001	<0.0006	0.000284	<0.0005	0.0027	<0.0003	-	-	-	-
2018	18-BOS-02	18-BOS-02	2018-06-25	1.63	181	<0.00001	<0.0001	<0.0003	0.000247	0.0009	0.002	<0.0003	-	-	-	-
2018	18-BOS-03	18-BOS-03	2018-06-25	1.44	168	<0.00001	<0.0001	<0.0003	0.000268	<0.0005	0.0292	<0.0003	-	-	-	-
2019	BOS8A	BOS-8A	2019-06-29	-	-	-	-	-	-	-	-	-	0.0090	0.00401	0.0471	0.025
2019	19-BOS-01	19-BOS-01	2019-06-29	1.61	211	<0.00001	<0.0001	<0.0003	0.000257	0.00128	0.0024	<0.0003	-	-	-	-
2019	19-BOS-02	18-BOS-02	2019-06-29	0.170	32.1	<0.00001	<0.0001	<0.0003	0.000042	<0.0005	<0.001	<0.0003	-	-	-	-

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Beryllium (Be)-Total	Bismuth (Bi)-Total	Boron (B)-Total	Cadmium (Cd)-Total	Calcium (Ca)-Total	Chromium (Cr)-Total	Cobalt (Co)-Total	Copper (Cu)-Total	Iron (Fe)-Total	Lead (Pb)-Total	Lithium (Li)-Total	Magnesium (Mg)-Total	Manganese (Mn)-Total	Mercury (Hg)-Total	Molybdenum (Mo)-Total	Nickel (Ni)-Total
			Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			LOR	0.00002	0.00005	0.01	0.000005	0.05	0.0001	0.0001	0.0002	0.01	0.00005	0.001	0.1	0.0001	0.000005	0.00005	0.0005
2008	2008-BOS-001	2008-BOS-001	2008-08-23	<0.001	<0.001	0.158	<0.0001	136	0.0052	0.0147	0.01	1.32	0.00062	0.014	62	0.153	<0.00005	0.00226	0.104
2008	2008-BOS-003	2008-BOS-003	2008-08-25	0.002	-	0.17	0.001	112	0.005	0.052	0.009	1.38	0.005	-	40.5	0.224	-	0.005	0.183
2008	BOS-8	BOS-8A	2008-08-25	-	-	-	0.001	-	0.005	-	0.009	1.38	0.005	-	-	-	-	-	1.38
2008	BOS-8A	BOS-8A	2008-06-30	0.002	-	0.17	0.001	112	0.005	0.052	0.009	1.38	0.005	-	40.5	0.224	-	0.005	0.183
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	0.001	-	0.005	-	0.009	1.38	0.005	-	-	-	-	-	1.38
2008	BOS-8A	BOS-8A	2008-07-14	0.001	0.0001	0.12	0.0002	81.9	0.0192	0.0248	0.011	3.23	0.002	-	42.6	0.277	-	0.004	0.0805
2008	BOS-8A	BOS-8A	2008-08-29	0.001	0.0001	0.16	0.0002	132	0.0029	0.0503	0.009	0.398	0.0005	-	48.1	0.072	-	0.0059	0.215
2009	BOS-8A	BOS-8A	2009-06-21	0.001	-	0.096	0.0002	42.8	0.005	0.0603	0.0083	0.665	0.00085	0.01	16.3	0.146	0.0001	0.005	0.123
2009	BOS-8A	BOS-8A	2009-08-04	0.001	-	0.214	0.00005	133	0.0062	0.0312	0.0147	2.46	0.00294	0.013	60.8	0.311	0.0001	0.005	0.097
2010	BOS-8A	BOS-8A	2010-07-01	0.001	-	-	0.00005	109	0.005	0.0223	0.0083	1.82	0.00038	0.011	50.5	0.219	-	0.005	0.0843
2011	BOS-8A	BOS-8A	2011-06-23	0.001	-	0.113	0.00005	60	0.005	0.0967	0.0043	0.469	0.00032	0.01	36.3	1.97	0.0001	0.005	0.104
2011	BOS-8A	BOS-8A	2011-07-03	0.0005	-	0.0497	0.000015	79.1	0.00045	0.00064	0.00278	0.173	0.000114	0.005	38.1	0.0136	-	0.000604	0.00804
2012	BOS-8A	BOS-8A	2012-06-10	0.001	-	0.067	0.000015	42.3	0.0014	0.0618	0.0044	0.199	0.00032	0.01	12.8	0.0573	0.00002	0.005	0.129
2013	BOS-8A	BOS-8A	2013-06-21	0.001	-	0.118	0.000052	157	0.0041	0.114	0.0085	7.04	0.00137	0.01	57.6	0.695	0.00002	0.005	0.239
2008	BOS-8B	BOS-8B	2008-08-29	0.001	0.0001	0.15	0.0002	120	0.0019	0.0025	0.003	0.044	0.0001	-	58.6	0.002	-	0.0042	0.0127
2009	BOS-8B	BOS-8B	2009-06-21	0.001	-	0.078	0.0002	43.5	0.005	0.0093	0.0027	0.246	0.00036	0.01	22	0.198	0.0001	0.005	0.0135
2009	BOS-8B	BOS-8B	2009-08-04	0.001	-	0.201	0.00008	210	0.005	0.0057	0.0034	0.103	0.00014	0.011	110	0.04	0.0001	0.005	0.0233
2010	BOS-8B	BOS-8B	2010-07-01	0.004	-	-	0.0002	107	0.005	0.0044	0.004	0.088	0.0004	0.024	63.3	0.0359	-	0.005	0.0287
2011	BOS-8B	BOS-8B	2011-06-23	0.001	-	0.193	0.00005	171	0.005	0.245	0.0015	0.082	0.0001	0.051	35.8	0.188	0.0001	0.0081	0.43
2011	BOS-8B	BOS-8B	2011-07-03	0.0005	-	0.128	0.000039	226	0.00018	0.00893	0.00165	0.478	0.00005	0.0387	48.7	0.0432	-	0.000609	0.0454
2012	BOS-8B	BOS-8B	2012-06-10	0.001	-	0.079	0.000026	43.9	0.001	0.0138	0.0028	0.214	0.00027	0.01	19.3	0.146	0.00002	0.005	0.0305
2008	BOS-8C	BOS-8C	2008-08-29	0.01	0.001	0.5	0.002	661	0.019	0.813	0.01	0.054	0.001	-	87	0.912	-	0.079	1.35
2009	BOS-8C	BOS-8C	2009-06-21	0.001	-	0.095	0.0002	57.5	0.141	0.129	0.0452	16	0.0223	0.016	16.4	0.398	0.0001	0.005	0.254
2011	BOS-8C	BOS-8C	2011-06-23	0.001	-	0.078	0.00005	89.6	0.005	0.0028	0.0023	0.439	0.00045	0.011	19.6	0.0259	0.0001	0.005	0.0098
2011	BOS-8C	BOS-8C	2011-07-03	0.0005	-	0.108	0.000014	161	0.00013	0.0013	0.00094	0.025	0.00005	0.0227	32.5	0.0109	-	0.000818	0.00885
2012	BOS-8C	BOS-8C	2012-06-10	0.001	-	0.128	0.000054	34	0.001	0.123	0.0014	0.097	0.0001	0.01	8.26	0.063	0.00002	0.005	0.592
2014	BOS8-16JUN14a	BOS8	2014-06-16	<0.001	-	<0.1	0.00002	89.3	<0.001	0.132	0.005	0.062	<0.0005	0.0068	30	0.127	-	0.0012	0.272
2014	BOS8-16JUN14b	BOS8	2014-06-16	<0.001	-	0.11	0.00003	100	<0.001	0.0143	0.0032	0.212	<0.0005	<0.005	51.4	0.171	-	<0.001	0.0361
2014	BOS8-16JUN14c	BOS8	2014-06-16	<0.001	-	<0.1	0.000025	26.9	<0.001	0.00618	0.0083	0.398	<0.0005	<0.005	9.48	0.0413	-	<0.001	0.0216
2014	BOS8-23JUN14a	BOS8	2014-06-23	<0.001	-	0.12	0.000037	136	<0.001	0.154	0.0071	0.667	<0.0005	0.0076	47.7	0.267	-	0.0017	0.384
2014	BOS8-23JUN14b	BOS8	2014-06-23	<0.001	-	0.14	0.000017	111	<0.001	0.0019	0.0024	0.058	<0.0005	<0.005	55.7	0.0253	-	<0.001	0.0199
2014	BOS8-23JUN14c	BOS8	2014-06-23	<0.001	-	0.25	0.000086	299	0.0026	0.576	0.0023	0.274	<0.0005	0.0492	71.2	0.277	-	0.003	0.744
2014	BOS8-31JUL14	BOS8	2014-07-31	<0.001	-	0.2	0.000039	227	0.0011	0.0588	0.0082	0.117	<0.0005	0.0134	77	0.0547	-	0.0019	0.272
2015	BOS8A-09AUG15	BOS8	2015-08-09	<0.001	-	0.27	0.000129	192	<0.001	0.0599	<0.001	<0.03	<0.0005	0.0348	64	0.0974	-	<0.001	0.0601
2016	BOS8A-12JUN16	BOS8	2016-06-12	<0.001	-	<0.1	0.0000295	91.5	<0.001	0.00817	0.0049	0.107	<0.0005	0.002	45.6	0.325	-	<0.001	0.0279
2015	BOS8A-24AUG15	BOS8	2015-08-24	<0.001	-	0.17	0.0000322	168	<0.001	0.0349	0.0089	0.431	<0.0005	0.0056	73.3	0.677	-	<0.001	0.245
2015	BOS8A-29JUN15	BOS8	2015-06-29	<0.001	-	0.11	0.0000133	89.2	<0.001	0.0198	0.0027	0.313	<0.0005	0.0025	49.2	0.624	-	<0.001	0.0952
2014	BOS8A-31JUL14	BOS8	2014-07-31	<0.001	-	0.16	0.000073	142	<0.001	0.0171	0.006	0.056	<0.0005	<0.005	75.9	0.701	-	<0.001	0.0793
2015	BOS8C-09AUG15	BOS8	2015-08-09	<0.001	-	0.6	0.000061	346	<0.001	1.35	0.0021	0.031	<0.0005	0.0758	122	0.465	-	0.0056	3.98
2016	BOS8C-12JUN16	BOS8	2016-06-12	<0.001	-	0.17	0.0000366	210	0.0136	0.82	0.0058	1.62	0.00061	0.0425	51.9	0.312	-	0.0025	1.03
2015	BOS8C-24AUG15	BOS8	2015-08-24	<0.001	-	0.22	0.0000753	185	<0.001	0.167	0.0021	0.059	<0.0005	0.0299	34	0.24	-	0.0016	0.344
2014	BOS8C-28AUG14	BOS8	2014-08-28	<0.001	-	0.14	0.000018	155	<0.001	0.0105	0.0041	0.054	<0.0005	<0.005	91	0.299	-	<0.001	0.132
2015	BOS8C-29JUN15	BOS8	2015-06-29	<0.001	-	0.26	0.0000601	157	<0.001	0.178	0.0021	0.521	<0.0005	0.0248	33.4	0.256	-	0.0032	0.302
2016	BOS8D-12JUN16a	BOS8	2016-06-12	<0.001	-	0.18	0.0000159	188	0.0026	0.431	0.005	0.298	<0.0005	0.0417	48.3	0.131	-	0.003	0.523
2016	BOS8D-12JUN16b	BOS8	2016-06-12	<0.001	-	0.18	0.0000261	186	0.0284	0.436	0.0091	4.49	0.00174	0.042	49.3	0.257	-	0.003	0.536
2017	BOS8A-04JUN	BOS-8A	2017-06-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	2017-BOS-001	2017-BOS-001	2017-06-04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	17-BOS-02	BOS-8B	2017-06-06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	17-BOS-03	17-BOS-03	2017-06-06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-02	18-BOS-02	2018-06-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-03	18-BOS-03	2018-06-25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	BOS8A	BOS-8A	2019-06-29	<0.0001		0.10	0.0000222	136	<0.001	0.0244	0.0032	0.089	<0.0005	0.0068	49.5	0.0286		0.0012	0.0979
2019	19-BOS-01	19-BOS-01	2019-06-29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	19-BOS-02	18-BOS-02	2019-06-29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Attachment 2: Boston Seepage Data 2008-2018

Year	Sample Code	Station Code	Date	Phosphorus (P)-Total	Potassium (K)-Total	Selenium (Se)-Total	Silicon (Si)-Total	Silver (Ag)-Total	Sodium (Na)-Total	Strontium (Sr)-Total	Thallium (Tl)-Total	Tin (Sn)-Total	Titanium (Ti)-Total	Uranium (U)-Total	Vanadium (V)-Total	Zinc (Zn)-Total
			Units	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
			LOR	0.05	0.1	0.00005	0.05	0.00001	0.05	0.0002	0.00001	0.0001	0.0003	0.00001	0.0005	0.001
2008	2008-BOS-001	2008-BOS-001	2008-08-23	<0.3	15.3	0.0028	1.42	0.000042	86.5	0.782	<0.0002	<0.0002	0.024	0.000173	0.0032	0.0037
2008	2008-BOS-003	2008-BOS-003	2008-08-25	-	12	-	-	0.005	59	0.619	0.05	0.05	0.002	-	0.002	0.103
2008	BOS-8	BOS-8A	2008-08-25	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-06-30	-	12	-	-	0.005	59	0.619	0.05	0.05	0.002	-	0.002	0.103
2008	BOS-8A	BOS-8A	2008-06-30	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	BOS-8A	BOS-8A	2008-07-14	-	13.7	0.002	-	0.0004	69	0.694	0.0001	0.0004	0.013	0.0002	0.0075	0.099
2008	BOS-8A	BOS-8A	2008-08-29	-	12.3	0.002	-	0.0004	65	0.64	0.0001	0.0004	0.005	0.0003	0.002	0.008
2009	BOS-8A	BOS-8A	2009-06-21	-	6.64	0.0023	-	0.0001	18.5	-	0.0001	0.05	0.0018	0.00028	0.0017	0.0071
2009	BOS-8A	BOS-8A	2009-08-04	-	17.3	0.0034	-	0.0001	102	-	0.0001	0.05	0.0052	0.00015	0.0045	0.0318
2010	BOS-8A	BOS-8A	2010-07-01	-	12.6	0.002	-	0.0001	-	-	0.0001	0.05	0.0029	0.00018	0.0017	0.0049
2011	BOS-8A	BOS-8A	2011-06-23	-	8.93	0.00113	-	0.0001	37	-	0.0001	0.05	0.001	0.00011	0.001	0.0068
2011	BOS-8A	BOS-8A	2011-07-03	-	7.3	0.00041	-	0.000093	51.4	-	0.00005	0.0001	0.00066	0.000047	0.00021	0.0038
2012	BOS-8A	BOS-8A	2012-06-10	-	3.73	0.00072	-	0.00002	11.9	-	0.0001	0.05	0.0029	0.00011	0.001	0.0042
2013	BOS-8A	BOS-8A	2013-06-21	-	10.4	0.00062	-	0.000066	40.5	-	0.0001	0.05	0.0036	0.00058	0.0021	0.0079
2008	BOS-8B	BOS-8B	2008-08-29	-	18.7	0.0021	-	0.0004	96	0.53	0.0001	0.0004	0.005	0.0002	0.0015	0.009
2009	BOS-8B	BOS-8B	2009-06-21	-	9.53	0.0038	-	0.0001	36.5	-	0.0001	0.05	0.001	0.0001	0.001	0.0063
2009	BOS-8B	BOS-8B	2009-08-04	-	23.2	0.0072	-	0.0001	180	-	0.0001	0.05	0.001	0.0001	0.0011	0.0091
2010	BOS-8B	BOS-8B	2010-07-01	-	14.6	0.008	-	0.0004	-	-	0.0004	0.05	0.0024	0.0004	0.002	0.016
2011	BOS-8B	BOS-8B	2011-06-23	-	12	0.00285	-	0.0001	40	-	0.0001	0.05	0.0032	0.0001	0.001	0.0055
2011	BOS-8B	BOS-8B	2011-07-03	-	13.2	0.00238	-	0.000032	54.7	-	0.00005	0.0001	0.00044	0.00002	0.00016	0.0055
2012	BOS-8B	BOS-8B	2012-06-10	-	5.38	0.00054	-	0.000038	16	-	0.0001	0.05	0.001	0.0001	0.001	0.0057
2008	BOS-8C	BOS-8C	2008-08-29	-	42.8	0.017	-	0.004	174	5.83	0.001	0.004	0.05	0.001	0.006	0.04
2009	BOS-8C	BOS-8C	2009-06-21	-	4.94	0.0022	-	0.0001	11.1	-	0.0001	0.05	0.108	0.00011	0.0373	0.0717
2011	BOS-8C	BOS-8C	2011-06-23	-	5.46	0.0004	-	0.0001	22.9	-	0.0001	0.05	0.0012	0.0001	0.001	0.004
2011	BOS-8C	BOS-8C	2011-07-03	-	9.15	0.00137	-	0.00001	48.9	-	0.00005	0.0001	0.0003	0.00001	0.00011	0.003
2012	BOS-8C	BOS-8C	2012-06-10	-	5.95	0.00074	-	0.00002	9.1	-	0.0001	0.05	0.0011	0.0001	0.001	0.0099
2014	BOS8-16JUN14a	BOS8	2014-06-16	-	4.7	0.00078	-	0.000021	14.2	-	<0.0002	<0.0005	0.011	<0.0002	<0.001	<0.005
2014	BOS8-16JUN14b	BOS8	2014-06-16	-	10.5	0.00088	-	0.00005	42	-	<0.0002	<0.0005	0.011	<0.0002	<0.001	<0.005
2014	BOS8-16JUN14c	BOS8	2014-06-16	-	3.1	0.00012	-	0.000842	4.6	-	<0.0002	<0.0005	<0.01	<0.0002	<0.001	<0.005
2014	BOS8-23JUN14a	BOS8	2014-06-23	-	7.7	0.00065	-	0.00003	26.5	-	<0.0002	<0.0005	0.014	0.00035	<0.001	0.0064
2014	BOS8-23JUN14b	BOS8	2014-06-23	-	10.6	0.00038	-	<0.00002	48.3	-	<0.0002	<0.0005	0.013	<0.0002	<0.001	<0.005
2014	BOS8-23JUN14c	BOS8	2014-06-23	-	16.9	0.00271	-	0.000114	50.9	-	<0.0002	<0.0005	0.018	<0.0002	<0.001	0.0071
2014	BOS8-31JUL14	BOS8	2014-07-31	-	5.3	0.001	-	<0.00002	44.4	-	<0.0002	<0.0005	0.019	0.00042	<0.001	0.0053
2015	BOS8A-09AUG15	BOS8	2015-08-09	-	13.5	0.00357	-	<0.00002	23.5	-	<0.0002	<0.0005	<0.01	<0.0002	<0.0005	0.0077
2016	BOS8A-12JUN16	BOS8	2016-06-12	-	7.4	0.000389	-	0.000025	30	-	<0.0002	<0.0005	<0.01	0.00034	<0.0005	<0.005
2015	BOS8A-24AUG15	BOS8	2015-08-24	-	12.9	0.00209	-	0.000032	53.7	-	<0.0002	<0.0005	<0.01	0.00062	0.00052	<0.005
2015	BOS8A-29JUN15	BOS8	2015-06-29	-	8.9	0.000472	-	<0.00002	32.6	-	<0.0002	<0.0005	<0.01	0.00024	<0.0005	<0.005
2014	BOS8A-31JUL14	BOS8	2014-07-31	-	13.2	0.00166	-	0.000026	55.9	-	<0.0002	<0.0005	0.016	0.00067	<0.001	0.0053
2015	BOS8C-09AUG15	BOS8	2015-08-09	-	31.8	0.00884	-	0.000031	46.6	-	<0.0002	<0.0005	<0.01	0.0003	0.0037	<0.005
2016	BOS8C-12JUN16	BOS8	2016-06-12	-	11.8	0.00216	-	0.000163	28.2	-	<0.0002	<0.0005	0.011	0.00025	0.00394	<0.005
2015	BOS8C-24AUG15	BOS8	2015-08-24	-	15.1	0.00464	-	0.000028	43.3	-	<0.0002	<0.0005	<0.01	<0.0002	<0.0005	0.0068
2014	BOS8C-28AUG14	BOS8	2014-08-28	-	12.7	0.00084	-	<0.00002	67.9	-	<0.0002	<0.0005	0.017	0.00042	<0.001	<0.005
2015	BOS8C-29JUN15	BOS8	2015-06-29	-	12.8	0.00218	-	0.000065	28.7	-	<0.0002	<0.0005	<0.01	<0.0002	<0.0005	0.0051
2016	BOS8D-12JUN16a	BOS8	2016-06-12	-	11	0.00167	-	0.000073	26.1	-	<0.0002	<0.0005	<0.01	0.00027	0.00138	0.0213
2016	BOS8D-12JUN16b	BOS8	2016-06-12	-	10.9	0.00159	-	0.000221	25.8	-	<0.0002	<0.0005	0.02	0.00027	0.00691	0.0322
2017	BOS8A-04JUN	BOS-8A	2017-06-04	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	2017-BOS-001	2017-BOS-001	2017-06-04	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	17-BOS-02	BOS-8B	2017-06-06	-	-	-	-	-	-	-	-	-	-	-	-	-
2017	17-BOS-03	17-BOS-03	2017-06-06	-	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-16	0.0155	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-01	BOS8	2018-06-25	0.0384	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-02	18-BOS-02	2018-06-25	0.0507	-	-	-	-	-	-	-	-	-	-	-	-
2018	18-BOS-03	18-BOS-03	2018-06-25	0.0213	-	-	-	-	-	-	-	-	-	-	-	-
2019	BOS8A	BOS-8A	2019-06-29		6.4	0.000411		<0.00002	21.1		<0.00001	<0.0005	<0.01	<0.0002	0.00054	<0.005
2019	19-BOS-01	19-BOS-01	2019-06-29	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	19-BOS-02	18-BOS-02	2019-06-29	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix B – 2019 Boston Ephemeral Streams Monitoring

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Memo

To:	Shelley Potter, TMAC	**Client:**	TMAC Resources Inc.
From:	Derrick Midwinter Lisa Barazzuol	**Project No:**	1CT022.037
Cc:	Oliver Curran, TMAC Ashley Mathai, TMAC	**Date:**	March 17, 2020
Subject:	Boston Ephemeral Stream Monitoring 2019		

1 Introduction

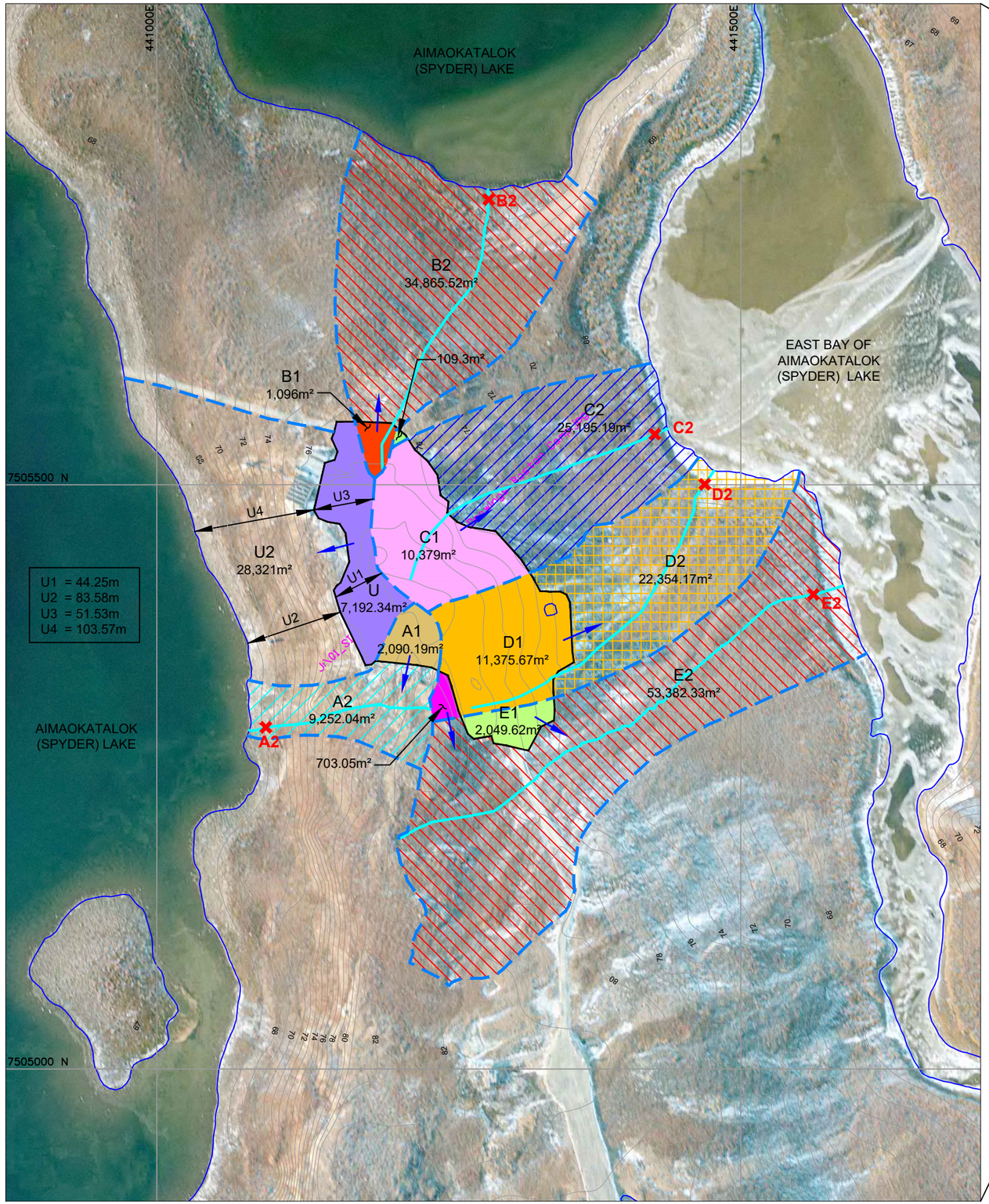
At the Boston site, ore and waste rock were generated as part of a 1996-1997 BHP Billiton underground exploration program. The ore was placed in a number of stockpiles on the camp pad and the waste rock was used to construct a camp pad, roads, and an airstrip at Boston. The ore/waste rock and associated runoff are managed as part of Water License 2AM-BOS1835 (Nunavut Water Board (NWB) 2018), and the Hope Bay Project Water and Ore/Waste Rock Management Plan for the Boston Site (SRK 2017).

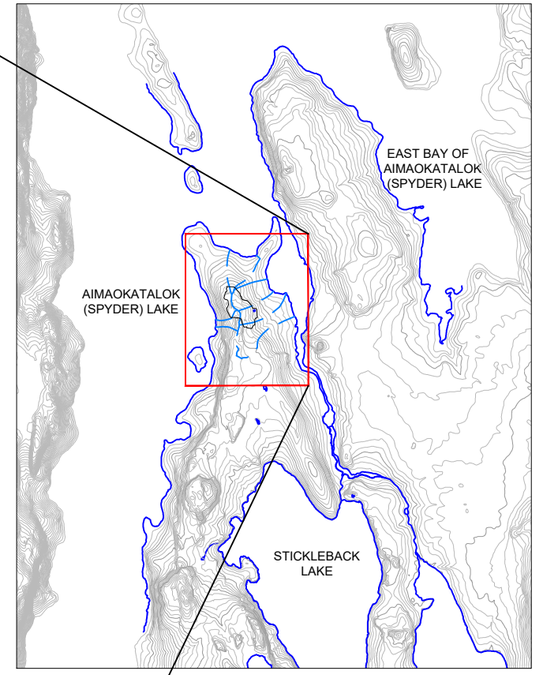
As recommended in the Hope Bay Project Water and Ore/Waste Rock Management Plan for the Boston Site (SRK 2017), ephemeral streams downgradient of the waste rock pile have been monitored during spring freshet since 2009 to monitor seepage downgradient of the Boston camp pad and to provide an indication of whether contaminants of potential concern from the ore and waste rock piles are reaching the shoreline of Aimaokatalok Lake. This memo presents the results of the 2019 ephemeral streams monitoring program.

2 Methods

2.1 Sample Collection

Five ephemeral stream sites have been identified in previous surveys of the area, as shown in Figure 1. TMAC Resources surveyed each of these sites for flow on June 29, 2019. Flow was observed at stations A2, D2 and E2 only. Field measurements included pH, electrical conductivity (EC), oxidation-reduction potential (ORP), temperature and flow rate at one station. The other stations had too shallow and fragments flow to measure accurately. The water quality samples were collected from stations A2, D2 and E2 and submitted by TMAC for laboratory testing at ALS Environmental (ALS) in Burnaby, British Columbia for pH, EC, total dissolved solids, total alkalinity, anions (bromide, chloride, fluoride, and sulphate), nutrients (nitrate, nitrite, ammonia and phosphorus) and dissolved metals (filtered and preserved in the field). The quality assurance and quality control (QA/QC) sampling program included the collection of one field duplicate and one field blank.





Legend

	Contours (1m)		Catchment Boundary
	Ephemeral streams		Flow direction
	Camp pad perimeter		
A2, B2, C2, D2, E2, U2	Dilution Zone (Hatch)	25,195.19m²	Catchment Areas
		C2	Ephemeral Stream Sampling Station

1:4000

0 50 100 150 200 Metres

srk consulting

SRK JOB NO.: 1CT022.037

FILE NAME: Boston_Catchments_20160324.dwg

TMAC Resources

Hope Bay Project

Boston Ephemeral Stream Monitoring

Ephemeral Stream Monitoring Locations

DATE:	APPROVED:	FIGURE:
Jan. 2020	MCN	1

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2.2 Quality Assurance and Control

One field duplicate and one field blank were collected as part of the QA/QC program. The QA/QC review of all data was conducted by SRK. In addition, ALS carried out its own QA/QC checks which were deemed acceptable.

Ion charge balances ranged from -3.8 to -1.5% for the four samples. These were deemed acceptable as they comply with SRK's criteria of ±10%.

Both the field conductivity and lab conductivity, and field pH and lab pH for collected samples were within the SRK criteria of an RPD ±30%.

The field duplicate (19-EPH-E2-DUP) was collected at E2. As per SRK's criteria, less than 10% of the parameters (with concentrations above 10 times the detection limit) had relative percent difference (RPD) values of over 30%, indicating a high reproducibility of sampling and low heterogeneity in the stream.

Field blanks typically indicate field contamination either due to sampling or environmental influences such as dust and ambient water. No dissolved metals were detected in the field blank; therefore, the field blank passed SRK's criteria. SRK considered all data acceptable.

3 Results

3.1 Field Observations

Table 1 presents a comparison of field parameters for ephemeral streams A2, D2 and E2 from 2019 to the historical data set. Consistent with previous years, field pH values were slightly alkaline or neutral. EC at D2 (1,400 µS/cm) was higher than A2 and E2 (250 and 530 µS/cm, respectively). The flowrate measured at A2 on June 29 was an order of magnitude lower than historical flowrates. All other field parameters are within historical ranges.

Table 1: Comparison of 2019 Field Observations to Historic Monitoring Data (2009-2018)

Ephemeral Stream			Field pH	Field EC	ORP	Temperature	Flow
			s.u.	*µS/cm*	*mV*	*°C*	*L/s*
A2	Sample Date	June 2019	8.2	250	22	19	0.008
	Statistic	P5	7.5	130	63	4.2	0.053
		P50	7.8	270	130	6.7	0.074
		P95	8	570	260	16	0.39
		n	7	7	7	7	4
D2	Sample Date	June 2019	7.6	1400	31	17	n/a
	Statistic	P5	6.5	160	45	2.9	0.41
		P50	6.7	810	200	3.8	0.69
		P95	7.2	2000	370	16	0.97
		n	7	7	7	7	2
E2	Sample Date	June 2019	7.6	530	20	15	n/a
	Statistic	P5	7.1	130	110	2.7	0.73
		P50	7.3	630	320	4.2	2.8
		P95	7.5	720	370	13	4.8
		n	7	7	7	7	2

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Note:

Flowrate was too low to measure at D2 and E2; n = sample count

3.2 Laboratory Results

A summary of water quality results for 2019 is provided in Table 2. Full results of the 2019 water quality data are presented in Attachment 1. Parameters identified by SRK (2009) as potential parameters of concern are presented in Figure 2 to Figure 9. Values below the detection limit are graphed as being at the detection limit. Lines are included in the figure for ease of trend identification; however, samples from each ephemeral stream are not necessarily collected from the same location each year.

Table 2: Summary of Water Quality Results for Stations A2, D2 and E2, 2009 to 2019

Sample ID	Year	General Parameters		Anions and Nutrients					Dissolved Metals								
		pH	EC	Alkalinity, Total	Ammonia	Nitrate	Sulphate	Chloride	Aluminum	Arsenic	Cadmium	Copper	Iron	Lead	Nickel	Selenium	Zinc
		s.u.	µS/cm	mg/L as $CaCO_3$	mg/L as N	mg/L as N	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
A2	2012	7.9	740	44	0.0077	0.31	43	180	0.0045	0.018	<0.00001	0.0009	<0.01	0.0001	0.004	<0.0001	0.0029
	2013	7.8	590	33	0.013	0.052	57	130	0.02	0.021	<0.00001	0.0014	0.052	0.000068	0.0047	<0.0001	0.0018
	2014	7.8	310	38	<0.005	<0.005	27	58	0.0027	0.036	<0.00001	0.0013	<0.01	<0.00005	0.018	<0.0001	0.0022
	2015	7.9	210	44	0.011	0.0083	24	22	0.0071	0.075	<0.000005	0.00099	<0.01	<0.00005	0.0039	<0.00005	0.0023
	2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2017	8.0	270	67	<0.0050	0.017	27	26	0.01	0.022	<0.0000050	0.0015	<0.010	<0.000050	0.015	0.000053	0.0017
	2018 (06-16)	7.8	670	51	0.0065	0.47	240	31	0.014	0.0038	0.000013	0.0022	0.015	<0.00005	0.0088	0.00046	0.0016
	2018 (06-25)	8.0	530	63	0.0078	0.088	77	80	0.0081	0.019	0.0000055	0.0017	0.011	<0.00005	0.01	0.000065	0.001
	2019	8.0	250	52	0.0064	0.013	35	22	0.013	0.035	<0.000005	0.0017	0.012	<0.00005	0.0096	0.000078	<0.001
D2	2009	6.7	--	25	0.024	4	200	460	0.012	<0.002	<0.000085	0.0016	<0.03	<0.00025	0.0053	<0.006	<0.005
	2010	--	--	30	0.03	2.1	220	550	0.0057	<0.003	<0.00025	0.0014	<0.03	<0.00025	0.0083	<0.005	<0.005
	2011	7.3	--	29	0.12	1	63	190	0.0063	0.0024	<0.000050	0.00076	<0.030	<0.000050	0.0058	0.0015	<0.0030
	2012	7.6	1500	31	0.0065	0.3	160	370	0.0067	0.00093	0.000016	0.001	<0.010	<0.000050	0.006	0.00077	0.0025
	2013	7.4	1600	35	0.0069	0.12	190	420	0.0066	0.0012	0.000026	0.00092	0.021	<0.000050	0.0069	0.00056	0.0034
	2014	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2015	7.7	1300	42	0.018	0.31	250	250	0.0031	0.0014	0.0000094	0.0011	0.011	<0.00005	0.0085	0.00062	0.0043
	2016	7.6	550	49	0.0075	<0.005	85	83	0.017	0.001	<0.000050	0.0011	0.02	<0.00005	0.0034	0.000063	0.0024
	2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2019	7.9	1400	57	0.0051	2.7	480	170	0.0083	0.0065	0.000025	0.0013	<0.01	<0.00005	0.03	0.0014	<0.001
E2	2009	7.0	--	43	0.022	2.2	48	170	0.016	<0.002	0.000063	0.003	<0.03	0.000068	0.006	<0.001	0.0055
	2010	--	--	59	<0.005	<0.005	50	140	0.0076	0.0016	<0.00005	0.001	<0.03	<0.00005	0.0029	<0.001	<0.001
	2011	7.7	--	36	0.023	0.02	34	48	0.01	0.002	<0.00005	0.001	<0.03	<0.00005	0.0018	<0.001	<0.003
	2012	7.8	380	43	<0.005	<0.005	50	59	0.013	0.00099	<0.00001	0.0018	0.014	<0.00005	0.003	<0.0001	0.0015
	2013	7.7	670	47	0.0055	<0.005	110	120	0.0075	0.0013	<0.00001	0.0012	0.01	<0.00005	0.0028	<0.0001	0.0011
	2014	7.6	440	46	0.0051	<0.005	83	62	0.0089	0.0013	<0.00001	0.0013	0.012	<0.00005	0.0026	<0.0001	0.0037
	2015	7.8	560	49	0.01	<0.005	110	77	0.013	0.00095	<0.000005	0.0014	0.016	<0.00005	0.0029	0.000072	0.0019
	2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2018	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2019	7.7	500	58	0.0073	<0.005	120	51	0.013	0.0019	0.000022	0.0015	0.014	<0.00005	0.0054	0.000054	0.0012

Source: X:\Projects\01_SITES\Hope.Bay\1CT022.037_2019 Geochem Compliance\Task 135 Boston Eph Streams\1. Working file\1CT022.037-135_2019EphemeralStreams_Working_Rev02_JCE.xlsx

A summary of the 2019 water quality data at A2, D2 and E2 is as follows:

- Sulphate concentrations ranged from 35 to 480 mg/L and at D2 and E2 were greater than the historical maximum observed in previous years (Figure 2). Sulphate values have oscillated for A2 and D2 whereas E2 has increased slightly since 2009. Higher sulphate concentrations were observed during periods of low flow resulting in lower sulphate loading rates (e.g. mg SO_4/s) compared to samples collected with higher flow rates and lower sulphate concentrations (e.g. D2 in 2011 and 2016, Table 2), suggesting that concentration is related to dilution from surface waters.
- Alkalinity levels at A2, D2 and E2 ranged from 52 to 58 mg/L and were within the range of historical levels.
- Chloride concentrations were uniformly low at A2 and E2 (22 and 51 mg/L, respectively), and higher at D2 (170 mg/L) and were within the historical range of data. Chloride concentrations for ephemeral streams exhibit a decreasing trend (Figure 3).
- Copper concentrations (ranging from 0.0013 to 0.0017 mg/L) were within the range of historical data and have remained stable since 2011 (Figure 4).
- Nitrate concentrations were low for A2 (0.013 mg/L) and E2 (<0.005 mg/L), and two orders of magnitude greater for D2 (2.7 mg/L). All values were within the historical range of data and have remained stable since 2009 (Figure 5).
- Arsenic concentrations at A2 (0.035 mg/L), D2 (0.0065 mg/L) and E2 (0.0019 mg/L) were within the range of historical concentrations. Arsenic values have oscillated for A2 whereas D2 and E2 have remained stable since 2009.
- Iron concentrations ranged from <0.01 to 0.014 mg/L. Values were within the range of the historical data and have remained stable since 2014 (Figure 7).
- Nickel concentrations (Figure 8) observed were within the range of historical data with the exception of sample D2, which had nickel concentration (0.03 mg/L) greater than the historical maximum concentration observed in 2015 (0.0085 mg/L). Nickel values have oscillated for A2 and D2 whereas E2 has remained stable since the start of monitoring.
- Selenium concentrations (Figure 9) were between 0.000078 and 0.0014 mg/L and within the range of historical data. Values have remained stable since 2012.
- Concentrations of the remaining dissolved metals presented in Table 2 were within the range of historical data.

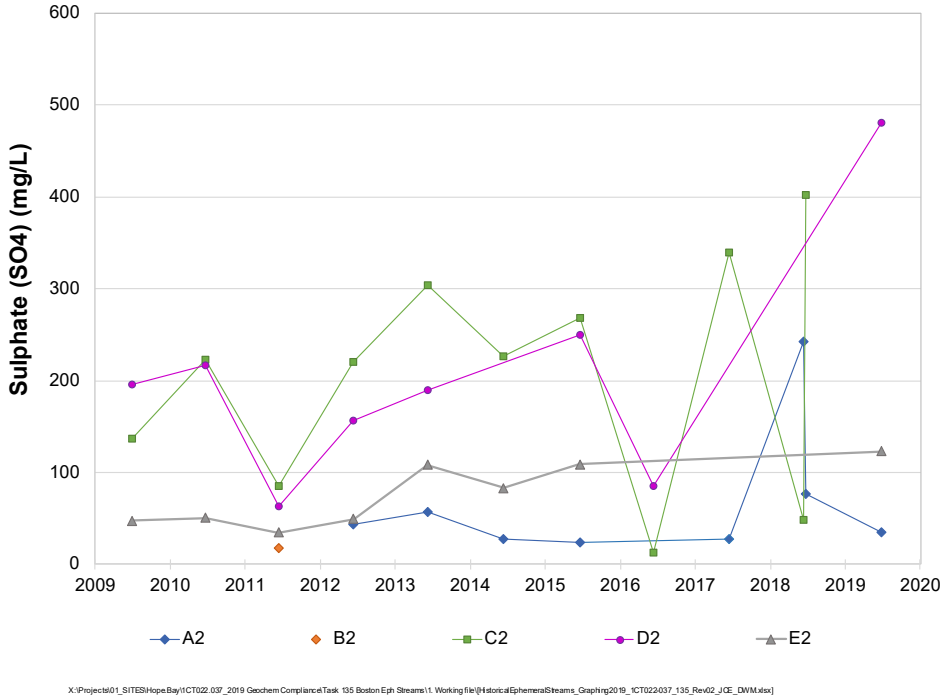


Figure 2: Ephemeral Stream Sulphate Concentrations

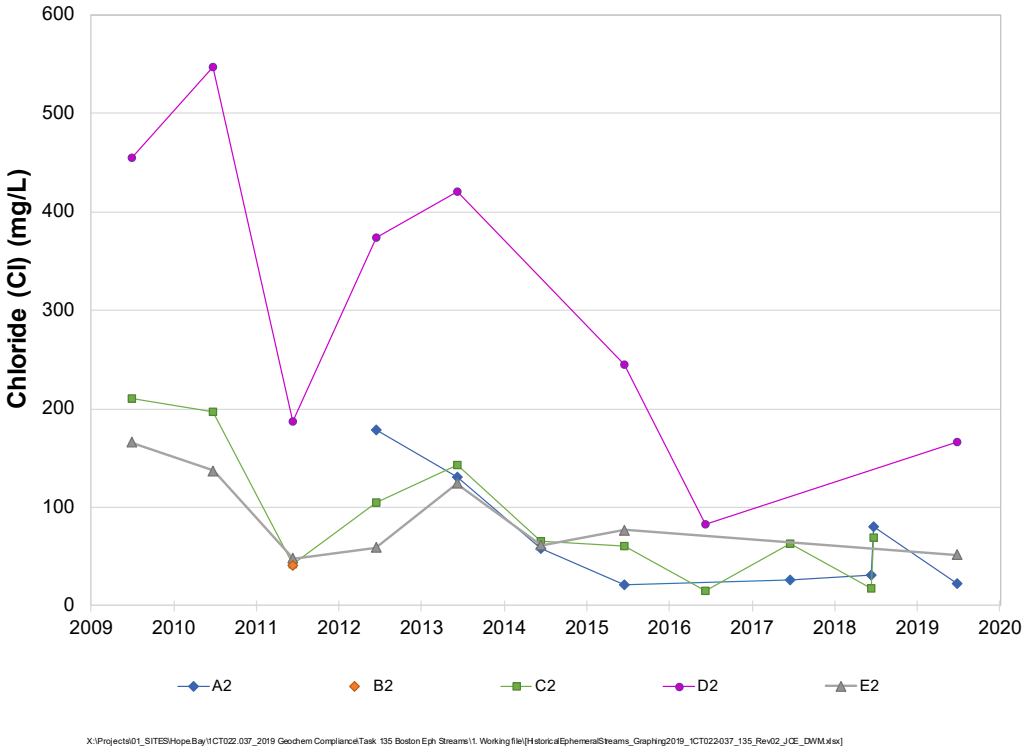


Figure 3: Ephemeral Stream Chloride Concentrations

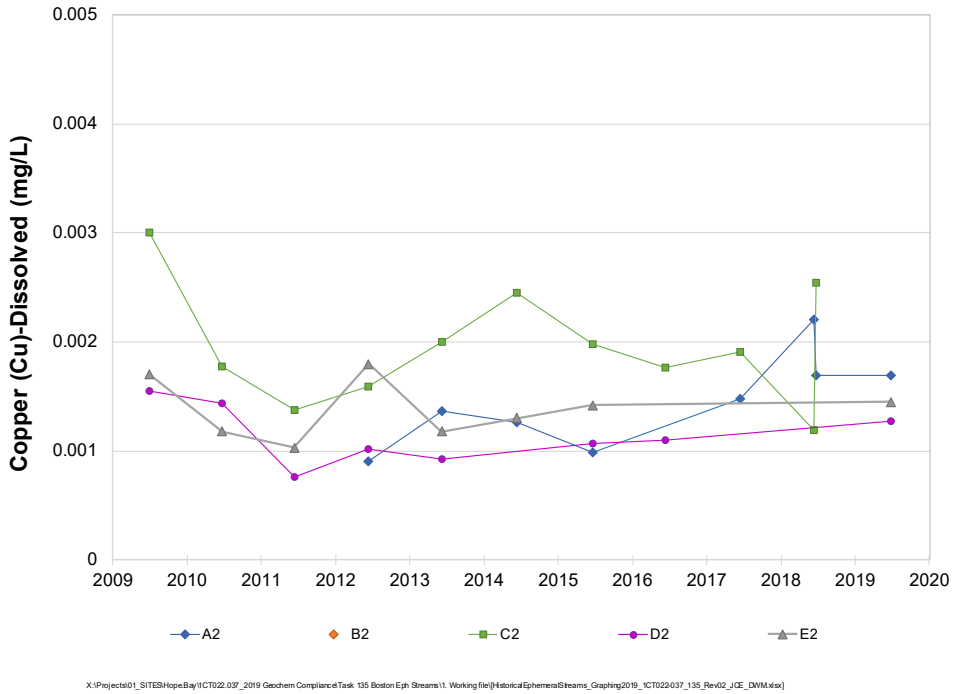


Figure 4: Ephemeral Streams Copper Concentrations

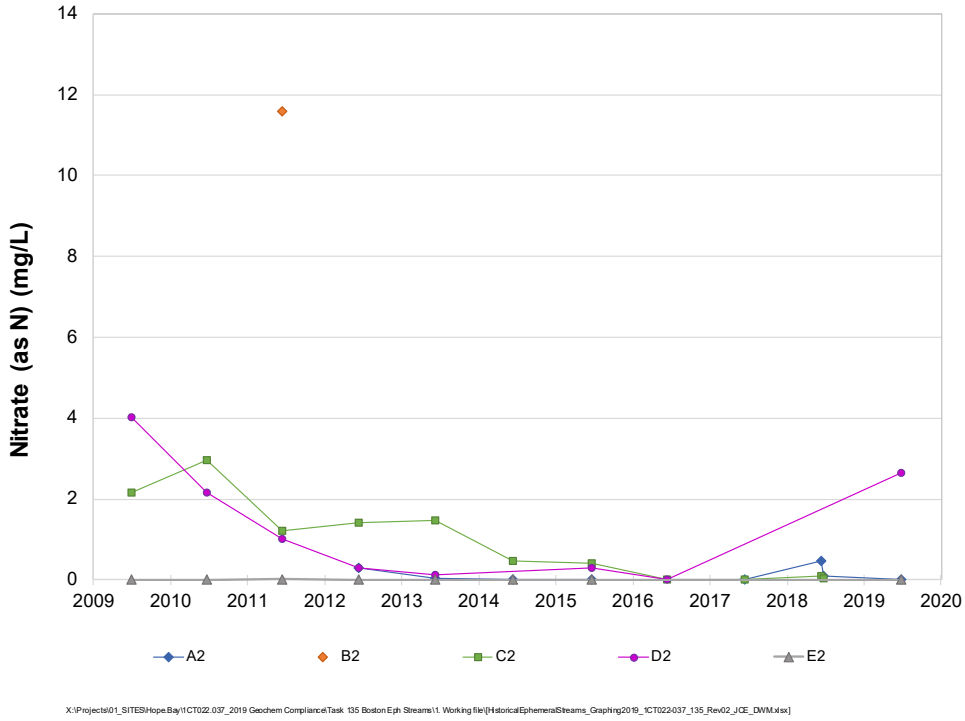


Figure 5: Ephemeral Streams Nitrate Concentrations

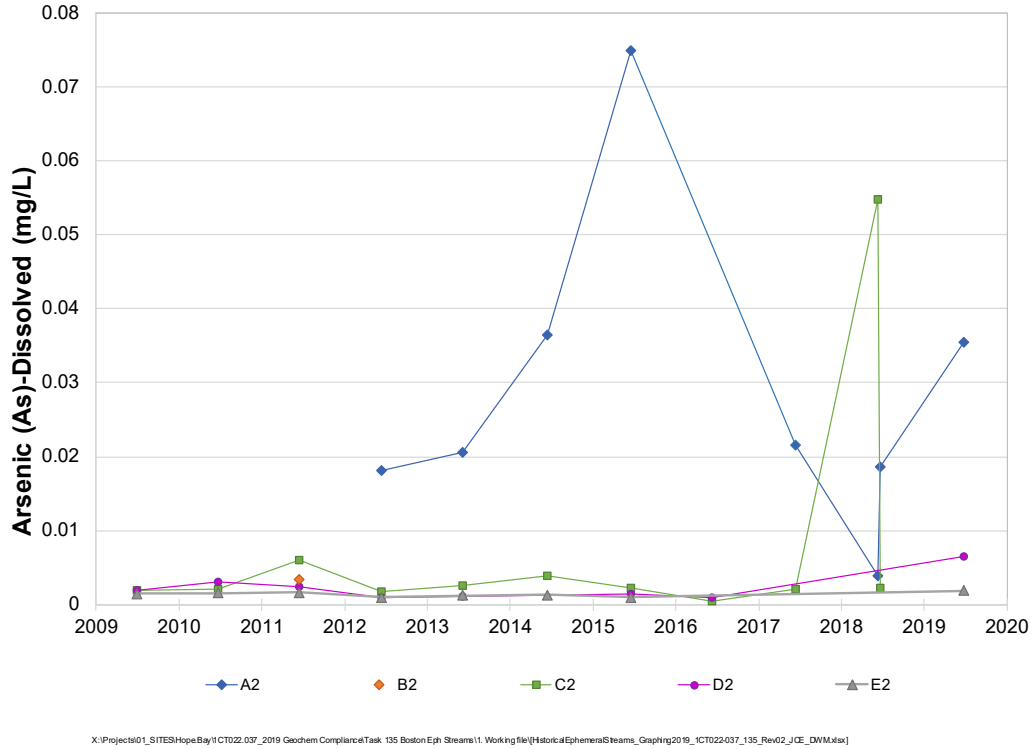


Figure 6: Ephemeral Streams Arsenic Concentrations

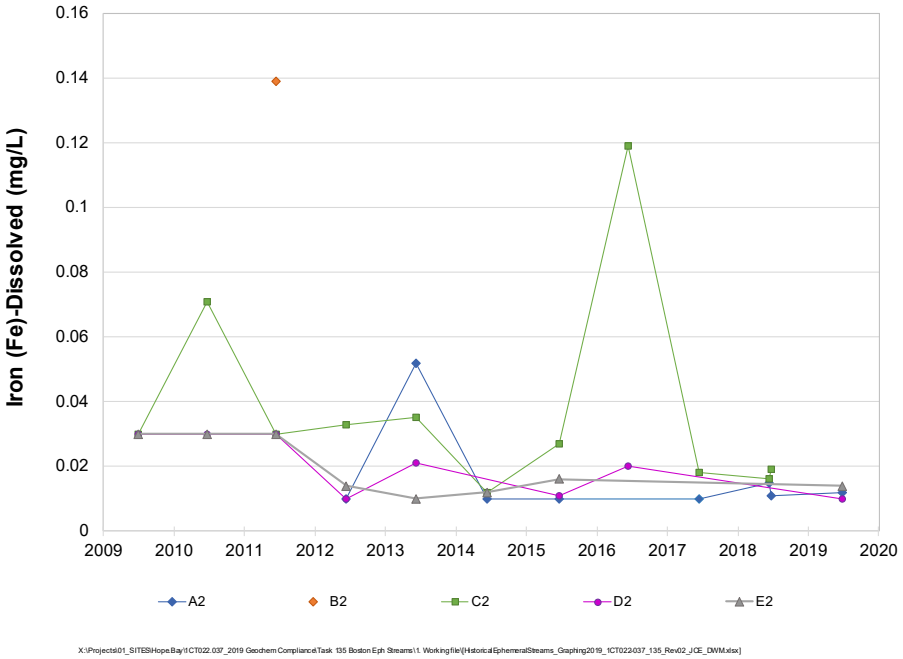


Figure 7: Ephemeral Streams Iron Concentrations

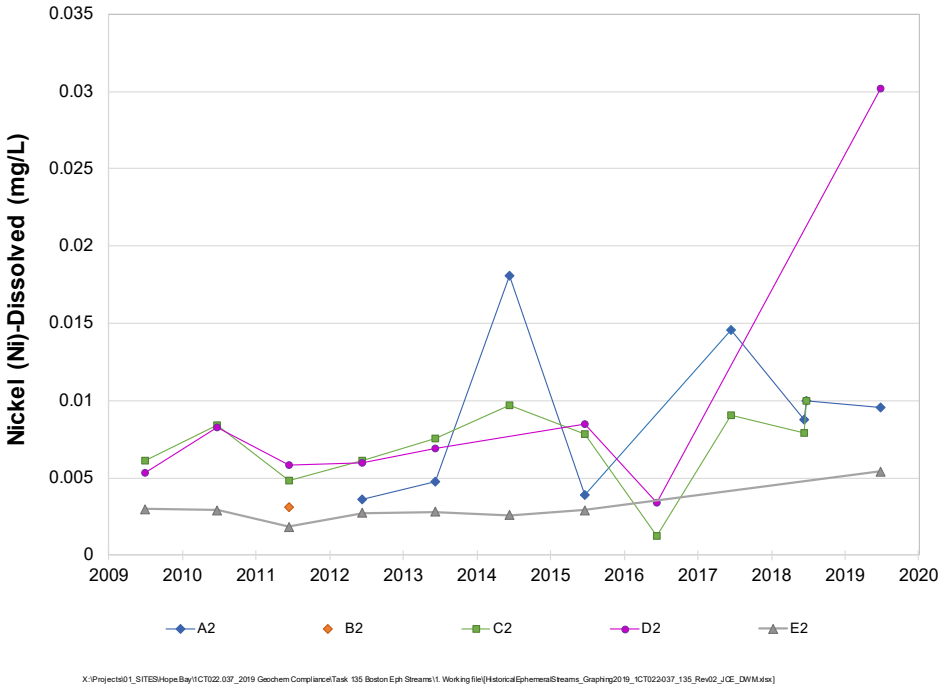


Figure 8: Ephemeral Streams Nickel Concentrations

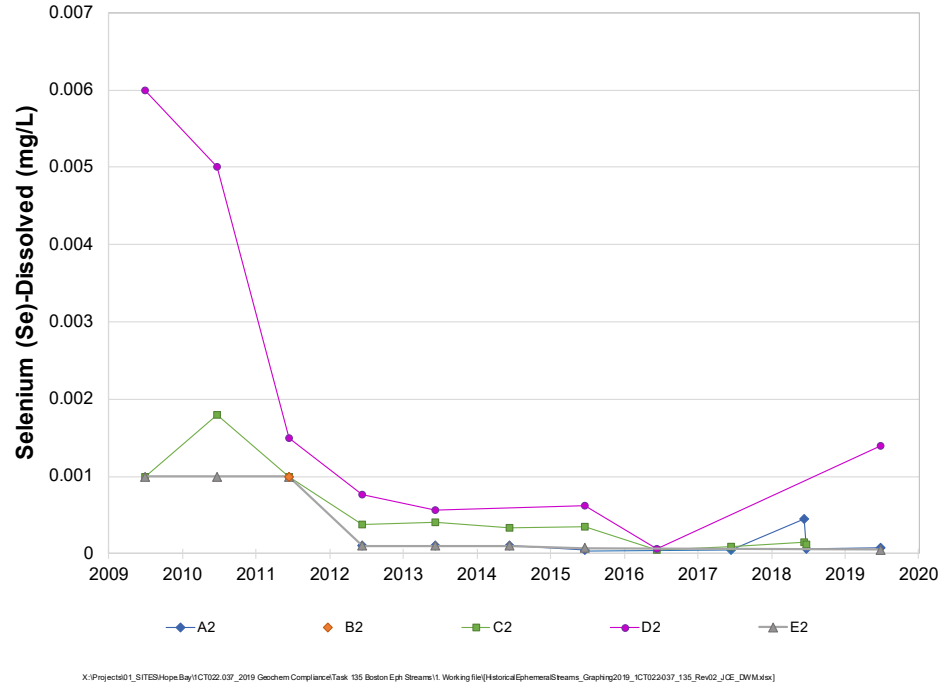


Figure 9: Ephemeral Streams Selenium Concentrations

4 Discussion

Seepage chemistry predictions were made as part of the former Boston Water and Ore/Waste Rock Management Plan (Supporting Document B of SRK 2009). The report calculated average and maximum predicted concentrations of sulphate, chloride, nitrate, arsenic, copper, iron, nickel and selenium that may be expected to discharge from the ore stockpile. Table 3 presents these model predictions for the ephemeral streams compared to the 2019 concentrations of these parameters.

At D2 and E2, sulphate concentrations observed in 2019 exceeded the maximum modeled values; however, as discussed in Section 3.2, higher concentrations are observed with lower flow samples and have lower sulphate loading rates than lower concentration samples with higher flow. Additionally, according to TMAC, in September 2018, repairs to a berm might have disturbed ore material which may have contributed an increase in sulphate within ephemeral streams catchment D2 (Figure 1), and there was no water discharged to catchment D2 or E2 during the monitoring period. Further monitoring will establish sulphate trends at D2 and E2. All other 2019 monitoring data were below maximum predicted values at streams A2, D2 and E2.

Table 3: Comparison of 2019 Water Quality Results to Model Predictions (SRK 2009)

Parameters	Units	Predicted Value			Max Predicted Value			2019 Measure Values		
		A2	D2	E2	A2	D2	E2	A2	D2	E2
Chloride	mg/L	95	140	160	360	560	640	22	170	51
Nitrate (as N)	mg/L	3.4	6.3	0.68	9.2	17	2.0	0.013	2.7	<0.0050
Sulphate	mg/L	70	130	15	120	220	25	35	**480**	**120**
Arsenic	mg/L	0.03	0.056	0.0063	0.063	0.1	0.013	0.035	0.0065	0.0019
Copper	mg/L	0.0026	0.0028	0.0017	0.0033	0.005	0.002	0.0017	0.0013	0.0015
Iron	mg/L	0.41	0.44	0.37	0.89	1.3	0.46	0.012	<0.010	0.014
Nickel	mg/L	0.095	0.17	0.02	0.32	0.59	0.065	0.0096	0.03	0.0054
Selenium	mg/L	0.0015	0.0024	0.0007	0.0035	0.0061	0.0011	0.000078	0.0014	0.000054

Source: P:\01_SITES\Hope.Bay\1CH008.022 Boston WR Management Plan\Boston Ephemeral Streams\2018\3. Working file\[2018EphemeralStreams_Working_1CT022-027_Rev00_MCN.xlsx]

Note – Underlined and bolded value indicates measured values greater than the maximum predicted value

5 Conclusions and Recommendations

Nitrate, sulphate, arsenic, copper, iron, nickel and selenium were identified by the water and load balance as potential contaminants of concern (SRK 2009). Monitoring of the ephemeral streams A2, B2, C2, D2 and E2 (Attachment 1) was initiated in 2009. In 2019, flow was observed, and samples collected on June 29 from A2, D2 and E2.

Field pH values were slightly alkaline or neutral. The flowrate measured at A2 was an order of magnitude lower than historical flowrates. All other field parameters are within historical ranges.

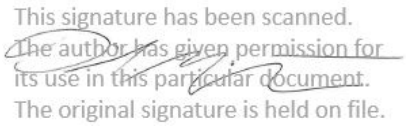
Sulphate values have oscillated for A2 and D2 whereas E2 has increased slightly since 2009. Chloride concentrations for ephemeral streams exhibit a decreasing trend. Nickel and arsenic values have oscillated for A2 and D2 whereas E2 has remained stable since the start of monitoring. Nitrate, copper, iron and selenium have stable trends.

Compared to SRK (2009) model predictions, the 2019 monitoring data were below maximum predicted values for chloride, nitrate, arsenic, copper, iron, nickel and selenium at streams A2, D2 and E2. At D2 and E2, maximum sulphate concentrations observed in 2019 exceeded the maximum modeled values. Further monitoring will establish sulphate trends.

Sulphate and chloride are not attenuated by the tundra and the concentrations measured in 2019 validate the 2009 water and load balance. The concentrations observed in the ephemeral streams indicate that the tundra continues to effectively attenuate contaminants of concern such as arsenic and selenium and the breakthrough of the effectiveness of the attenuation process has not occurred. SRK recommends continued monitoring of the ephemeral stream sampling sites as outlined in SRK (2017).

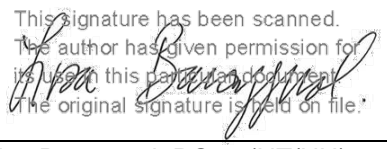
Regards,

SRK Consulting (Canada) Inc.



Derrick Midwinter, PGeo (ON)
Staff Consultant

Reviewed by



Lisa Barazzuol, PGeo (NT/NU)
Principal Consultant

6 References

Nunavut Water Board, 2018. Water Licence No: 2AM-BOS1835. December 2018.

SRK Consulting (Canada) Inc., 2009. Water and Ore/Waste Rock Management Plan for the Boston Site Hope Bay Project, Nunavut. Report 1CH008.022 for Hope Bay Mining Ltd. July 2009.

SRK Consulting (Canada) Inc., 2017. Water and Ore/Waste Rock Management Plan for the Boston Site, Hope Bay Project, Nunavut. Report 1CT022.009 for TMAC Resources Inc. January 2017.

Attachment 1: 2019 Water Quality Results

Attachment 1: 2019 Water Quality Results

Sample	Date	Start time	Coordinates (E)	Coordinates (N)	Description of location	Field measurements	Conductivity	ORP	Temp.	ALS Sample ID	Conductivity	Hardness (as CaCO3)	pH
						pH				unit	µS/cm	mg/L	s.u.
						s.u.	µS/cm	mV	ºC	detection limit	2	0.5	0.1
19-EPH-A2	2019-06-29	13:50:00	441091	7505330	Sample taken upstream from lake in small pool	8.2	251	22	18.8	L2301883-1	248	103	7.97
19-EPH-D2	2019-06-29	12:35:00	441397	7505440	Sample taken 94m up from GPS point. Lake levels high.	7.6	1403	31	16.9	L2301883-2	1430	737	7.9
19-EPH-E2	2019-06-29	11:50:00	441470	7505373	Sample taken 97m up from GPS point. Lake levels high.	7.6	533	20	15	L2301883-3	500	228	7.69
19-EPH-E2-DUP	2019-06-29	11:50:00	-	-	-	-	-	-	-	L2301883-4	505	240	7.7
FIELD BLANK 1	2019-06-29	11:50:00	-	-	-	-	-	-	-	L2301883-5	<2.0	<0.50	5.38

Attachment 1: 2019 Water Quality Results

Sample	Total Suspended Solids	Total Dissolved Solids	Acidity (as CaCO3)	Alkalinity, Total (as CaCO3)	Ammonia, Total (as N)	Bromide (Br)	Chloride (Cl)	Fluoride (F)	Nitrate (as N)	Nitrite (as N)	Phosphorus (P)-Total	Sulfate (SO4)	Aluminum (Al)-Dissolved	Antimony (Sb)-Dissolved	Arsenic (As)-Dissolved	Barium (Ba)-Dissolved	Beryllium (Be)-Dissolved	Bismuth (Bi)-Dissolved	Boron (B)-Dissolved	Cadmium (Cd)-Dissolved
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	3	1	1	1	0.005	0.05	0.5	0.02	0.005	0.001	0.002	0.3	0.001	0.0001	0.0001	0.00005	0.00002	0.00005	0.01	0.000005
19-EPH-A2	<3.0	180	1.9	52.2	0.0064	<0.050	22.2	0.029	0.0133	0.0013	0.0087	34.7	0.0128	0.00112	0.0354	0.00638	<0.000020	<0.000050	0.044	<0.0000050
19-EPH-D2	8.1	1270	2.6	56.8	0.0051	0.39	166	<0.10	2.66	0.0053	0.0086	481	0.0083	0.0108	0.00647	0.0474	<0.000020	<0.000050	0.144	0.0000251
19-EPH-E2	4.3	406	3.2	57.5	0.0073	0.057	51.4	0.039	<0.0050	<0.0010	0.0101	123	0.0125	0.00066	0.0019	0.0318	<0.000020	<0.000050	0.036	0.0000223
19-EPH-E2-DUP	<3.0	422	2.6	57.4	0.0513	0.084	51.6	0.04	<0.0050	<0.0010	0.0108	123	0.0127	0.00067	0.00182	0.0328	<0.000020	<0.000050	0.037	0.0000264
FIELD BLANK 1	<3.0	<10	2	<1.0	<0.0050	<0.050	<0.50	<0.020	<0.0050	<0.0010	<0.0020	<0.30	<0.0010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000050	<0.010	<0.0000050

Attachment 1: 2019 Water Quality Results

Sample	Calcium (Ca)-Dissolved	Chromium (Cr)-Dissolved	Cobalt (Co)-Dissolved	Copper (Cu)-Dissolved	Iron (Fe)-Dissolved	Lead (Pb)-Dissolved	Lithium (Li)-Dissolved	Magnesium (Mg)-Dissolved	Manganese (Mn)-Dissolved	Mercury (Hg)-Dissolved	Molybdenum (Mo)-Dissolved	Nickel (Ni)-Dissolved	Phosphorus (P)-Dissolved	Potassium (K)-Dissolved	Selenium (Se)-Dissolved	Silicon (Si)-Dissolved	Silver (Ag)-Dissolved	Sodium (Na)-Dissolved	Strontium (Sr)-Dissolved
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	0.05	0.0001	0.0001	0.0002	0.01	0.00005	0.001	0.1	0.0001	0.000005	0.00005	0.0005	0.05	0.1	0.00005	0.05	0.00001	0.05	0.0002
19-EPH-A2	27.6	<0.00010	0.00025	0.00169	0.012	<0.000050	0.0048	8.19	0.00083	<0.0000050	0.000363	0.00958	<0.050	1.69	0.000078	0.418	<0.000010	8.34	0.193
19-EPH-D2	203	<0.00010	0.00419	0.00127	<0.010	<0.000050	0.022	55.8	0.00584	<0.0000050	0.000894	0.0302	<0.050	11.2	0.0014	2.12	0.000021	29.2	1.34
19-EPH-E2	58.8	0.00017	0.00359	0.00145	0.014	<0.000050	0.0056	19.8	0.452	<0.0000050	0.000444	0.00541	<0.050	1.71	0.000054	2.04	<0.000010	15.3	0.371
19-EPH-E2-DUP	62.8	0.00015	0.00361	0.00155	0.013	<0.000050	0.0056	20.3	0.467	<0.0000050	0.000398	0.00571	<0.050	1.73	0.000062	2.07	<0.000010	15.7	0.368
FIELD BLANK 1	<0.050	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	<0.0010	<0.10	<0.00010	<0.0000050	<0.000050	<0.00050	<0.050	<0.10	<0.000050	<0.050	<0.000010	<0.050	<0.00020

Attachment 1: 2019 Water Quality Results

Sample	Sulfur (S)-Dissolved	Thallium (Tl)-Dissolved	Tin (Sn)-Dissolved	Titanium (Ti)-Dissolved	Uranium (U)-Dissolved	Vanadium (V)-Dissolved	Zinc (Zn)-Dissolved	Zirconium (Zr)-Dissolved
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	0.5	0.00001	0.0001	0.0003	0.00001	0.0005	0.001	0.0003
19-EPH-A2	11.5	<0.000010	<0.00010	<0.00030	0.000021	<0.00050	<0.0010	<0.00030
19-EPH-D2	166	<0.000010	<0.00010	<0.00030	0.000028	<0.00050	<0.0010	<0.00030
19-EPH-E2	41.1	<0.000010	<0.00010	0.00035	0.00001	<0.00050	0.0012	<0.00030
19-EPH-E2-DUP	42.1	<0.000010	<0.00010	0.00042	<0.000010	<0.00050	0.0011	<0.00030
FIELD BLANK 1	<0.50	<0.000010	<0.00010	<0.00030	<0.000010	<0.00050	<0.0010	<0.00030