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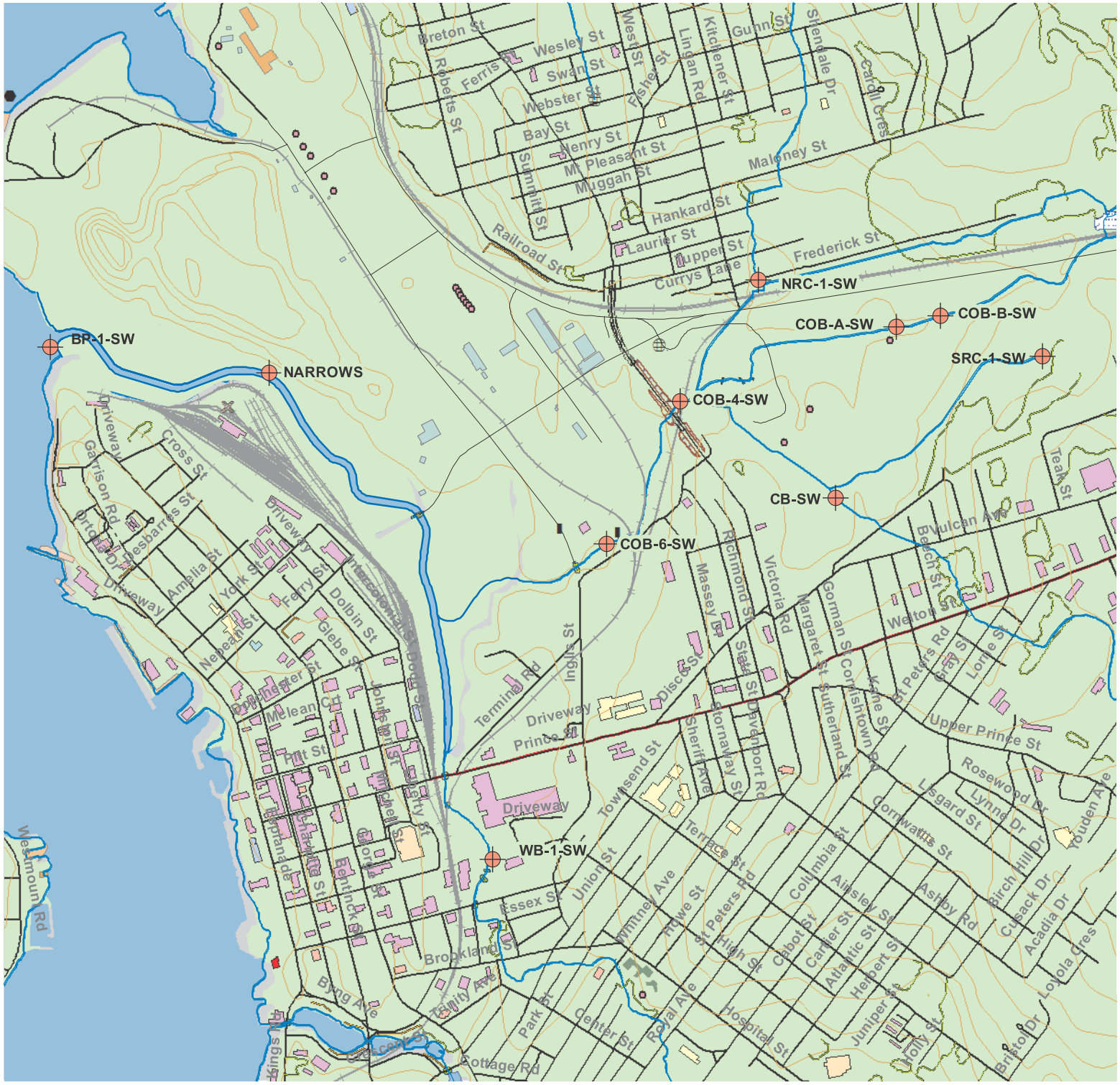
Long Term Maintenance and Monitoring
Semi-Annual Surface Water Quality Monitoring Program - Summer 2019
Final Report

Following completion of the Sydney Tar Ponds and Coke Ovens Remediation Project, surface water quality monitoring was implemented as part of the long term maintenance and monitoring (LTMM) program to provide ongoing data and compliance commitments to regulatory agencies and/or stakeholders. Nova Scotia Lands (NS Lands) is a Crown Corporation of the Province of Nova Scotia responsible for the LTMM semi-annual surface water quality program. NS Lands retained Dillon Consulting Limited (Dillon) to conduct the summer (July 2019) LTMM Surface Water Quality Monitoring Program, the details of which are provided herein.

PROJECT METHODOLOGY

The summer surface water quality monitoring program, which was completed on July 29, 2019, was scheduled to consist of the collection of surface water samples at ten stations (i.e., CB-SW, NRC-1-SW, SRC-1-SW, COB-A-SW, COB-B-SW, COB-4-SW, COB-6-SW, WB-1-SW, Narrows and BP-1-SW) (see Figure 1). A GPS unit was used to confirm that the monitoring locations sampled as part of the LTMM surface water quality monitoring program were the same as those used during historical surface water monitoring events (i.e., the Environmental Effects Monitoring and Surface Water Monitoring (EEMSWM) Program associated with the Sydney Tar Ponds remediation and past LTMM program events). Tasks associated with the summer 2019 surface water monitoring included:

- Documenting ecological activity in the surface water bodies, if observed;
- Recording of physical conditions and potential contaminants (i.e., debris, precipitate);
- Measurement of field parameters (e.g., pH, conductivity, temperature, salinity and turbidity);
- Flow calculation; and,
- Collection of surface water samples for polycyclic aromatic hydrocarbons (PAHs), general chemistry and total metals (including mercury) (RCApMS) analysis. As concentrations of petroleum hydrocarbons (PHC) and polychlorinated biphenyls (PCBs) had historically remained below laboratory detection limits, the surface water program was modified in July 2016 to consist of PAH and RCApMS analysis only (following approval from Nova Scotia Environment (NSE) and NS Lands).



LONG TERM MAINTENANCE
AND MONITORING
SURFACE WATER QUALITY MONITORING PROGRAM

SURFACE WATER LOCATIONS
FIGURE 1

LEGEND

Surface Water Locations

0 100 200 400 600 m

MAP DRAWING INFORMATION:
Province of Nova Scotia Mapping

MAP CREATED BY: SCM
MAP CHECKED BY: NJW
MAP PROJECTION: NAD 1983 UTM Zone 20N

FILE LOCATION: \\DILLON.CA\DILLON_DFS\SYDNEY
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PROJECT: 14-1360

DILLON CONSULTING

A summary of the surface water stations included in the summer 2019 monitoring program is presented in Table 1.

Table 1 – Surface Water Quality Monitoring Stations

Monitoring Station ID	Water Body	Rationale for Sampling
CB-SW	Cagney Brook	To characterize surface water quality within the urban area of Sydney upstream of CO7/CO8[1].
NRC-1-SW	North Realigned Channel	To characterize surface water quality within the urban area of Whitney Pier upstream of CO7/CO8.
SRC-1-SW	South Realigned Channel	To characterize surface water quality related to runoff from the municipal landfill upstream of CO7/CO8.
COB-A-SW	Coke Ovens Brook - concrete riffles upstream of Stable Drive	To characterize surface water quality from runoff and leachate associated with the municipal landfill upstream of CO1[2], CO6[3] and CO7/CO8.
COB-B-SW[4]	Coke Oven Brook along SPAR Road, east of COB-A-SW	To further characterize the potential for impacts from the municipal landfill to COB-A-SW.
COB-4-SW	COB-A-SW	To characterize surface water quality from the upstream areas of CO1, CO6 and CO7/CO8. This sampling location is also upstream of TP6B[5].
COB-6-SW	Coke Ovens Brook	To further characterize surface water quality from the upstream areas of CO1, CO6 and CO7/CO8. This sampling location is also upstream of TP6B.
WB-1-SW	Coke Ovens Brook	To characterize surface water quality within the urban area of Sydney upstream of TP6B and TP7[6].
NARROWS	Wash Brook	To characterize surface water quality downgradient of the majority of the remediated sites.
BP-1-SW[7]	North Channel, Open Hearth Park	To further characterize surface water quality downgradient of the remediation sites and as it discharges to Sydney Harbour.

Notes:
1 CO7/CO8: Collection System (CO7)/Water Treatment Plant (CO8).
2 CO1: Coke Oven Brook.
3 CO6: Surface Cap.
4 Upstream monitoring station COB-B-SW was added to the monitoring program in 2015 to further characterize the potential for impacts from the municipal landfill to COB-A-SW.
5 TP6B: Solidification/Stabilization/Channel.
6 TP7: Tar Ponds Cap.
7 The LTMM location of surface water station BP-1-SW is similar to the location used during Pre-Construction activities associated with the EEM Program and is approximately 40 meters (m) upstream from the collection point utilized during the Construction period of the EEM Program.

Field data was recorded on site specific data sheets. Stream flow measurements were calculated by measuring the width of the stream at the sampling location and by measuring the depth of the stream at ¼, ½ and ¾ width intervals. The stream flow velocity was also measured at ¼, ½ and ¾ intervals. Using a spreadsheet formula, the approximate stream flow was calculated for each monitoring station. Due to the depth of surface water station BP-1-SW, it was not possible to obtain field measurements across the entire stream width. Dillon personnel collected as much field data at this deeper location as safely possible (i.e., from the stream banks/shoreline). Stream flow velocity for this location was calculated using the Muggah Creek North Channel Survey (CBCL Limited, October 2014) provided by NS Lands.

Sample containers were pre-labelled by the laboratory with the sample identification, analysis required and the project number. The date and time of sample collection were noted on the sample containers in the field at the time of collection. New nitrile gloves were worn by field staff for each sample to avoid cross-contamination between sampling stations. Samples were collected by opening the container facing upstream. Where samples were collected directly into the sample bottles containing preservative, the container was not fully submerged during sampling to avoid washing the preservative out of the container. The sample bottles for metals analysis contained nitric acid preservative so that dissolved metals remained in solution.

WEATHER CONDITIONS

Weather information obtained from Environment Canada's climate station at the Sydney Airport indicates that accumulated precipitation for the 30 days preceding the July 29, 2019 surface water monitoring program was approximately 113.2 millimeters (mm). No significant rainfall was recorded on the day of, or the three days leading up to, the sampling event.

Tidal information obtained from Meteo365 (https://www.tide-forecast.com) for November 23, 2019, indicated a high tide level of 1.11 m and a low tide level of 0. 27 m.

FIELD OBSERVATIONS AND MEASUREMENTS

Observations at the ten surface water stations during the summer 2019 monitoring program are summarized in Table 2. Field measurements are summarized in Table 3.

Table 2 – Summer 2019 Surface Water Quality Monitoring Field Observations

Monitoring Station ID	Field Observations	Corresponding Photograph Number
CB-SW	Heavy vegetation in the brook and on the brook banks. No debris observed. Standing water in the brook; no flow. No surface water sample collected.	1
NRC-1-SW	Vegetation present on both sides of the brook banks. Debris (i.e., plastic bags and bottles, pieces of fiberboard, tin cans and a propane tank) observed in the channel and on the channel banks.	2
SRC-1-SW	Debris (i.e., plastic bags and car parts, tin cans and tires) observed in the channel. The concrete channel walls have spray painted graffiti visibly dissolving at the high water point. Moss observed on the bottom of channel and below the water line on some rocks. Trace vegetation and small fish were observed in the channel. Water was less than 2 centimeters (cm) deep; insufficient depth to sample.	3

Table 2 – Summer 2019 Surface Water Quality Monitoring Field Observations

Monitoring Station ID	Field Observations	Corresponding Photograph Number
COB-A-SW	Heavy vegetation on the brook banks and within the brook upstream from the sampling station. What appeared to be manganese observed on the water surface. Debris (i.e., Styrofoam) observed upstream.	4
COB-B-SW	Vegetation observed within the brook and along the banks. Bare spots in the brook appeared to be possible tire tracks (i.e., ATV). No debris observed. Standing water in the brook; no flow. No surface water sample collected.	5
COB-4-SW	Vegetation was observed along the brook banks. Moss and other vegetation were noted in and/or on the water in the brook. Water flow and iron staining observed on the riprap south of the sampling station. No debris observed.	6 and 7
COB-6-SW	Some vegetation observed along the brook banks. Heavy moss cover the channel bottom. Debris (i.e., plastic bottles and styrofoam) observed on the brook banks.	8
WB-1-SW	Vegetation observed along brook banks. Debris (i.e., metal, glass, wood and fabric) observed on the brook banks. Sheen (source unknown) observed in the sediment near a culvert on the east side of the brook.	9
NARROWS	Seaweed, algae and moss observed in the channel and on the banks. Mussels and periwinkles were observed on the riprap along the banks.	10
BP-1-SW	Seaweed, moss and algae observed in the channel and on the banks. Mussels and periwinkles were observed on the riprap along the banks. Wood debris was observed along the top of the bank.	11

Note:
1 Photographs are presented in Appendix A.

Table 3 – Summer 2019 Surface Water Quality Monitoring Field Measurements

Monitoring Station ID	pH	Turbidity (NTU)	Conductivity (mS/cm)	Salinity (%)	Stream Flow[1] (m^3/s)
CB-SW	No Flow – Standing Water Only				
NRC-1-SW	7.89	0	0.251	0.12	0.07
SRC-1-SW	Insufficient Water Depth to Measure				
COB-A-SW	7.62	8.2	0.417	0.20	0.01
COB-B-SW	No Flow – Standing Water Only				
COB-4-SW	7.44	0	0.495	0.24	0.26
COB-6-SW	8.34	0	0.567	0.28	0.13

Table 3 – Summer 2019 Surface Water Quality Monitoring Field Measurements

Monitoring Station ID	pH	Turbidity (NTU)	Conductivity (mS/cm)	Salinity (%)	Stream Flow[1] (m^3/s)
WB-1-SW	8.15	0	0.355	0.17	0.17
NARROWS	7.76	0	42.89	27.64	3.67
BP-1-SW[2]	7.48	0	43.50	28.10	3.60

Notes:
1 Stream flow is an approximate calculated value.
2 Collected during low tide conditions.

REGULATORY FRAMEWORK

As specified in Section 4.2, page 21 of the NS Lands LTMM Plan, the remedial criteria used for eight of the ten surface water stations included in the LTMM monitoring program (i.e., CB-SW, NRC-1-SW, SRC-1-SW, COB-A-SW, COB-B-SW, COB-4-SW, COB-6-SW and WB-1-SW) were the Nova Scotia Contaminated Sites Regulations (NS CSRs) Tier I Environmental Quality Standards (EQS) (which came into effect July 6, 2013) for surface water (fresh water) and the Canadian Council of Ministers of the Environment (CCME) for the protection of fresh water aquatic life (FWAL) (accessed online 2019). Analytical results for the remaining two surface water stations included in the monitoring program (i.e., Narrows and BP-1-SW) were compared to the NS CSRs Tier I EQS for surface water (marine) and the CCME guidelines for the protection of aquatic life (marine).

Additionally, as specified in Section 4.2, page 21 of the NS Lands LTMM Plan, analytical results for surface water samples collected at the upstream sampling stations were compared to previously calculated 95% upper confidence limits (UCL) of available Pre-Construction/Baseline analytical data from the EEMSWCM Program associated with the Sydney Tar Ponds remediation. Furthermore, analytical results for the upstream sampling stations were also compared to calculated 95% UCLs of available historical upstream analytical data (i.e., the Upstream Calculated 95% UCL). Analytical results for the two sampling stations near Sydney Harbour were compared to the calculated 95% UCLs of available Pre-Construction/Baseline analytical data for the Battery Point sampling station.

SURFACE WATER QUALITY TREND ANALYSIS – MANN KENDALL

Mann-Kendall analysis as a non-parametric statistic test routinely used to assess the stability of a solute plume (i.e., are concentration trends stable, decreasing, or increasing). At least four independent sampling events are required to evaluate surface water quality trends via Mann-Kendall analysis. The Mann-Kendall test procedure starts by comparing the most recent round of water quality data with the results of earlier rounds. Non-detect data values are typically assigned a value that is half the laboratory detection limit. The Mann-Kendall test is not designed to account for seasonal variation in data.

Based on a review of the analytical results from the summer 2019 monitoring event and historical monitoring events, select parameters, with concentrations above (or historically above) applicable guidelines were selected for Mann-Kendall analysis. These include PAH indicator parameters anthracene, pyrene, and benzo(a)pyrene, and inorganic chemistry indicator parameters boron, cadmium, strontium, sulphate, and zinc.

In certain situations, Mann-Kendall analysis results may be biased due to elevated laboratory detection limits. Non-detected data on the Mann-Kendall analysis of indicator parameters was identified and confirmed the influence of non-detected data is minimal.

SURFACE WATER RESULTS

The surface water quality results for the summer 2019 event, and available post-remediation surface water data, are presented in the attached Tables B-1 and B-2 in Appendix B. Laboratory certificates of analysis are presented in Appendix C. As stated above, surface water samples were analyzed for PAHs and RCApMS. Samples were delivered to Bureau Veritas (formerly Maxxam Analytics) in Sydney, Nova Scotia for analysis. Bureau Veritas is accredited through the Standard Council of Canada (SCC) and is a member of the Canadian Association for Laboratory Accreditation (CALA).

Review of the July 2019 data indicates:

- PAH results:
  - The pyrene concentration of 0.029 ug/L in the Narrows exceeded the Tier I EQS (marine) of 0.02 ug/L; and,
  - The remaining PAH parameters analyzed were non-detect and/or below the comparison criteria.

A summary of concentrations of select organic parameters (i.e., naphthalene and benzo(a)pyrene) reported at each station relative to the calculated 95% UCLs is provided in Table 4. There were no exceedances of the relative calculated 95% UCLs during the summer 2019 monitoring event.

- General chemistry and metals results:
  - Concentrations of aluminum ranging from 10 ug/L to 71 ug/L exceeded the Tier I EQS (fresh water) of 5 ug/L in NRC-1-SW, COB-A-SW, COB-4-SW, COB-6-SW, WB-1-SW and the field duplicate sample of WB-1-SW;
  - Boron concentrations of 3000 ug/L and 3100 ug/L exceeded the Tier I EQS (marine water) of 1200 ug/L in the Narrows and BP-1-SW, respectively;
  - Cadmium concentrations ranging from 0.018 ug/L to 0.021 ug/L in NRC-1-SW, WB-1-SW and the field duplicate sample of WB-1-SW exceeded the Tier I EQS (fresh water) of 0.01 ug/L;
  - The copper concentration of 5.6 ug/L exceeded the Tier I EQS (marine water) of 2 ug/L at BP-1-SW;
  - Iron concentrations ranging from 310 ug/L to 1400 ug/L exceeded the Tier I EQS (fresh water) and CCME FWAL guideline of 300 ug/L at NRC-1-SW, COB-4-SW and the field duplicate sample of WB-1-SW (i.e., the iron concentration in the original WB-1-SW sample was below the Tier I EQS and CCME FWAL guideline with a concentration of 290 ug/L). The laboratory detection limit for iron was elevated above the Battery Point/Narrows Calculated 95% UCL for the Narrows and BP-1-SW;
  - The manganese concentration of 120 ug/L exceeded the Battery Point/Narrows Calculated 95% UCL of 70 ug/L at the Narrows;
  - Concentrations of nitrite ranging from 0.064 mg/L to 0.13 mg/L exceeded the CCME FWAL guideline of 0.06 mg/L in NRC-1-SW, COB-4-SW, COB-6-SW, WB-1-SW and the field duplicate of WB-1-SW;
  - Concentrations of strontium ranging from 230 ug/L to 300 ug/L exceeded the Upstream Calculated 95% UCL of 132 ug/L and the Pre-Construction/Baseline Calculated 95% UCL of 210 ug/L at COB-A-SW, COB-4-SW and COB-6-SW;

Table 4 - Summary of Organic Surface Water Indicator Parameter Concentrations relative to Calculated 95% (ug/L)												
Parameter	**Pre-Construction/ Baseline Calculated 95% UCL[1]**	**Date**	**Sample Location**									
			CB-SW	**NRC-1-SW**	**SRC-1-SW**	**COB-A-SW**	**COB-B-SW[2]**	**COB-4-SW**	**COB-6-SW**	**WB-1-SW**	**NARROWS**	**BP-1-SW**
Naphthalene	1.8	12/22/2014	<0.20	<0.20	<0.20	<0.20	-	<0.20	<0.20	<0.20	0.22	<0.20
		7/27/2015	<0.20	<0.20	<0.20	Dry	Dry	<0.20	<0.20	<0.20	<0.20	<0.20
		11/18/2015	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
		7/22/2016	<0.20	<0.20	<0.20	Dry	Dry	<0.20	<0.20	<0.20	<0.20	<0.20
		12/8/2016	<0.20	0.20	<0.20	<0.20	<0.20	<0.20	0.38	<0.20	0.21	<0.20
		8/3/2017	<0.20	Dry	<0.20	Dry	Dry	<0.20	<0.20	<0.20	<0.20	<0.20
		12/18/2017	<0.20	<0.20	<0.20	Dry	<0.20	<0.20	0.54	<0.20	0.30	0.33
		7/25/2018	Dry	<0.20	<0.20	<0.20	Dry	<0.20	<0.20	<0.20	0.41	<0.20
		11/23/2018	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.49	<0.20	0.22	0.20
		7/29/2019	Dry	<0.20	Insufficent Water to Sample	<0.20	Dry	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(a)pyrene	0.05	12/22/2014	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010
		7/27/2015	<0.010	<0.010	<0.010	Dry	Dry	<0.010	<0.010	<0.010	<0.010	<0.010
		11/18/2015	<0.010	**0.068**	<0.010	<0.010	<0.010	**0.39**	0.015	<0.010	<0.010	<0.010
		7/22/2016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	<0.010	<0.010
		12/8/2016	<0.010	0.011	<0.010	<0.010	<0.010	0.028	0.027	<0.010	<0.010	<0.010
		8/3/2017	<0.010	Dry	<0.010	Dry	Dry	<0.010	<0.010	<0.010	<0.010	<0.010
		12/18/2018	<0.010	<0.010	0.016	Dry	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
		7/25/2018	Dry	<0.010	0.034	<0.010	Dry	<0.010	<0.010	<0.010	<0.010	<0.010
		11/23/2018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**1.3**	<0.010	<0.010
		7/29/2019	Dry	<0.010	Insufficent Water to Sample	<0.010	Dry	<0.010	<0.010	<0.010	<0.010	<0.010

Notes:

[1] Pre-Construction/Baseline Calculated 95% UCL are from the EEMSWCM Program

[2] Added to the program in July 2015

Bold indicates the concentration exceeds the Pre-Construction/Baseline Calculated 95% UCL

- Sulphate concentrations ranging from of 69 mg/L to 100 mg/L exceeded the Upstream Calculated 95% UCL of 26 mg/L at COB-A-SW, COB-4-SW and COB-6-SW. The sulphate concentration of 100 mg/L also exceeded the Pre-Construction/ Baseline Calculated 95% UCL of 84 mg/L at COB-A-SW;
- The laboratory detection limit for zinc was elevated above the NSE Tier I EQS for the Narrows and BP-1-SW; and,
- The remaining general chemistry parameters were non-detect and/or below applicable criteria.

Table 5 provides a summary of concentrations reported for select inorganic parameters relative to the calculated 95% UCLs.

TREND ANALYSIS

The surface water quality trend analysis for the summer 2019 monitoring event was based on the available analytical results (i.e., four rounds of sampling events are required) for select parameters, including PAH indicator parameters anthracene, pyrene and benzo(a)pyrene and inorganic chemistry indicator parameters boron, cadmium, strontium, sulphate and zinc. Trend analysis results for these select parameters were generally stable or indicated fluctuations with no trend, with the exception of pyrene at WB-1-SW, which indicated a potentially increasing concentration trend. However, a closer review of the data suggests it is more likely fluctuating (future data will confirm). Strontium and sulphate at COB-A-SW, zinc at COB-4-SW, strontium at COB-A-SW and cadmium at NRC-1-SW each indicated a declining trend. Mann-Kendall results are presented in Appendix D.

QUALITY CONTROL PROCESS

The laboratory analytical certificate has been reviewed for quality assurance/quality control purposes. The laboratory completed quality control analysis including duplicates, blanks, spikes, surrogate recoveries and spiked blanks to assess accuracy and precision as well as the potential for bias, contamination and degradation or matrix effects. Review of the laboratory report indicated the following:

- An elevated PAH RDL for acenaphthylene, due to sample matrix/co-extractive interference, was reported for BP-1-SW;
- An elevated RDL for total organic carbon due to sample matrix in Narrows;
- Elevated RDLs for perylene, due to detected levels in the method blank, in NRC-1-SW, COB-A-SW, COB-4-SW, COB-6-SW, WB-1-SW, the field duplicate for WB-1-SW, and BP-1-SW;
- Elevated reporting limits for trace metals due to sample matrix was reported for the Narrows and BP-1-SW and,
- A poor RCAp Ion Balance, due to sample matrix, was reported for WB-1-SW.

The above noted laboratory notes do not represent a concern relative to data quality.

One field duplicate of sample WB-1-SW was collected during the summer 2019 monitoring event. The relative percent difference (RPD) was calculated between the sample and associated field duplicate results. The RPD was not calculated for those parameters where one or both of the results associated with the original and/or field duplicate sample exhibited concentrations less than five times the laboratory reportable detection limit (RDL). Calculations indicate that the RPDs of the analyzed parameters were within the acceptable RPD range (i.e., 40% for organics and 25% for inorganics) with calculated RPDs ranging from 0% to 35.29%.

Table 5 – Summary of Inorganic Surface Water Indicator Parameter Concentrations relative to Calculated 95% UCLs												
Sample Location	**Date**	**SO4**	**Al**	**As**	**Cd**	**Cr**	**Co**	**Fe**	**Pb**	**Mn**	**Se**	**Sr**
	Units	**(mg/L)**	**(ug/L)**									
Upstream Calculated 95% UCL[1]		**26**	**220**	**1.6**	**0.1**	**8.3**	**-**	**3,318**	**1.2**	**583**	**1.9**	**132**
Pre-Construction/Baseline Calculated 95% UCL[1]		**84**	**-**	**1.98**	**-**	**-**	**1.3**	**1,900**	**-**	**800**	**-**	**210**
CB-SW	12/22.2014	26	110	<1.0	0.018	<1.0	<0.40	290	<0.50	190	<1.0	130
	7/27/2015	16	28	<1.0	<0.010	<1.0	<0.40	260	<0.50	61	<1.0	**320**
	11/18/2015	24	130	<1.0	0.011	<1.0	<0.40	280	<0.50	140	<1.0	**140**
	7/22/2016	10	55	1.4	<0.010	<1.0	<0.40	640	<0.50	71	<1.0	**160**
	12/8/2016	23	84	<1.0	0.017	<1.0	<0.40	330	<0.50	310	<1.0	110
	8/3/2017	12	150	1.4	<0.010	1.0	<0.40	750	0.61	380	<1.0	**340**
	12/18/2017	24	91	<1.0	0.015	<1.0	<0.40	300	<0.50	200	<1.0	130
	7/25/2018						Dry					
	11/23/2018	**32**	91	<1.0	0.014	<1.0	<0.40	210	<0.50	210	<1.0	77
	7/29/2019						Dry					
NRC-1-SW	12/22.2014	20	58	<1.0	0.022	<1.0	<0.40	150	<0.50	85	<1.0	32
	7/27/2015	22	45	<1.0	0.019	<1.0	<0.40	1,300	<0.50	75	<1.0	54
	11/18/2015	15	**1,500**	**3.5**	**0.14**	1.9	1.5	**3,800**	**9.5**	**1,100**	<1.0	36
	7/22/2016	15	31	<1.0	0.016	<1.0	<0.40	970	0.61	47	<1.0	52
	12/8/2016	16	110	<1.0	0.025	<1.0	<0.40	360	0.8	200	<1.0	34
	8/3/2017						Dry					
	12/18/2017	21	34	<1.0	0.016	<1.0	<0.40	140	<0.50	87	<1.0	31
	7/25/2018	12	**270**	<1.0	0.012	<1.0	<0.40	460	0.99	62	<1.0	60
	11/23/2018	17	36	<1.0	0.015	<1.0	<0.40	130	<0.50	61	<1.0	35
	7/29/2019	15	46	<1.0	0.018	<1.0	<0.40	1400	<0.50	130	<1.0	55
SRC-1-SW	12/22.2014	**54**	**290**	<1.0	0.035	<1.0	<0.40	340	1.2	190	<1.0	**150**
	7/27/2015	**47**	51	1.0	0.013	<1.0	<0.40	210	1.1	260	<1.0	**150**
	11/18/2015	**43**	**240**	<1.0	0.023	1.2	<0.40	310	0.75	230	<1.0	**150**
	7/22/2016	**51**	50	**1.9**	0.018	<1.0	<0.40	350	<0.50	350	<1.0	**170**
	12/8/2016	**42**	**300**	<1.0	0.039	1.0	<0.40	400	**1.6**	200	<1.0	**140**
	8/3/2017	**54**	24	**1.8**	<0.010	<1.0	<0.40	150	<0.50	91	<1.0	**190**
	12/18/2017	**50**	**3,000**	**4.1**	**0.31**	4.9	1.7	**4,600**	**10**	**2,200**	<1.0	**140**
	7/25/2018	**43**	**2,500**	**4.9**	**0.26**	4.0	1.9	**5,500**	**12**	**2,600**	<1.0	**170**
	11/23/2018	**46**	**320**	<1.0	0.027	<1.0	<0.40	420	**1.3**	160	<1.0	130
	7/29/2019	Insufficient Water Present - No Sample										
COB-A-SW	12/22/2014	**160**	16	<1.0	<0.010	<1.0	<0.40	51	<0.50	25	<1.0	**260**
	7/27/2015						Dry					
	11/18/2015	**170**	5.1	<1.0	<0.010	<1.0	<0.40	82	<0.50	74	<1.0	**260**
	7/22/2016						Dry					
	12/8/2016	**150**	8.5	<1.0	<0.010	<1.0	<0.40	68	<0.50	92	<1.0	**250**
	8/3/2017						Dry					
	12/18/2017						Dry					
	7/25/2018	**100**	**300**	**2.6**	0.058	<1.0	1.6	**9,100**	**1.4**	**2,900**	<1.0	**270**
	11/23/2018	**110**	46	<1.0	<0.010	<1.0	<0.40	810	<0.50	300	<1.0	**210**
	7/29/2019	**100**	10	<1.0	<0.010	<1.0	<0.40	240	<0.50	290	<1.0	**240**
COB-B-SW[2]	7/27/2015						Dry					
	11/18/2015	**190**	7.9	<1.0	<0.010	<1.0	<0.40	<50	<0.50	21	<1.0	**250**
	7/22/2016						Dry					
	12/8/2016	**440**	13	<1.0	0.027	<1.0	0.90	130	<0.50	**1,400**	<1.0	**480**
	8/3/2017						Dry					
	12/18/2017	**120**	6.7	<1.0	<0.010	<1.0	0.42	110	<0.50	490	<1.0	**190**
	7/25/2018						Dry					
	11/23/2018	**110**	7.0	<1.0	<0.010	<1.0	0.46	200	<0.50	500	<1.0	**200**
	7/29/2019						Dry					
COB-4-SW	12/22.2014	**47**	82	<1.0	0.014	<1.0	<0.40	210	<0.50	95	<1.0	**140**
	7/27/2015	**100**	51	<1.0	<0.010	<1.0	<0.40	460	<0.50	110	<1.0	**250**
	11/18/2015	**41**	**7,100**	**13**	**0.29**	8.0	4.6	**14,000**	**37**	**1,500**	<1.0	**150**
	7/22/2016	**74**	28	<1.0	<0.010	<1.0	<0.40	300	<0.50	140	<1.0	**270**
	12/8/2016	**39**	120	<1.0	0.014	<1.0	<0.40	390	0.99	180	<1.0	110
	8/3/2017	**110**	14	<1.0	0.011	<1.0	<0.40	83	<0.50	130	<1.0	**450**
	12/18/2017	**42**	53	<1.0	0.010	<1.0	<0.40	270	<0.50	120	<1.0	110
	7/25/2018	**100**	43	1.0	<0.010	<1.0	<0.40	51	0.75	23	<1.0	**430**
	11/23/2018	**41**	140	<1.0	0.014	<1.0	<0.40	230	0.55	99	<1.0	130
	7/29/2019	**69**	28	<1.0	<0.010	<1.0	<0.40	370	<0.50	150	<1.0	**230**

Table 5 – Summary of Inorganic Surface Water Indicator Parameter Concentrations relative to Calculated 95% UCLs												
Sample Location	**Date**	**SO4**	**Al**	**As**	**Cd**	**Cr**	**Co**	**Fe**	**Pb**	**Mn**	**Se**	**Sr**
	Units	**(mg/L)**	**(ug/L)**									
Upstream Calculated 95% UCL[1]		**26**	**220**	**1.6**	**0.1**	**8.3**	**-**	**3,318**	**1.2**	**583**	**1.9**	**132**
Pre-Construction/Baseline Calculated 95% UCL[1]		**84**	**-**	**1.98**	**-**	**-**	**1.3**	**1,900**	**-**	**800**	**-**	**210**
COB-6-SW	12/22.2014	**56**	61	<1.0	0.01	<1.0	<0.40	170	<0.50	56	<1.0	**180**
	7/27/2015	**91**	39	<1.0	<0.010	<1.0	<0.40	160	<0.50	23	<1.0	**300**
	11/18/2015	**44**	220	<1.0	0.018	<1.0	<0.40	490	**1.5**	79	<1.0	**180**
	7/22/2016	**64**	46	1.0	<0.010	<1.0	<0.40	180	<0.50	37	<1.0	**300**
	12/8/2016	**41**	200	<1.0	0.015	<1.0	<0.40	360	1.0	110	<1.0	**160**
	8/3/2017	**110**	42	1.3	0.011	<1.0	<0.40	<50	<0.50	35	<1.0	**500**
	12/18/2017	**48**	130	<1.0	0.010	<1.0	<0.40	260	<0.50	73	<1.0	**160**
	7/25/2018	**95**	23	<1.0	<0.010	<1.0	<0.40	140	<0.50	110	<1.0	**350**
	11/23/2018	**45**	150	<1.0	0.015	<1.0	<0.40	360	0.87	130	<1.0	**140**
	7/29/2019	**76**	37	<1.0	<0.010	<1.0	<0.40	130	<0.50	31	<1.0	**300**
WB-1-SW	12/22.2014	7.9	160	<1.0	0.038	<1.0	<0.40	270	0.71	95	<1.0	53
	7/27/2015	10	89	<1.0	0.012	<1.0	<0.40	480	<0.50	41	<1.0	100
	11/18/2015	8.3	63	<1.0	<0.010	<1.0	<0.40	200	<0.50	43	<1.0	73
	7/22/2016	**410**	87	<1.0	0.035	<1.0	<0.40	590	0.56	160	<1.0	**1300**
	12/8/2016	8.4	100	<1.0	0.026	<1.0	<0.40	220	<0.50	100	<1.0	61
	8/3/2017	**230**	28	1.0	0.027	<1.0	<0.40	680	<0.50	450	<1.0	**940**
	12/18/2017	8.0	110	<1.0	0.022	<1.0	<0.40	190	<0.50	63	<1.0	49
	7/25/2018	**71**	120	<1.0	0.024	<1.0	<0.40	330	**1.8**	140	<1.0	**320**
	11/23/2018	6.5	**1200**	**4.3**	**0.15**	3.5	1.2	**3700**	**28**	200	<1.0	50
	7/29/2019	14	69	<1.0	0.02	<1.0	<0.40	290	<0.50	64	<1.0	120
Battery Point/ Narrows Calculated 95% UCL[1]		**2,180**	**-**	**-**	**-**	**-**	**0.9**	**190**	**-**	**70**	**-**	**7,000**
NARROWS	12/22.2014	270	110	<1.0	0.027	<1.0	<0.40	***250***	<0.50	63	<1.0	610
	7/27/2015	1,500	86	<10	<0.10	<10	*<4.0*	*<500*	<5.0	***100***	<10	5,400
	11/18/2015	110	76	<1.0	0.012	<1.0	<0.40	***320***	<0.50	45	<1.0	370
	7/22/2016	1,400	51	<10	<0.10	<10	*<4.0*	*<500*	<5.0	***120***	<10	5,400
	12/8/2016	270	75	<1.0	0.029	<1.0	<0.40	***250***	<0.50	***110***	<1.0	890
	8/3/2017	2,000	<50	<10	<0.10	<10	*<4.0*	<500	<5.0	***110***	<10	6,100
	12/18/2017	150	110	<1.0	0.018	<1.0	<0.40	***280***	<0.50	***72***	<1.0	450
	7/25/2018	1,700	56	<10	<0.10	<10	*<4.0*	*<500*	<5.0	***100***	<10	5,000
	11/23/2018	180	86	<1.0	0.021	<1.0	<0.40	***220***	<0.50	52	<1.0	500
	7/29/2019	1,700	110	<10	<0.10	<10	*<4.0*	*<500*	<5.0	***120***	<10	5000
BP-1-SW	12/22.2014	170	110	<1.0	0.028	<1.0	<0.40	***240***	<0.50	61	<1.0	950
	7/27/2015	1,300	140	<10	<0.10	<10	*<4.0*	*<500*	<5.0	59	<10	5,300
	11/18/2015	190	140	<1.0	0.014	<1.0	<0.40	***410***	<0.50	57	<1.0	580
	7/22/2016	1,600	63	<10	<0.10	<10	*<4.0*	*<500*	<5.0	***71***	<10	5,500
	12/8/2016	290	86	<1.0	0.025	<1.0	<0.40	***280***	<0.50	***100***	<1.0	1,000
	8/3/2017	2,000	<50	<10	<0.10	<10	*<4.0*	<500	<5.0	***110***	<10	6,100
	12/18/2017	210	95	<1.0	0.020	<1.0	<0.40	***220***	<0.50	60	<1.0	630
	7/25/2018	1,900	58	<10	<0.10	<10	*<4.0*	***1,000***	<5.0	***94***	<10	5,900
	11/23/2018	250	86	<1.0	0.024	<1.0	<0.40	***240***	<0.50	50	<1.0	730
	7/29/2019	1,700	<50	<10	<0.10	<10	*<4.0*	*<500*	<5.0	50	<10	5,000

Notes:

[1]Upstream, Pre-Construction/Baseline and Battery Point/Narrows Calculated 95% UCLs are from the EEMSWCM Program

[2] Added to the program in July 2015

Bold indicates the concentration exceeds the Upstream Calculated 95% UCL

Underline indicates exceedance of the Pre-Construction/Baseline Calculated 95% UCL

Italics Bold indicates exceedance of the Battery Point/Narrows Calculated 95% UCL

Italics indicates that the laboratory detection limit is greater than the comparison criteria

The data quality is considered acceptable and the results representative. There were no holding time exceedances.

SUMMARY

Analytical results of the summer 2019 surface water monitoring program indicate that concentrations of the analyzed parameters are generally below the applicable criteria and respective 95% UCLs. Criteria and 95% UCL exceedances are summarized in Table 6.

Table 6 - Summary of Surface Water Station Criteria and 95 % UCL Exceedances July 2019

Parameter	Location (Criteria and/or 95% UCL Exceedance)
PAHs	
Pyrene	· Narrows (Tier I EQS (marine water))
General Chemistry and Metals	
Aluminum	· NRC-1-SW (Tier I EQS (fresh water)) · COB-A-SW (Tier I EQS (fresh water)) · COB-4-SW (Tier I EQS (fresh water)) · COB-6-SW (Tier I EQS (fresh water)) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Boron	· Narrows (Tier I EQS (marine water)) · BP-1-SW (Tier I EQS (marine water))
Cadmium	· NRC-1-SW (Tier I EQS (fresh water)) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Copper	· BP-1-SW (Tier I EQS (marine water))
Iron	· NRC-1-SW (Tier I EQS (fresh water) and CCME FWAL)) · COB-4-SW (Tier I EQS (fresh water) and CCME FWAL)) · Field duplicate sample of WB-1-SW (Tier I EQS (fresh water) and CCME FWAL))
Manganese	· Narrows (Battery Point/Narrows Calculated 95% UCL) · Battery Point (Battery Point/Narrows Calculated 95% UCL)
Nitrite	· NRC-1-SW (CCME FWAL) · COB-4-SW (CCME FWAL) · COB-6-SW CCME FWAL) · WB-1-SW (and the field duplicate sample of WB-1-SW) (CCME FWAL)
Strontium	· COB-A-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) · COB-4-SW(Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) · COB-6-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL)
Sulphate	· COB-A-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) · COB-4-SW (Upstream 95% UCL) · COB-6-SW (Upstream 95% UCL)

Review of the surface water analytical data from the summer 2019 monitoring event indicates findings are generally consistent with past LTMM events, with the following exceptions:

- The copper exceedance of the Tier I EQS (marine water) at BP-1-SW is the first reported for this parameter at this surface water station since the LTMM program commenced;
- The nitrite exceedances of the CCME FWAL guidelines at NRC-1-SW, COB-6-SW and WB-1-SW (and the field duplicate of WB-1-SW) are the first exceedances reported for this parameter at these surface water stations since the LTMM program commenced; and,
- The iron exceedance of the Tier I EQS (fresh water) and CCME FWAL guideline is the first recorded exceedance observed at surface water station COB-4-SW since 2016.

RECOMMENDATIONS

The next surface water monitoring event will be conducted in the fall (e.g., November 2019). It is recommended that fall 2019 sampling program include the collection of surface water samples at ten stations (i.e., CB-SW, NRC-1-SW, SRC-1-SW, COB-A-SW, COB-B-SW, COB-4-SW, COB-6-SW, WB-1-SW, Narrows and BP-1-SW) for PAH and RCApMS analysis.

DISCLAIMER

This report was prepared exclusively for the purposes, project and site location outlined in the report. The report is based on information provided to, or obtained by Dillon Consulting Limited ("Dillon") as indicated in the report, and applies solely to site conditions existing at the time of the site investigation. Although a reasonable investigation was conducted by Dillon, Dillon's investigation was by no means exhaustive and cannot be construed as a certification of the absence of any contaminants from the site. Rather, Dillon's report represents a reasonable review of available information within an agreed work scope, schedule and budget. It is therefore possible that currently unrecognized contamination or potentially hazardous materials may exist at the site, and that the levels of contamination or hazardous materials may vary across the site. Further review and updating of the report may be required as local and site conditions, and the regulatory and planning frameworks, change over time.

CLOSING

We trust this information is adequate for your needs. Please, however, contact the undersigned if you have any comments or questions regarding the content of this report.

Yours truly,

DILLON CONSULTING LIMITED

Nadine J. Wambolt, B. Tech., CET
Project Manager

MSS:kme

APPENDIX A
SITE PHOTOGRAPHS

PHOTO 1: View of CB-SW, with no flow present (standing water only).

PHOTO 2: View from NRC-1-SW looking southeast.

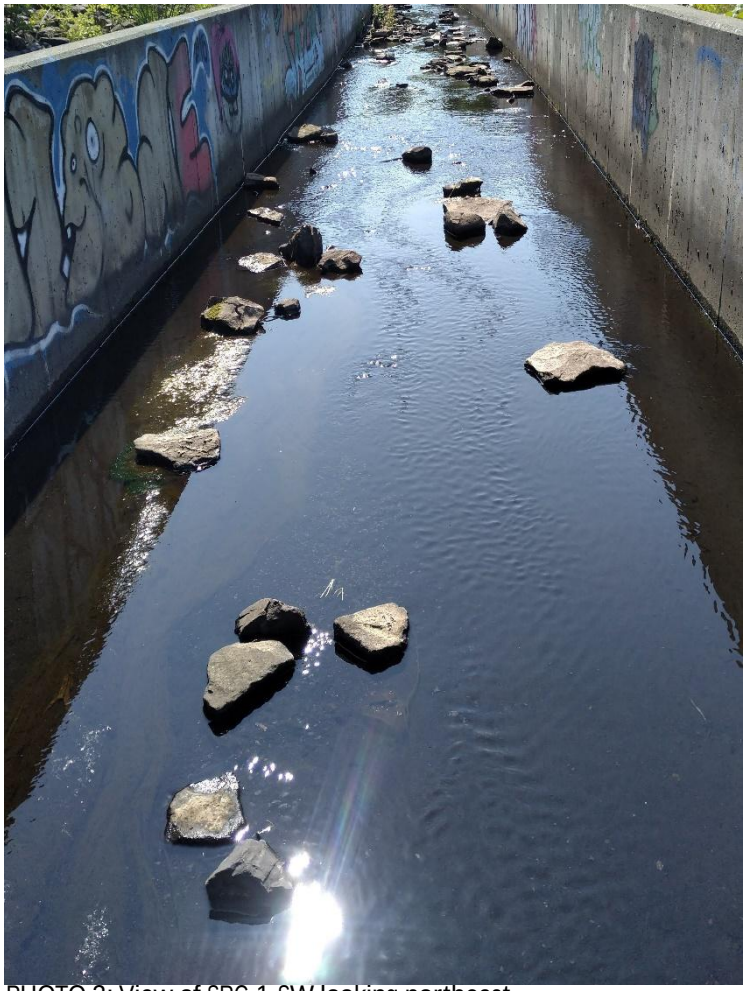

PHOTO 3: View of SRC-1-SW looking northeast.

PHOTO 4: View of COB-A-SW looking west.

PHOTO 5: View of COB-B-SW looking southwest.

PHOTO 6: View from COB-4-SW looking northeast.

PHOTO 7: View of water flow and iron staining on Riprap south of COB-4-SW at looking south.

PHOTO 8: View of COB-6-SW looking northeast.

PHOTO 9: View of WB-1-SW looking southwest.

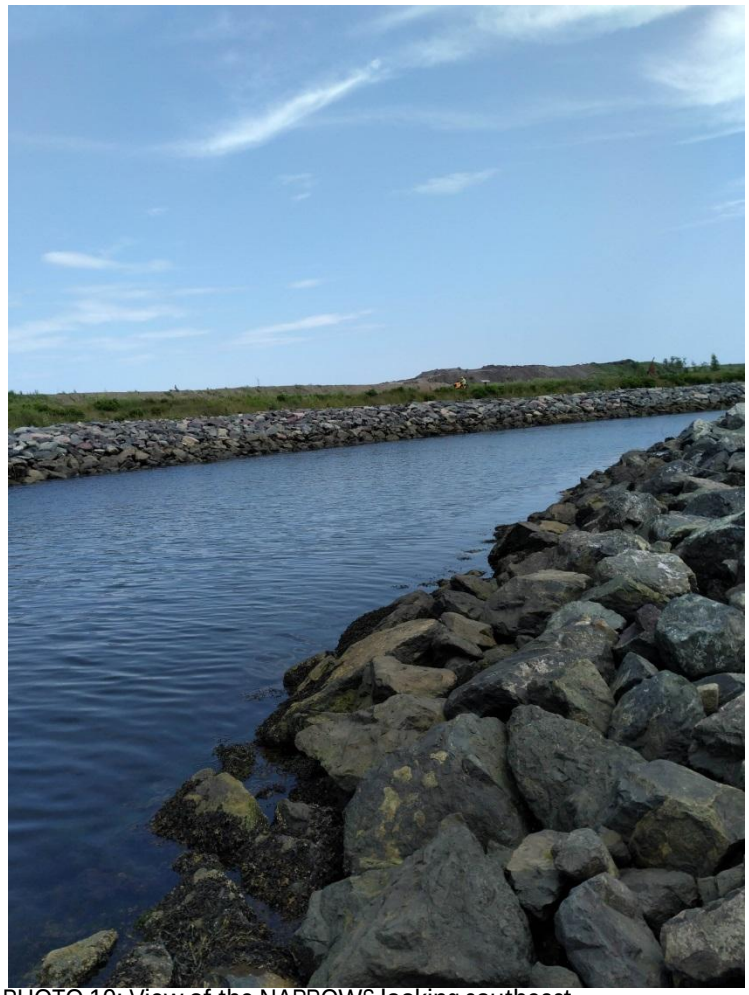

PHOTO 10: View of the NARROWS looking southeast.

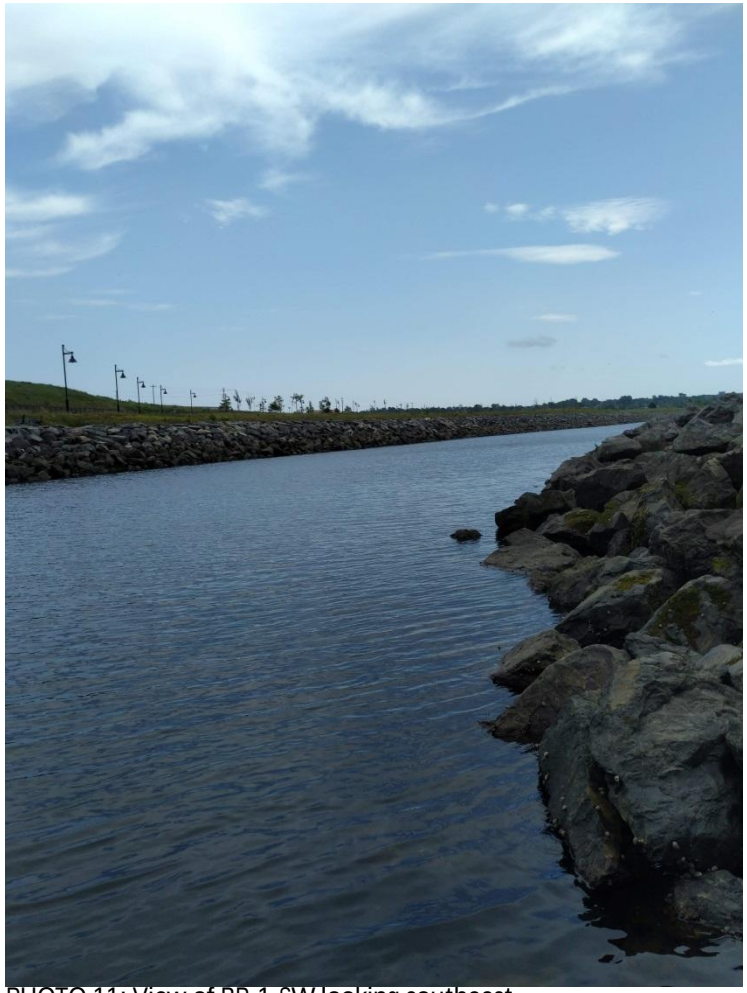

PHOTO 11: View of BP-1-SW looking southeast.

APPENDIX B
TABLES

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Perylene	Phenanthrene	Pyrene
Units		µg/L																			
NSE Tier 1 EQS Fresh Water [1]		5.8	4.6	0.012	0.018	0.015	0.48 [3]	0.17	0.48 [3]	0.48 [3]	1.4	0.26	0.04	3	0.21	2	2	1.1	-	0.4	0.025
CCME FWAL [2]		5.8	-	0.012	0.018	0.015	-	-	-	-	-	-	0.04	3	-	-	-	1.1	-	0.4	0.025
Upstream Calculated 95% UCL		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-
CB-SW	07/23/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.20	<0.050	<0.05	<0.010	<0.010	<0.010
	12/22/14	0.049	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.028	<0.010	<0.050	<0.050	<0.20	<0.010	0.017	0.012
	07/27/15	0.066	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	0.039	<0.010	<0.050	<0.050	<0.20	<0.010	0.017	0.016
	11/18/15	0.049	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	0.027	<0.010	<0.050	<0.050	<0.20	<0.010	0.026	0.019
	07/22/16	0.11	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	0.051	<0.010	<0.050	<0.050	<0.20	<0.010	0.05	0.017
	12/8/16	0.056	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	0.028	<0.010	<0.050	<0.050	<0.20	<0.010	0.028	0.014
	8/3/17	0.071	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	**0.062**	0.048	<0.010	<0.050	<0.050	<0.20	<0.010	0.037	**0.033**
	12/18/17	0.042	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.020	<0.010	<0.050	<0.050	<0.20	<0.010	0.018	0.011
	07/25/18	DRY - NO SAMPLE																			
	11-23-18	0.026	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.050	<0.050	<0.20	<0.010	0.015	<0.010
	07/29/19	DRY - NO SAMPLE																			
NRC-1-SW	07/23/13	0.022	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	0.025	0.015	<0.010	<0.20	<0.050	<0.05	<0.010	0.025	0.019
	12/22/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/27/15	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.011	<0.010
	11/18/15	0.022	<0.010	**0.037**	**0.075**	**0.068**	0.068	0.039	0.038	0.032	0.091	0.017	**0.18**	0.021	0.041	<0.050	<0.050	<0.20	0.017	0.13	**0.14**
	07/22/16	0.028	<0.010	**0.021**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.050	<0.050	<0.20	<0.010	0.018	<0.010
	12/8/16	0.059	<0.010	0.010	0.011	0.011	0.011	<0.010	<0.010	<0.010	0.016	<0.010	0.03	0.036	<0.010	<0.050	0.056	0.20	<0.010	0.066	**0.027**
	8/3/17	DRY - NO SAMPLE																			
	12/18/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/25/18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	0.01
	11-23-18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/29/19	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.020 *	0.016	<0.010
SRC-1-SW	07/23/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.20	<0.050	<0.05	<0.010	<0.010	<0.010
	12/22/14[FD]	<0.010	<0.010	<0.010	<0.010	0.013	0.013	0.010	<0.010	<0.010	0.011	<0.010	0.021	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.012	0.018
	12/22/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/27/15[FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/27/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11/18/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/22/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/8/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.013	0.011
	8/3/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/18/17	<0.010	<0.010	<0.010	0.015	**0.016**	0.018	0.012	<0.010	<0.010	0.024	<0.010	0.040	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.021	**0.035**
	7/25/2018[FD]	<0.010	<0.010	<0.010	0.018	0.013	0.023	0.017	0.014	0.012	0.028	<0.010	**0.052**	<0.010	0.013	<0.050	<0.050	<0.20	<0.010	0.032	**0.048**
	07/25/18	<0.010	<0.010	<0.010	**0.024**	**0.034**	0.036	0.028	0.019	0.022	0.034	<0.010	**0.073**	<0.010	0.018	<0.050	<0.050	<0.20	<0.010	0.047	**0.06**
	11-23-18	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.012	0.011
	07/29/19	INSUFFICIENT WATER PRESENT - NO SAMPLE																			

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Perylene	Phenanthrene	Pyrene
Units		µg/L																			
NSE Tier 1 EQS Fresh Water [1]		5.8	4.6	0.012	0.018	0.015	0.48 [3]	0.17	0.48 [3]	0.48 [3]	1.4	0.26	0.04	3	0.21	2	2	1.1	-	0.4	0.025
CCME FWAL [2]		5.8	-	0.012	0.018	0.015	-	-	-	-	-	-	0.04	3	-	-	-	1.1	-	0.4	0.025
Upstream Calculated 95% UCL		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-
COB-A-SW	07/23/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.20	<0.050	<0.05	<0.010	<0.010	<0.010
	12/22/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	0.01
	07/27/15	DRY - NO SAMPLE																			
	11/18/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/22/16	DRY - NO SAMPLE																			
	12/8/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	8/3/17	DRY - NO SAMPLE																			
	12/18/17	DRY - NO SAMPLE																			
	07/25/18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11-23-18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/29/19	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.020 *	<0.010	<0.010
COB-B-SW	07/27/15	DRY - NO SAMPLE																			
	11/18/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/22/16	DRY - NO SAMPLE																			
	12/8/16	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	8/3/17	DRY - NO SAMPLE																			
	12/18/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/25/18	DRY - NO SAMPLE																			
	11-23-18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/29/19	DRY - NO SAMPLE																			
COB-4-SW	12/22/14	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/27/15	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.010	0.012
	11/18/15	0.14	0.027	**0.12**	**0.43**	**0.39**	0.33	**0.24**	0.20	0.19	0.48	0.073	**0.88**	0.078	**0.22**	<0.050	<0.050	<0.20	0.10	**0.48**	**0.74**
	07/22/16	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/22/16[FD]	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/8/16	0.059	<0.010	**0.013**	**0.021**	**0.028**	0.026	0.018	0.017	0.014	0.031	<0.010	**0.043**	0.036	0.013	<0.050	<0.050	<0.20	<0.010	0.065	**0.04**
	8/3/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	8/3/17[FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/18/17	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/25/18	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11-23-18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.012	<0.010
	07/29/19	0.029	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.050	<0.050	<0.20	<0.020 *	0.013	<0.010

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Perylene	Phenanthrene	Pyrene
Units		µg/L																			
NSE Tier 1 EQS Fresh Water [1]		5.8	4.6	0.012	0.018	0.015	0.48 [3]	0.17	0.48 [3]	0.48 [3]	1.4	0.26	0.04	3	0.21	2	2	1.1	-	0.4	0.025
CCME FWAL [2]		5.8	-	0.012	0.018	0.015	-	-	-	-	-	-	0.04	3	-	-	-	1.1	-	0.4	0.025
Upstream Calculated 95% UCL		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-
COB-6-SW	07/23/13	0.073	0.025	**0.015**	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	0.034	0.034	<0.010	<0.20	<0.050	<0.05	<0.010	0.048	**0.026**
	12/22/14	0.089	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.02	0.026	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	0.013
	07/27/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11/18/15	0.016	<0.010	<0.010	0.015	0.015	0.016	0.019	<0.010	<0.010	0.018	<0.010	0.030	<0.010	0.016	<0.050	<0.050	<0.20	<0.010	0.014	**0.030**
	07/22/16	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/8/16	0.11	0.012	0.01	0.018	**0.027**	0.025	0.019	0.016	0.013	0.029	<0.010	**0.043**	0.052	0.013	0.083	<0.050	0.38	0.011	0.049	0.038
	8/3/17	0.052	0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.036	0.024	<0.010	<0.050	<0.050	<0.20	<0.010	0.018	0.017
	12/18/17	0.13	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.048	<0.010	0.14	0.057	0.54	<0.010	0.030	0.012
	07/25/18	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11-23-18	0.15	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.076	<0.010	0.13	0.062	0.49	<0.010	0.043	0.01
	07/29/19	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.020 *	<0.010	<0.010
WB-1-SW	07/23/13	0.11	0.021	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	0.018	0.054	<0.010	<0.20	<0.050	<0.05	<0.010	0.066	<0.010
	12/22/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.011	<0.010
	07/27/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11/18/15 [FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	11/18/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/22/16	0.019	<0.010	<0.010	<0.010	**0.025**	0.029	0.012	0.013	0.017	0.15	<0.010	**0.16**	0.011	0.011	<0.050	<0.050	<0.20	<0.010	0.07	**0.092**
	12/8/16 [FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/8/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	8/3/17	0.029	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	<0.010	**0.044**	0.016	<0.010	<0.050	<0.050	<0.20	<0.010	0.035	**0.027**
	12-18-17 [FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/18/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/25/18	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.023	<0.010
	11-23-18	0.25	0.12	**0.84**	**1.6**	**1.3**	**1.1**	**0.69**	**0.61**	**0.67**	**1.7**	0.20	**3.3**	0.33	**0.64**	0.059	0.063	<0.20	0.31	**2.3**	**2.5**
	11-23-18 FD	0.22	0.11	**0.97**	**1.6**	**1.1**	**0.99**	**0.60**	**0.56**	**0.59**	**1.7**	0.17	**3.1**	0.30	**0.58**	<0.050	0.057	<0.20	0.27	**2.1**	**2.5**
	07/29/19	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.020 *	<0.010	<0.010
	07-29-19 [FD]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.017	<0.010

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(j)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Perylene	Phenanthrene	Pyrene
Units		µg/L																			
NSE Tier 1 EQS Marine Water [1]		6	6	-	-	0.01	-	-	-	-	0.1	-	11	12	-	1	2	1.4	-	4.6	0.02
CCME MAL [2]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	-	-
Battery Point/Narrows Calculated 95% UCL		-	-	-	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BP-1-SW	07/23/13	0.02	<0.03	<0.010	<0.010	<0.010	<0.010	<0.010	NM	<0.010	<0.010	<0.010	0.012	0.025	<0.010	<0.20	<0.050	<0.05	<0.03	0.034	0.01
	12/22/14	0.069	0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.041	0.083	<0.010	0.094	<0.050	<0.20	<0.010	0.065	0.036
	07/27/15	0.014	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010	<0.050	<0.050	<0.20	<0.010	0.015	<0.010
	11/18/15	0.052	0.067	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.018	0.058	<0.010	0.057	<0.050	<0.20	<0.010	0.042	0.022
	07/22/16	0.014	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	<0.010	<0.050	<0.050	<0.20	<0.010	0.012	<0.010
	12/8/16	0.059	0.055	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.046	<0.010	0.072	<0.050	<0.20	<0.010	0.03	0.016
	8/3/17	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/18/17	0.071	0.071	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	0.058	<0.010	0.091	<0.050	0.33	<0.010	0.044	0.018
	07/25/18	0.028	0.033	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	0.036	<0.010	<0.050	<0.050	<0.20	<0.010	0.028	<0.010
	11-23-18	0.071	0.067	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.022	0.063	<0.010	0.064	<0.050	0.20	<0.010	0.048	0.031
	07/29/19	0.017	<0.020 **	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	0.016	<0.010	<0.050	<0.050	<0.20	<0.020 *	0.016	<0.010
NARROWS	12/22/14	0.10	0.11	0.014	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.033	0.089	<0.010	0.013	<0.050	0.22	<0.51	0.065	0.030
	07/27/15	0.035	0.037	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.016	0.033	<0.010	<0.050	<0.050	<0.20	<0.010	0.026	0.014
	11/18/15	0.074	0.099	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.023	0.071	<0.010	0.068	<0.050	<0.20	<0.010	0.041	0.019
	07/22/16	0.024	0.02	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	0.021	<0.010	<0.050	<0.050	<0.20	<0.010	0.016	<0.010
	12/8/16	0.078	0.058	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.017	0.049	<0.010	0.069	<0.050	0.21	<0.010	0.031	0.016
	8/3/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	12/18/17	0.10	0.099	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.022	0.080	<0.010	0.12	<0.050	0.30	<0.010	0.048	0.018
	07/25/18	0.11	0.10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.03	0.098	<0.010	0.085	<0.050	0.41	<0.010	0.067	0.013
	11-23-18	0.077	0.069	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.033	0.062	<0.010	0.065	<0.050	0.22	<0.010	0.052	0.035
	07/29/19	0.031	0.023	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	<0.010	0.035	0.028	<0.010	<0.050	<0.050	<0.20	<0.020 *	0.029	0.029

NOTES:

FD - Field Duplicate

NM - Not Measured or not analyzed

mg/L - milligrams per liter

UCL - Upper Concentration Limit

* Elevated RDL(s) due to detected levels in the method blank

**Elevated PAH RDL(s) due to Matrix/co-extractive interference

- No applicable guideline criteria

1 - Nova Scotia Environment Tier I Environmental Quality Standards (EQS) for surface water (freshwater and marine) 2013

2 - Canadian Council of Ministers of the Environment (CCME) for the protection of aquatic life (freshwater and marine) 2014

3 - Guideline values for benzo(b)fluoranthene, benzo(j)fluoranthene and benzo(k)fluoranthene are to be compared to the sum of the parameters

Bold	Concentration exceeds Tier I EQS for surface water (freshwater)
Underline	Concentration exceeds Tier I EQS for surface water (marine)
Shading	Concentration exceeds CCME FWAL
Shading	Concentration exceeds CCME MAL
Double Underline	Concentration exceeds Upstream Calculated 95% Upper Concentration Limit
Dashed Border	Concentration exceeds Battery Point/Narrows Calculated 95% Upper Concentration Limit
Red	Concentration exceeds Pre-Construction/Baseline Calculated 95% Upper Concentration Limit

This summary is to be used in conjunction with, not as a replacement of, the Laboratory Certificates of Analysis

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Na	K	Ca	Mg	ALK	SO4	Cl	SiO2	OPO4	P	NO3	NO2	NO2-NO3	NH3	Colour	TOC	TURBIDITY	CONDUCTIVITY	pH	HARDNESS	BICARB ALKALINITY	CARB ALKALINITY	TDS	Anion Sum	Ion Balance	Langelier Index (@20C)	Langelier Index (@4C)	Sat. pH (@20C)	Sat. pH (@4C)
Units		µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	TCU	mg/L	NTU	µS/cm	pH	mg/L	mg/L	mg/L	mg/L	me/L	%	unitless	unitless	unitless	unitless
NSE Tier 1 EQS Fresh Water [1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME FWAL [2]		-	-	-	-	-	-	120	-	-	-	13	0.06	-	1 [3]	-	-	-	-	6.5-9.0	-	-	-	-	-	-	-	-	-	-
Upstream Calculated 95% UCL		-	-	-	-	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	-	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CB-SW	07/23/13	41100	1710	52000	5620	140	6.5	67	8.7	<0.010	<100	<0.05	<0.010	<0.05	<0.05	24	4.4	0.5	500	7.63	150	140	<1.0	270	4.81	0.93	0.08	-0.17	7.55	7.8
	12/22/14	20000	1400	27000	3700	62	26	30	7.3	0.046	110	0.18	<0.010	0.18	0.081	29	4.4	1.1	270	7.74	82	61	<1.0	150	2.65	1.53	-0.418	-0.669	8.16	8.41
	07/27/15	38000	1800	33000	4300	96	16	55	10.0	0.12	210	<0.050	<0.010	<0.050	0.087	9	2.0	1.1	380	7.95	99	95	<1.0	220	3.81	1.60	0.0480	-0.201	7.90	8.15
	11/18/15	27000	1700	28000	3800	72	24	43	7.6	0.048	110	0.12	<0.010	0.12	<0.050	20	5.3	2.1	320	7.81	84	72	<1.0	180	3.17	4.11	-0.271	-0.521	8.08	8.33
	07/22/16	27000	1400	27000	3500	75	10	40	8.6	0.096	140	0.11	0.012	0.12	0.052	65	9.8	1.6	270	7.88	82	75	<1.0	160	2.86	0	-0.188	-0.439	8.07	8.32
	12/8/16	22000	1400	26000	3400	65	23	48	7.1	0.033	<100	0.19	<0.010	0.19	<0.050	30	4.9	1.9	280	7.46	78	65	<1.0	170	3.12	9.86	-0.694	-0.944	8.15	8.4
	8/3/17	33000	2200	30000	3900	97	12	56	10	0.15	330	<0.010	0.06	0.06	0.071	<5.0	1.9	0.88	370	7.99	92	96	<1.0	210	3.76	5.92	0.065	-0.185	7.93	8.18
	12/18/17	22000	1300	26000	3500	66	24	38	7.3	0.038	<100	0.13	<0.01	0.13	<0.050	26	5.7	2.1	280	7.79	80	65	<1.0	160	2.89	5.47	-0.345	-0.595	8.14	8.39
	07-25-18	DRY - NO SAMPLE																												
	11-23-18	68000	1300	29000	3500	58	32	130	6.5	<0.010	<100	0.19	<0.010	0.19	0.059	36	5.8	1.2	550	7.70	88	58	<1.0	300	5.38	6.11	-0.494	-0.743	8.19	8.44
	07/29/19	DRY - NO SAMPLE																												
NRC-1-SW	07/23/13	27800	1560	16600	1370	46	19	27	9.6	0.022	<100	0.092	0.011	0.1	0.098	19	3.9	1.3	220	8.31	47	45	<1.0	131	2.09	2.56	-0.172	-0.423	8.48	8.73
	12/22/14	13000	640	12000	1500	17	20	20	5.1	<0.010	<100	0.21	<0.010	0.21	<0.050	10	2.2	0.51	140	7.28	36	17	<1.0	84	1.34	0.37	-1.75	-2.01	9.03	9.28
	07/27/15	20000	480	19000	2100	44	22	29	6.0	<0.010	<100	0.077	<0.010	0.077	0.077	42	5.8	2.4	220	7.47	56	44	<1.0	130	2.16	2.61	-0.963	-1.21	8.43	8.68
	11/18/15	14000	1000	12000	1800	25	15	25	5.7	<0.010	130	0.10	<0.010	0.10	<0.050	15	4.2	21	160	7.37	38	25	<1.0	95	1.51	0.980	-1.49	-1.74	8.86	9.11
	07/22/16	20000	690	18000	2200	49	15	25	5.8	0.012	<100	0.13	<0.010	0.13	<0.050	42	8.1	1.6	200	7.96	55	48	<1.0	120	2	0.25	-0.447	-0.698	8.41	8.66
	12/8/16	15000	680	12000	1600	21	16	26	5.3	<0.010	<100	0.19	<0.010	0.19	0.1	11	2.2	2.3	160	7.21	36	21	<1.0	90	1.49	3.47	-1.74	-1.99	8.95	9.2
	8/3/17	DRY - NO SAMPLE																												
	12/18/17	15000	730	12000	1700	21	21	25	5.7	<0.010	<100	0.21	<0.010	0.21	<0.050	6.7	3.3	0.71	170	7.22	36	21	<1.0	94	1.57	6.44	-1.74	-1.99	8.95	9.2
	07-25-18	25000	770	20000	2400	48	12	39	5.5	<0.010	<100	0.12	<0.010	0.12	<0.050	24	6.4	1.7	260	7.73	59	48	<1.0	140	2.32	0.22	-0.657	-0.907	8.38	8.63
	11-23-18	49000	710	12000	1700	21	17	87	5.0	<0.010	<100	0.14	<0.010	0.14	<0.050	12	2.7	0.89	350	6.98	38	21	<1.0	190	3.24	5.37	-1.99	-2.24	8.97	9.22
	07/29/19	24000	630	19000	2400	52	15	34	6.6	<0.010	<100	<0.010	0.077	0.077	<0.050	49	6.2	2.7	220	7.86	57	52	<1.0	130	2.32	1.98	-0.508	-0.759	8.37	8.62
SRC-1-SW	07/23/13	39700	2290	51700	7230	110	40	59	6.7	<0.010	<100	<0.05	<0.010	<0.05	<0.05	14	4.9	0.46	500	8.37	160	110	2.4	272	4.67	3.11	0.7	0.451	7.67	7.92
	12/22/14[FD]	34000	2700	46000	4800	87	53	56	8.3	<0.010	<100	0.24	0.025	0.26	0.20	16	4.6	5.0	450	7.92	130	86	<1.0	260	4.44	2.42	0.108	-0.141	7.81	8.06
	12/22/14	34000	2600	46000	4800	86	54	56	7.6	<0.010	<100	0.23	0.023	0.25	0.21	16	4.8	5.4	440	7.80	140	85	<1.0	260	4.43	1.84	-0.01	-0.259	7.81	8.06
	07/27/15[FD]	40000	1900	42000	4700	95	46	55	6.6	<0.010	<100	0.092	<0.010	0.092	0.084	17	5.0	1.5	430	7.79	120	94	<1.0	250	4.41	1.73	-0.024	-0.273	7.81	8.06
	07/27/15	38000	1800	41000	4300	95	47	57	6.7	<0.010	<100	0.092	<0.010	0.092	0.079	16	5.0	1.6	430	7.66	120	95	<1.0	250	4.49	4.54	-0.157	-0.407	7.82	8.07
	11/18/15	32000	2700	41000	4600	94	43	51	5.7	<0.010	<100	0.076	<0.010	0.076	<0.050	13	5.0	4.4	430	7.87	120	93	<1.0	240	4.22	3.94	0.0500	-0.200	7.82	8.07
	07/22/16	33000	2900	48000	5600	100	51	46	8.9	0.013	<100	0.08	<0.010	0.08	<0.050	22	7.3	1.8	420	7.99	140	100	<1.0	260	4.39	0	0.266	0.016	7.73	7.98
	12/8/16	51000	2300	42000	4500	86	42	110	7.8	0.012	<100	0.15	0.012	0.16	0.17	19	4.3	7.3	520	7.58	120	86	<1.0	310	5.58	7.72	-0.29	-0.539	7.87	8.12
	8/3/17	50000	2800	51000	5400	120	54	85	10	<0.010	<100	0.014	<0.050	0.055	0.073	14	5.7	1.2	580	8.15	150	110	1.5	330	5.83	5.42	0.492	0.243	7.66	7.91
	12/18/17	40000	3000	44000	5300	87	50	73	8.7	<0.010	160	0.20	0.013	0.21	0.39	23	5.7	42	470	7.8	130	87	<1.0	290	4.87	2.42	-0.027	-0.276	7.83	8.08
	07-25-18[FD]	45000	2700	50000	6000	120	43	63	1.8	<0.010	140	0.066	<0.010	0.066	<0.050	19	8.5	250	530	8	150	120	1.1	290	5.06	1.65	0.348	0.099	7.65	7.9
	07-25-18	48000	2700	48000	2600	110	43	69	2.0	<0.010	180	0.085	<0.010	0.085	<0.050	18	11	140	540	8.14	140	110	1.4	290	5.09	0.1	0.447	0.197	7.69	7.94
	11-23-18	50000	2200	40000	4400	91	46	90	7.7	<0.010	<100	0.19	0.011	0.20	0.41	22	5.3	6.8	530	7.71	120	91	<1.0	300	5.32	6.61	-0.152	-0.401	7.86	8.11
	07/29/19	INSUFFICIENT WATER PRESENT - NO SAMPLE																												
COB-A-SW	07/23/13	94700	27000	336000	34900	150	740	150	22	<0.010	<100	3.5	<0.010	3.5	<0.05	5.3	4.8	0.1	2000	7.90	980	150	1.1	1510	22.8	3.51	1	0.756	6.9	7.14
	12/22/14	23000	3300	88000	13000	97	160	37	13	<0.010	<100	0.4	<0.010	0.4	<0.050	5.4	2	0.41	640	7.68	270	96	<1.0	400	6.32	1.94	0.165	-0.084	7.52	7.76
	07/27/15	DRY - NO SAMPLE																												
	11/18/15	24000	3700	88000	13000	120	170	33	12	0.013	<100	0.25	<0.010	0.25	<0.050	<5.0	2.6	0.25	640	7.95	270	120	<1.0	420	6.88	2.38	0.505	0.257	7.44	7.69
	07/22/16	DRY - NO SAMPLE																												
	12/8/16	22000	4000	81000	11000	110	150	47	13	0.015	<100	0.49	0.012	0.51	0.59	6.3	2.8	0.35	640	7.75	250	100	<1.0	400	6.65	4.64	0.235	-0.014	7.52	7.77
	8/3/17	DRY - NO SAMPLE																												
	12/18/17	DRY - NO SAMPLE																												
	07-25-18	27000	1600	80	9300	140	100	37	16	<0.010	0.16	<0.05	<0.010	<0.05	<0.050	8.2	3.3	2.4	600	8.05	240	140	1.5	370	5.99	2.44	0.658	0.409	7.39	7.64
	11-23-18	21000	2300	70000	10,000	110	110	32	13	<0.010	<100	0.24	<0.010	0.24	0.050	6.2	2.3	14	540	7.78	220	110	<1.0	330	5.42	0.840	0.216	-0.033	7.56	7.81
	07/29/19	29000	1700	75000	9,000	140	100	40	15	<0.010	<100	<0.010	<0.050	<0.050	<0.050	9.2	2.6	0.84	550	8.02	220	140	1.4	360	6.09	2.78	0.611	0.363	7.41	7.66

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Al	Sb	As	Ba	Be	Bi	B	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	Sr	Tl	Sn	Ti	U	V	Zn
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	NSE Tier 1 EQS Fresh Water [1]	5	20	5.0	1000	5.3	-	1200	0.01	-	10	2	300	1	820	0.026	73	25	1.0	0.1	21000	0.8	-	-	300	6	30
	CCME FWAL [2]	100 [5]	-	5	-	-	-	1500	0.09	1 [4]	-	2 [6]	300	1 [7]	-	0.026	73	25 [8]	1	0.25	-	0.8	-	-	15	-	7
	Upstream Calculated 95% UCL	220	-	1.6	-	-	-	-	0.1	8.3	-	-	3318	1.2	583	-	-	-	1.9	-	132	-	-	-	-	-	-
	Pre-Construction/Baseline Calculated 95% UCL	-	-	1.98	-	-	-	-	-	-	1.3	-	1900	-	800	-	-	-	-	-	210	-	-	-	-	-	-
CB-SW	07/23/13	**28.5**	<1.0	1.4	61.9	<1.0	<2.0	<50	**0.016**	1.3	<0.40	2.0	**454**	<0.50	**3690**	NM	<2.0	<2.0	<1.0	<0.10	196	<0.10	<2.0	<2.0	0.37	<2.0	<5
	12/22/14	**110**	<1.0	<1.0	27	<1.0	<2.0	<50	**0.018**	<1.0	<0.40	<2.0	290	<0.50	190	<0.013	<2.0	<2.0	<1.0	<0.10	130	<0.10	<2.0	3.5	0.17	<2.0	6.0
	07/27/15	**28**	<1.0	<1.0	52	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	260	<0.50	61	<0.013	<2.0	<2.0	<1.0	<0.10	320	<0.10	<2.0	<2.0	<0.10	<2.0	9.0
	11/18/15	**130**	<1.0	<1.0	29	<1.0	<2.0	<50	**0.011**	<1.0	<0.40	<2.0	280	<0.50	140	<0.013	<2.0	<2.0	<1.0	<0.10	140	<0.10	<2.0	4.3	0.12	<2.0	6.1
	07/22/16	**55**	<1.0	1.4	30	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	**640**	<0.50	71	<0.013	<2.0	<2.0	<1.0	<0.10	160	<0.10	<2.0	5.6	<0.10	<2.0	<5.0
	12/8/16	**84**	<1.0	<1.0	25	<1.0	<2.0	<50	**0.017**	<1.0	<0.40	<2.0	**330**	<0.50	310	<0.013	<2.0	<2.0	<1.0	<0.10	110	<0.10	<2.0	<2.0	0.14	<2.0	<5.0
	8/3/17	**150**	<1.0	1.4	87	<1.0	<2.0	<50	<0.010	1.0	<0.40	<2.0	**750**	0.61	380	<0.013	<2.0	<2.0	<1.0	<0.10	340	<0.10	<2.0	2.9	<0.10	2.6	<5.0
	12/18/17	**91**	<1.0	<1.0	28	<1.0	<2.0	<50	**0.015**	<1.0	<0.40	<2.0	**300**	<0.50	200	<0.013	<2.0	<2.0	<1.0	<0.10	130	<0.10	<2.0	2.4	0.11	<2.0	<5.0
	07-25-18	DRY - NO SAMPLE																									
	11-23-18	**91**	<1.0	<1.0	16	<1.0	<2.0	<50	**0.014**	<1.0	<0.40	<2.0	210	<0.50	210	<0.013	<2.0	<2.0	<1.0	<0.10	77	<0.10	<2.0	2.4	0.19	<2.0	5.5
	07/29/19	DRY - NO SAMPLE																									
NRC-1-SW	07/23/13	**131**	<1.0	1.4	11.8	<1.0	<2.0	<50	**0.021**	<1.0	<0.40	**3.1**	148	**1.53**	69.1	NM	<2.0	<2.0	<1.0	<0.10	64.7	<0.10	<2.0	2.4	0.21	2.2	5.3
	12/22/14	**58**	<1.0	<1.0	12	<1.0	<2.0	<50	**0.022**	<1.0	<0.40	<2.0	150	<0.50	85	<0.013	<2.0	<2.0	<1.0	<0.10	32	<0.10	<2.0	<2.0	<0.10	<2.0	9.1
	07/27/15	**45**	<1.0	<1.0	11	<1.0	<2.0	<50	**0.019**	<1.0	<0.40	<2.0	**1300**	<0.50	75	<0.013	<2.0	<2.0	<1.0	<0.10	54	<0.10	<2.0	<2.0	<0.10	<2.0	11
	11/18/15	**1500**	<1.0	3.5	29	<1.0	<2.0	<50	**0.14**	1.9	1.5	**5**	**3800**	**9.5**	**1100**	<0.013	<2.0	3.3	<1.0	<0.10	36	<0.10	<2.0	34	0.14	3	27
	07/22/16	**31**	<1.0	<1.0	10	<1.0	<2.0	<50	**0.016**	<1.0	<0.40	<2.0	**970**	0.61	47	<0.013	<2.0	<2.0	<1.0	<0.10	52	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	12/8/16	**110**	<1.0	<1.0	19	<1.0	<2.0	<50	**0.025**	<1.0	<0.40	<2.0	**360**	0.8	200	<0.013	<2.0	<2.0	<1.0	<0.10	34	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	8/3/17	DRY - NO SAMPLE																									
	12/18/17	**34**	<1.0	<1.0	11	<1.0	<2.0	<50	**0.016**	<1.0	<0.40	<2.0	140	<0.50	87	<0.013	<2.0	<2.0	<1.0	<0.10	31	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	07-25-18	**270**	<1.0	<1.0	14	<1.0	<2.0	<50	**0.012**	<1.0	<0.40	**2.5**	**460**	0.99	62	<0.013	<2.0	<2.0	<1.0	<0.10	60	<0.10	<2.0	7.0	0.10	<2.0	<5.0
	11-23-18	**36**	<1.0	<1.0	13	<1.0	<2.0	<50	**0.015**	<1.0	<0.40	<2.0	130	<0.50	61	<0.013	<2.0	<2.0	<1.0	<0.10	35	<0.10	<2.0	<2.0	<0.1	<2.0	6.7
	07/29/19	**46**	<1.0	<1.0	9.7	<1.0	<2.0	<50	**0.018**	<1.0	<0.40	0.77	**1400**	<0.50	130	<0.013	<2.0	<2.0	<1.0	<0.10	55	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
SRC-1-SW	07/23/13	**29**	<1.0	1.2	10.2	<1.0	<2.0	57	<0.01	<1.0	<0.40	<2.0	69	<0.50	41.4	NM	<2.0	<2.0	<1.0	<0.10	174	<0.10	<2.0	<2.0	0.38	<2.0	<5
	12/22/14[FD]	**350**	<1.0	<1.0	17	<1.0	<2.0	110	**0.042**	<1.0	<0.40	**2.8**	**350**	**1.2**	200	<0.013	<2.0	<2.0	<1.0	<0.10	150	<0.10	<2.0	6.8	0.40	<2.0	7.0
	12/22/14	**290**	<1.0	<1.0	17	<1.0	<2.0	110	**0.035**	<1.0	<0.40	**2.6**	**340**	**1.2**	190	<0.013	<2.0	<2.0	<1.0	<0.10	150	<0.10	<2.0	6.6	0.40	<2.0	6.9
	07/27/15[FD]	**51**	<1.0	1.0	17	<1.0	<2.0	64	**0.015**	1.5	<0.40	<2.0	190	<0.50	260	<0.013	<2.0	<2.0	<1.0	<0.10	150	<0.10	<2.0	<2.0	0.32	<2.0	8.4
	07/27/15	**51**	<1.0	1.0	16	<1.0	<2.0	63	**0.013**	<1.0	<0.40	**24**	210	**1.1**	260	<0.013	<2.0	<2.0	<1.0	<0.10	150	<0.10	<2.0	2.4	0.29	<2.0	9.5
	11/18/15	**240**	<1.0	<1.0	16	<1.0	<2.0	57	**0.023**	1.2	<0.40	**2.2**	**310**	0.75	230	<0.013	<2.0	<2.0	<1.0	<0.10	150	<0.10	<2.0	5.3	0.33	<2.0	<5.0
	07/22/16	**50**	<1.0	1.9	11	<1.0	<2.0	91	**0.018**	<1.0	<0.40	<2.0	**350**	<0.50	350	<0.013	<2.0	<2.0	<1.0	<0.10	170	<0.10	<2.0	2.1	0.38	<2.0	<5.0
	12/8/16	**300**	<1.0	<1.0	18	<1.0	<2.0	54	**0.039**	1.0	<0.40	**2.7**	**400**	**1.6**	200	<0.013	<2.0	<2.0	<1.0	<0.10	140	<0.10	<2.0	13	0.35	<2.0	5.7
	8/3/17	**24**	<1.0	1.8	19	<1.0	<2.0	130	<0.010	<1.0	<0.40	<2.0	150	<0.50	91	<0.013	<2.0	<2.0	<1.0	<0.10	190	<0.10	<2.0	<2.0	0.4	<2.0	<5.0
	12/18/17	**3000**	<1.0	4.1	79	<1.0	<2.0	91	**0.31**	4.9	1.7	**11**	**4600**	**10**	**2200**	<0.013	<2.0	3.2	<1.0	<0.10	140	<0.10	<2.0	46	0.58	**7.5**	**50**
	07-25-18[FD]	**1600**	<1.0	3.5	45	<1.0	<2.0	120	**0.18**	2.5	1.2	**5.3**	**3400**	**9.5**	**2600**	**0.04**	<2.0	2.1	<1.0	<0.10	180	<0.10	<2.0	34	0.54	**4.9**	**30**
	07-25-18	**2500**	1.1	4.9	58	<1.0	<2.0	120	**0.26**	4.0	1.9	**7.9**	**5500**	**12**	**2600**	**0.04**	<2.0	3.4	<1.0	<0.10	170	<0.10	<2.0	50	0.56	**7.4**	**47**
	11-23-18	**320**	<1.0	<1.0	16	<1.0	<2.0	74	**0.027**	<1.0	<0.40	**2.7**	**420**	**1.3**	160	<0.013	<2.0	<2.0	<1.0	<0.10	130	<0.10	<2.0	9.3	0.32	<2.0	6.2
	07/29/19	INSUFFICIENT WATER PRESENT - NO SAMPLE																									
COB-A-SW	07/23/13	**17.2**	<1.0	<1.0	56.2	<1.0	<2.0	415	**0.015**	<1.0	<0.40	<2.0	56	<0.50	27.9	NM	<2.0	<2.0	<1.0	<0.10	671	<0.10	<2.0	<2.0	2.14	<2.0	<5
	12/22/14	**16**	<1.0	<1.0	14	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	51	<0.50	25	<0.013	<2.0	<2.0	<1.0	<0.10	260	<0.10	<2.0	<2.0	0.38	<2.0	<5.0
	07/27/15	DRY - NO SAMPLE																									
	11/18/15	**5.1**	<1.0	<1.0	15	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	82	<0.50	74	<0.013	<2.0	<2.0	<1.0	<0.10	260	<0.10	<2.0	<2.0	0.42	<2.0	<5.0
	07/22/16	DRY - NO SAMPLE																									
	12/8/16	**8.5**	<1.0	<1.0	12	<1.0	<2.0	85	<0.010	<1.0	<0.40	<2.0	68	<0.50	92	<0.013	<2.0	<2.0	<1.0	<0.10	250	<0.10	<2.0	<2.0	0.32	<2.0	<5.0
	8/3/17	DRY - NO SAMPLE																									
	12/18/17	DRY - NO SAMPLE																									
	07-25-18	**300**	<1.0	2.6	73	<1.0	<2.0	58	**0.058**	<1.0	1.6	**2.2**	**9100**	**1.4**	**2900**	<0.013	<2.0	3	<1.0	<0.10	270	<0.10	<2.0	4.6	0.5	<2.0	14
	11-23-18	**46**	<1.0	<1.0	16	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	**810**	<0.50	300	<0.013	<2.0	<2.0	<1.0	<0.10	210	<0.10	<2.0	2	0.31	<2.0	<5.0
	07/29/19	**10**	<1.0	<1.0	18	<1.0	<2.0	53	<0.010	<1.0	<0.40	<0.50	240	<0.50	290	<0.013	<2.0	<2.0	<1.0	<0.10	240	<0.10	<2.0	<2.0	0.49	<2.0	<5.0

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Na	K	Ca	Mg	ALK	SO4	Cl	SiO2	OPO4	P	NO3	NO2	NO2-NO3	NH3	Colour	TOC	TURBIDITY	CONDUCTIVITY	pH	HARDNESS	BICARB ALKALINITY	CARB ALKALINITY	TDS	Anion Sum	Ion Balance	Langelier Index (@20C)	Langelier Index (@4C)	Sat. pH (@20C)	Sat. pH (@4C)
Units		µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	TCU	mg/L	NTU	µS/cm	pH	mg/L	mg/L	mg/L	mg/L	me/L	%	unitless	unitless	unitless	unitless
NSE Tier 1 EQS Fresh Water [1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME FWAL [2]		-	-	-	-	-	-	120	-	-	-	13	0.06	-	1 [3]	-	-	-	-	6.5-9.0	-	-	-	-	-	-	-	-	-	-
Upstream Calculated 95% UCL		-	-	-	-	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	-	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COB-B-SW	07/27/15	DRY - NO SAMPLE																												
	11/18/15	25000	3800	89000	13000	110	190	35	11	0.013	<100	0.35	<0.010	0.35	<0.050	<5.0	2.4	<0.10	670	7.86	280	110	<1.0	430	7.13	3.03	0.393	0.144	7.46	7.71
	07/22/16	DRY - NO SAMPLE																												
	12/8/16	68000	20000	200000	21000	170	440	140	17	0.017	<100	0.56	0.017	0.58	8.1	9.7	6.2	0.4	1600	7.4	590	170	<1.0	1000	16.7	2.77	0.378	0.132	7.02	7.27
	8/3/17	DRY - NO SAMPLE																												
	12/18/17	21000	2400	63000	9800	96	120	34	12	<0.010	<100	0.31	<0.010	0.31	0.06	<5.0	3.4	0.77	510	7.47	200	96	<1.0	320	5.37	4.07	-0.179	-0.428	7.65	7.89
	07-25-18	DRY - NO SAMPLE																												
	11-23-18	21000	2200	65000	9200	95	110	32	11	<0.010	<100	0.30	<0.010	0.30	0.065	6.2	2.2	1.1	520	7.41	200	94	<1.0	310	5.10	1.29	-0.229	-0.478	7.64	7.88
	07/29/19	DRY - NO SAMPLE																												
COB-4-SW	12/22/14	20000	1600	34000	3600	53	47	31	7.4	<0.010	<100	0.26	<0.010	0.26	0.057	12	3	1.5	300	7.70	99	52	<1.0	180	2.92	0.17	-0.431	-0.681	8.13	8.38
	07/27/15	37000	2900	60000	6300	94	100	58	8.5	<0.010	<100	0.31	0.013	0.33	<0.050	11	4.1	1.8	530	7.72	180	93	<1.0	330	5.65	4.15	0.036	-0.213	7.68	7.93
	11/18/15	21000	2800	33000	4600	58	41	33	7.5	0.012	390	0.18	<0.010	0.18	<0.050	14	9.3	140	310	7.56	100	58	<1.0	190	2.96	8.50	-0.540	-0.790	8.10	8.35
	07/22/16	34000	2400	55000	5300	98	74	54	9.2	0.015	<100	0.15	<0.010	0.15	<0.050	19	5.2	1.3	460	7.91	160	98	<1.0	300	5.06	3.27	0.223	-0.026	7.69	7.94
	07/22/16 [FD]	36000	2500	55000	5700	99	72	49	9.1	0.016	<100	0.15	<0.010	0.15	<0.050	18	4.8	1.2	460	7.85	160	99	<1.0	290	4.89	0.31	0.169	-0.081	7.68	7.93
	12/8/16	19000	1300	28000	2900	49	39	34	7.4	0.012	<100	0.27	<0.010	0.27	0.083	8.8	2.6	2.7	270	7.76	81	49	<1.0	160	2.79	5.08	-0.477	-0.727	8.24	8.49
	8/3/17	44000	3300	78000	7600	130	110	72	11	<0.010	<100	<0.010	0.12	0.12	0.061	<5.0	2.6	0.46	690	7.98	230	130	1.2	410	6.98	3.41	0.543	0.295	7.44	7.68
	8/3/17 [FD]	46000	3500	81000	7700	140	110	71	11	<0.010	<100	<0.010	0.1	0.1	0.11	<5.0	2.5	0.34	700	8.15	230	130	1.8	410	6.98	1.45	0.73	0.482	7.42	7.67
	12/18/17	20000	1200	28000	3000	45	42	32	7.8	<0.010	<100	0.22	<0.010	0.22	0.07	7.8	2.7	1.30	280	7.72	81	45	<1.0	160	2.71	3.24	-0.560	-0.810	8.28	8.53
	07-25-18	64000	2500	60000	5200	76	100	110	7.9	<0.010	<100	<0.05	<0.010	<0.05	<0.050	12	4.0	0.42	720	8.84	170	71	4.6	400	6.68	3.01	1.02	0.772	7.81	8.06
	07-25-18	64000	2500	60000	5200	76	100	110	7.9	<0.010	<100	<0.05	<0.010	<0.05	<0.050	12	4.0	0.42	720	8.84	170	71	4.6	400	6.68	3.01	1.02	0.772	7.81	8.06
	11-23-18	56000	1800	38000	4200	73	41	97	7.1	<0.010	<100	0.26	<0.010	0.26	0.21	23	5.0	2.0	520	7.85	110	72	<1.0	290	5.07	3.79	-0.130	-0.379	7.98	8.23
	07/29/19	35000	1700	51000	5000	97	69	53	10	<0.010	<100	<0.010	0.11	0.11	0.074	18	4.1	1.4	470	7.80	150	96	<1.0	280	4.88	3.61	0.0810	-0.168	7.72	7.97
COB-6-SW	07/23/13	69200	5110	98900	9820	81	170	110	11	<0.010	<100	0.35	<0.010	0.35	<0.05	7.2	2.4	0.38	890	8.36	290	79	1.7	520	8.18	4.1	0.78	0.532	7.58	7.83
	12/22/14	22000	1800	39000	3800	58	56	35	8.3	<0.010	<100	0.28	0.011	0.29	0.1	11	2.6	0.87	340	7.86	110	57	<1.0	200	3.33	0.76	-0.173	-0.423	8.04	8.29
	07/27/15	39000	2600	57000	5000	93	91	61	8.4	<0.010	<100	0.18	0.015	0.19	<0.050	10	3.7	0.98	520	8.46	160	91	2.5	320	5.5	4.46	0.75	0.501	7.71	7.96
	11/18/15	27000	2100	37000	3700	70	44	42	7.6	0.012	<100	0.16	<0.010	0.16	<0.050	10	3.7	4.9	360	7.96	110	69	<1.0	210	3.51	1.89	-0.023	-0.273	7.98	8.23
	07/22/16	40000	2400	55000	4700	99	64	67	8.2	0.015	<100	0.081	<0.010	0.081	<0.050	23	5.3	1	490	8.05	160	98	1.0	300	5.21	2.46	0.365	0.116	7.69	7.94
	12/8/16	26000	1700	34000	3400	60	41	53	7.9	0.014	<100	0.27	0.01	0.28	<0.050	12	2.9	3.4	340	7.87	100	60	<1.0	210	3.56	5.33	-0.203	-0.453	8.08	8.33
	8/3/17	74000	3300	61000	5300	72	110	130	9.9	<0.010	<100	<0.010	0.082	0.082	0.093	6.3	3.1	0.29	760	8.83	170	67	4.3	430	7.29	3.7	0.989	0.74	7.84	8.09
	12/18/17	26000	1600	34000	3400	60	48	44	8.4	<0.010	<100	0.26	<0.010	0.26	0.05	13	3.5	2.7	350	7.6	99	60	<1.0	200	3.46	4.22	-0.473	-0.723	8.08	8.33
	07-25-18	43000	2800	72000	6600	130	95	67	9.7	<0.010	<100	0.14	<0.010	0.14	<0.050	12	4.1	0.6	640	7.99	210	120	1.1	370	6.41	2.56	0.499	0.25	7.49	7.74
	11-23-18	44000	1500	33000	3400	56	45	76	7.6	<0.010	<100	0.20	<0.010	0.20	0.084	15	3.5	1.8	440	7.95	96	55	<1.0	240	4.19	3.71	-0.191	-0.440	8.14	8.39
	07/29/19	44000	2100	56000	4300	100	76	72	8.9	<0.010	<100	<0.010	0.064	0.06	<0.050	16	4.1	1.0	530	8.68	160	96	4.3	320	5.63	4.65	0.986	0.737	7.70	7.95
WB-1-SW	07/23/13	5750000	210000	323000	667000	83	1500	11000	2	<0.010	<1000	0.051	<0.010	0.051	0.2	9.6	<5	6	31000	7.65	3600	82	<1.0	19000	330	0.43	0.178	-0.059	7.47	7.71
	12/22/14	12000	700	7500	1400	17	7.9	21	3.4	0.011	<100	0.14	<0.010	0.14	0.12	32	3.7	0.83	120	7.19	25	17	<1.0	65	1.1	2.33	-2.04	-2.29	9.23	9.48
	07/27/15	19000	860	12000	2200	28	10	32	3.6	0.023	<100	0.16	0.016	0.18	0.18	51	6.3	0.82	170	7.44	39	28	<1.0	98	1.68	0.00	-1.37	-1.62	8.82	9.07
	11/18/15 [FD]	14000	760	9200	1600	23	8.3	26	3.9	0.012	<100	0.098	<0.010	0.098	<0.050	30	4.5	0.18	140	7.42	29	23	<1.0	77	1.36	6.25	-1.59	-1.84	9.01	9.26
	11/18/15	14000	760	9600	1600	23	8.3	24	3.9	0.012	<100	0.11	<0.010	0.11	<0.050	30	4.3	0.67	140	7.45	31	23	<1.0	77	1.32	3.13	-1.54	-1.79	8.99	9.24
	07/22/16	1600000	54000	79000	190000	62	410	2900	4.2	0.024	<100	0.22	0.021	0.24	0.084	37	16	2.2	8500	7.52	980	62	<1.0	5300	92.8	2.21	-0.583	-0.823	8.11	8.35
	12/8/16 [FD]	14000	770	9400	1700	22	8.5	24	3.7	0.03	<100	0.15	<0.010	0.15	0.13	26	3.7	1.1	140	7.29	30	22	<1.0	76	1.3	1.56	-1.71	-1.97	9.01	9.26
	12/8/16	14000	800	9700	1600	22	8.4	25	3.8	0.03	<100	0.15	<0.010	0.15	0.14	27	3.6	1.2	140	7.46	31	22	<1.0	77	1.33	3.1	-1.54	-1.79	9	9.25
	8/3/17	940000	35000	82000	110000	97	230	1600	5.2	<0.010	<100	<0.010	0.055	0.055	0.075	9	2.6	1.8	5900	7.73	660	96	<1.0	3100	52	2.7	-0.088	-0.33	7.81	8.06
	12-18-17 [FD]	11000	610	7400	1400	19	8.3	21	3.4	<0.010	<100	0.11	<0.010	0.11	<0.050	32	4.9	0.78	120	7.18	24	19	<1.0	66	1.16	7.91	-1.99	-2.24	9.17	9.42
	12/18/17	11000	590	7600	1400	19	8.0	21	3.4	<0.010	<100	0.11	<0.010	0.11	<0.050	30	4.8	0.75	110	7.28	25	19	<1.0	65	1.13	6.10	-1.88	-2.14	9.17	9.42
	07-25-18	220000	8500	33000	26000	63	71	460	4.0	<0.010	<100	0.16	0.013	0.17	0.051	21	4.3	1.3	1800	7.96	190	63	<1.0	870	15.8	7.17	-0.25	-0.497	8.21	8.46
	11-23-18	15000	820	7700	1600	17	6.5	26	3.0	<0.010	160	0.091	<0.010	0.091	<0.050	38	6.3	83	130	7.63	26	17	<1.0	75	1.21	4.35	-1.58	-1.83	9.21	9.47
	11-23-18 [FD]	15000	780	8000	1500	16	6.5	26	3.0	<0.010	<100	0.12	<0.010	0.12	0.41	39	6.2	50	130	7.29	26	16	<1.0	75	1.20	6.25	-1.93	-2.18	9.22	9.47
	07/29/19	33000	1500	16000	3900	35	14	67	4.0	<0.010	<100	<0.010	0.091	0.091	<0.050	43	5.3	0.79	300	7.55	55	35	<1.0	160	2.89	5.28	-1.09	-1.34	8.64	8.89
	07-29-19 [FD]	39000	1500	16000	4800	36	16	77	3.9	<0.010	<100	<0.010	0.13	0.13	<0.050	40	5.2	0.91	320	7.54	60	36	<1.0	180	3.23	4.70	-1.08	-1.33	8.62	8.87

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Al	Sb	As	Ba	Be	Bi	B	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	Sr	Tl	Sn	Ti	U	V	Zn
Units		**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
NSE Tier 1 EQS Fresh Water [1]		5	20	5.0	1000	5.3	-	1200	0.01	-	10	2	300	1	820	0.026	73	25	1.0	0.1	21000	0.8	-	-	300	6	30
CCME FWAL [2]		100 [5]	-	5	-	-	-	1500	0.09	1 [4]	-	2 [6]	300	1 [7]	-	0.026	73	25 [8]	1	0.25	-	0.8	-	-	15	-	7
Upstream Calculated 95% UCL		220	-	1.6	-	-	-	-	0.1	8.3	-	-	3318	1.2	583	-	-	-	1.9	-	132	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	1.98	-	-	-	-	-	-	1.3	-	1900	-	800	-	-	-	-	-	210	-	-	-	-	-	-
COB-B-SW	07/27/15	DRY - NO SAMPLE																									
	11/18/15	**7.9**	<1.0	<1.0	18	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	<50	<0.50	21	<0.013	<2.0	<2.0	<1.0	<0.10	250	<0.10	<2.0	<2.0	0.42	<2.0	<5.0
	07/22/16	DRY - NO SAMPLE																									
	12/8/16	**13**	<1.0	<1.0	52	<1.0	<2.0	540	**0.027**	<1.0	0.90	<2.0	130	<0.50	**1400**	<0.013	<2.0	2.8	<1.0	<0.10	480	<0.10	<2.0	<2.0	0.68	<2.0	<5.0
	8/3/17	DRY - NO SAMPLE																									
	12/18/17	**6.7**	<1.0	<1.0	14	<1.0	<2.0	<50	<0.010	<1.0	0.42	<2.0	110	<0.50	490	<0.013	<2.0	<2.0	<1.0	<0.10	190	<0.10	<2.0	<2.0	0.18	<2.0	<5.0
	07-25-18	DRY - NO SAMPLE																									
	11-23-18	**7.0**	<1.0	<1.0	17	<1.0	<2.0	<50	<0.010	<1.0	0.46	<2.0	200	<0.50	500	<0.013	<2.0	<2.0	<1.0	<0.1	200	<0.10	<2.0	<2.0	0.27	<2.0	<5.0
	07/29/19	DRY - NO SAMPLE																									
COB-4-SW	12/22/14	**82**	<1.0	<1.0	20	<1.0	<2.0	<50	**0.014**	<1.0	<0.40	<2.0	210	<0.50	95	<0.013	<2.0	<2.0	<1.0	<0.10	140	<0.10	<2.0	3.2	0.18	<2.0	7.2
	07/27/15	**51**	<1.0	<1.0	32	<1.0	<2.0	60	<0.010	<1.0	<0.40	<2.0	**460**	<0.50	110	<0.013	<2.0	<2.0	<1.0	<0.10	250	<0.10	<2.0	2.1	0.35	<2.0	10
	11/18/15	**7100**	<1.0	13	77	<1.0	<2.0	<50	**0.29**	8.0	4.6	**17**	**14000**	**37**	**1500**	**0.082**	<2.0	9.5	<1.0	<0.10	150	0.18	<2.0	200	0.53	**14**	**96**
	07/22/16	**28**	<1.0	<1.0	24	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	300	<0.50	140	<0.013	<2.0	<2.0	<1.0	<0.10	270	<0.10	<2.0	<2.0	0.32	<2.0	<5.0
	07/22/16[FD]	**42**	<1.0	<1.0	26	<1.0	<2.0	<50	<0.010	<1.0	<0.40	2	**310**	<0.50	140	<0.013	<2.0	<2.0	<1.0	<0.10	280	<0.10	<2.0	<2.0	0.33	<2.0	<5.0
	12/8/16	**120**	<1.0	<1.0	19	<1.0	<2.0	<50	**0.014**	<1.0	<0.40	<2.0	**390**	0.99	180	<0.013	<2.0	<2.0	<1.0	<0.10	110	<0.10	<2.0	<2.0	0.18	<2.0	<5.0
	8/3/17	**13**	<1.0	<1.0	36	<1.0	<2.0	58	**0.011**	<1.0	<0.40	<2.0	83	<0.50	120	<0.013	<2.0	<2.0	<1.0	<0.10	440	<0.10	<2.0	<2.0	0.5	<2.0	<5.0
	8/3/17[FD]	**14**	<1.0	<1.0	37	<1.0	<2.0	63	<0.010	<1.0	<0.40	<2.0	83	<0.50	130	<0.013	<2.0	<2.0	<1.0	<0.10	450	<0.10	<2.0	<2.0	0.54	<2.0	<5.0
	12/18/17	**53**	<1.0	<1.0	18	<1.0	<2.0	<50	0.010	<1.0	<0.40	<2.0	270	<0.50	120	<0.013	<2.0	<2.0	<1.0	<0.10	110	<0.10	<2.0	<2.0	0.16	<2.0	5.1
	07-25-18	**43**	<1.0	1.0	33	<1.0	<2.0	57	<0.010	<1.0	<0.40	<2.0	51	0.75	23	<0.013	<2.0	<2.0	<1.0	<0.10	430	<0.10	<2.0	<2.0	0.48	<2.0	<5.0
	07-25-18	**43**	<1.0	1.0	33	<1.0	<2.0	57	<0.010	<1.0	<0.40	<2.0	51	0.75	23	<0.013	<2.0	<2.0	<1.0	<0.10	430	<0.10	<2.0	<2.0	0.48	<2.0	<5.0
	11-23-18	**140**	<1.0	<1.0	17	<1.0	<2.0	<50	**0.014**	<1.0	<0.40	2.0	230	0.55	99	<0.013	<2.0	<2.0	<1.0	<0.10	130	<0.10	<2.0	3.6	0.27	<2.0	<5.0
	07/29/19	**28**	<1.0	<1.0	26	<1.0	<2.0	<50	<0.010	<1.0	<0.40	1.2	**370**	<0.50	150	<0.013	<2.0	<2.0	<1.0	<0.10	230	<0.10	<2.0	<2.0	0.35	<2.0	<5.0
COB-6-SW	07/23/13	**65.7**	<1.0	1.0	66.6	<1.0	<2.0	66	<0.01	<1.0	<0.40	<2.0	61	<0.50	30.3	NM	<2.0	<2.0	<1.0	<0.10	645	<0.10	<2.0	<2.0	0.68	<2.0	<5
	12/22/14	**61**	<1.0	<1.0	22	<1.0	<2.0	<50	0.01	<1.0	<0.40	<2.0	170	<0.50	56	<0.013	<2.0	<2.0	<1.0	<0.10	180	<0.10	<2.0	<2.0	0.22	<2.0	6.0
	07/27/15	**39**	<1.0	<1.0	29	<1.0	<2.0	52	<0.010	<1.0	<0.40	**2.2**	160	<0.50	23	<0.013	<2.0	<2.0	<1.0	<0.10	300	<0.10	<2.0	<2.0	0.34	<2.0	7.4
	11/18/15	**220**	<1.0	<1.0	21	<1.0	<2.0	<50	**0.018**	<1.0	<0.40	<2.0	**490**	**1.5**	79	<0.013	<2.0	<2.0	<1.0	<0.10	180	<0.10	<2.0	4	0.22	<2.0	<5.0
	07/22/16	**46**	<1.0	1.0	26	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	180	<0.50	37	<0.013	<2.0	<2.0	<1.0	<0.10	300	<0.10	<2.0	<2.0	0.3	<2.0	<5.0
	12/8/16	**200**	<1.0	<1.0	21	<1.0	<2.0	<50	**0.015**	<1.0	<0.40	<2.0	**360**	1.0	110	<0.013	<2.0	<2.0	<1.0	<0.10	160	<0.10	<2.0	3	0.23	<2.0	<5.0
	8/3/17	**42**	<1.0	1.3	38	<1.0	<2.0	59	**0.011**	<1.0	<0.40	<2.0	<50	<0.50	35	<0.013	<2.0	<2.0	<1.0	<0.10	500	<0.10	<2.0	<2.0	0.43	<2.0	<5.0
	12/18/17	**130**	<1.0	<1.0	20	<1.0	<2.0	<50	0.010	<1.0	<0.40	<2.0	260	<0.50	73	<0.013	<2.0	<2.0	<1.0	<0.10	160	<0.10	<2.0	3.0	0.19	<2.0	<5.0
	07-25-18	**23**	<1.0	<1.0	35	<1.0	<2.0	62	<0.010	<1.0	<0.40	<2.0	140	<0.50	110	<0.013	<2.0	<2.0	<1.0	<0.10	350	<0.10	<2.0	<2.0	0.5	<2.0	<5.0
	11-23-18	**150**	<1.0	<1.0	20	<1.0	<2.0	<50	**0.015**	<1.0	<0.40	<2.0	**360**	0.87	130	<0.013	<2.0	<2.0	<1.0	<0.10	140	<0.10	<2.0	4.8	0.22	<2.0	6.4
	07/29/19	**37**	<1.0	<1.0	25	<1.0	<2.0	<50	<0.010	<1.0	<0.40	1.2	130	<0.50	31	<0.013	<2.0	<2.0	<1.0	<0.10	300	<0.10	<2.0	<2.0	0.39	<2.0	<5.0
WB-1-SW	07/23/13	*<50*	<10	<10	280	<10	<20	**2470**	**0.6**	*<10*	*<4.0*	*<20*	**936**	*<5*	**1920**	NM	*<20*	*<20*	*<10*	*<1.0*	4660	*<1*	<20	<20	1.6	<20	*<50*
	12/22/14	**180**	<1.0	<1.0	15	<1.0	<2.0	<50	**0.038**	<1.0	<0.40	<2.0	270	0.71	95	<0.013	<2.0	<2.0	<1.0	<0.10	53	<0.10	<2.0	4.6	<0.10	<2.0	10
	07/27/15	**89**	<1.0	<1.0	18	<1.0	<2.0	<50	**0.012**	<1.0	<0.40	<2.0	**480**	<0.50	41	<0.013	<2.0	<2.0	<1.0	<0.10	100	<0.10	<2.0	<2.0	<0.10	<2.0	7.9
	11/18/15[FD]	**63**	<1.0	<1.0	15	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	200	<0.50	41	<0.013	<2.0	<2.0	<1.0	<0.10	70	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	11/18/15	**63**	<1.0	<1.0	15	<1.0	<2.0	<50	<0.010	<1.0	<0.40	<2.0	200	<0.50	43	<0.013	<2.0	<2.0	<1.0	<0.10	73	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	07/22/16	**87**	<1.0	<1.0	39	<1.0	<2.0	690	**0.035**	<1.0	<0.40	<2.0	**590**	0.56	160	<0.013	<2.0	<2.0	<1.0	<0.10	1300	<0.10	<2.0	<2.0	0.47	<2.0	11
	12/8/16[FD]	**140**	<1.0	<1.0	15	<1.0	<2.0	<50	**0.025**	<1.0	<0.40	<2.0	220	<0.50	98	<0.013	<2.0	<2.0	<1.0	<0.10	59	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	12/8/16	**100**	<1.0	<1.0	16	<1.0	<2.0	<50	**0.026**	<1.0	<0.40	<2.0	220	<0.50	100	<0.013	<2.0	<2.0	<1.0	<0.10	61	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	8/3/17	**28**	<1.0	1.0	73	<1.0	<2.0	430	**0.027**	<1.0	<0.40	<2.0	**680**	<0.50	450	<0.013	<2.0	<2.0	<1.0	<0.10	940	<0.10	<2.0	<2.0	0.43	<2.0	<5.0
	12-18-17[FD]	**110**	<1.0	<1.0	12	<1.0	<2.0	<50	**0.027**	<1.0	<0.40	<2.0	190	<0.50	62	<0.013	<2.0	<2.0	<1.0	<0.10	48	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	12/18/17	**110**	<1.0	<1.0	12	<1.0	<2.0	<50	**0.022**	<1.0	<0.40	<2.0	190	<0.50	63	<0.013	<2.0	<2.0	<1.0	<0.10	49	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	07-25-18	**120**	<1.0	<1.0	35	<1.0	<2.0	110	**0.024**	<1.0	<0.40	**4.7**	**330**	**1.8**	140	<0.013	<2.0	<2.0	<1.0	<0.1	320	<0.10	<2.0	2.7	0.18	<2.0	6.0
	11-23-18	**1800**	<1.0	4.3	37	<1.0	<2.0	<50	**0.14**	3.5	1.2	**9.7**	**3500**	**29**	210	**0.037**	<2.0	2.8	<1.0	**1.7**	50	<0.10	<2.0	25	0.17	6.8	79
	11-23-18[FD]	**1200**	<1.0	3.9	40	<1.0	<2.0	<50	**0.15**	3.3	1.2	**9.2**	**3700**	**28**	200	**0.033**	<2.0	2.3	<1.0	**1.5**	50	<0.10	<2.0	23	0.15	5.2	**160**
	07/29/19	**69**	<1.0	<1.0	20	<1.0	<2.0	<50	**0.020**	<1.0	<0.40	0.94	290	<0.50	64	<0.013	<2.0	<2.0	<1.0	<0.10	120	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0
	07-29-19[FD]	**71**	<1.0	<1.0	21	<1.0	<2.0	<50	**0.021**	<1.0	<0.40	0.89	**310**	<0.50	71	<0.013	<2.0	<2.0	<1.0	<0.10	120	<0.10	<2.0	<2.0	<0.10	<2.0	<5.0

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Na	K	Ca	Mg	ALK	SO4	Cl	SiO2	OPO4	P	NO3	NO2	NO2-NO3	NH3	Colour	TOC	TURBIDITY	CONDUCTIVITY	pH	HARDNESS	BICARB ALKALINITY	CARB ALKALINITY	TDS	Anion Sum	Ion Balance	Langelier Index (@20C)	Langelier Index (@4C)	Sat. pH (@20C)	Sat. pH (@4C)
Units		µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	TCU	mg/L	NTU	µS/cm	pH	mg/L	mg/L	mg/L	mg/L	me/L	%	unitless	unitless	unitless	unitless
NSE Tier 1 EQS Marine Water [1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME MAL [2]		-	-	-	-	-	-	-	-	-	-	200	-	-	-	-	-	-	-	7.0-8.7	-	-	-	-	-	-	-	-	-	-
Battery Point/Narrows Calculated 95% UCL		-	-	-	-	-	2180	-	-	-	-	-	-	-	-	-	-	88	-	-	-	-	-	-	-	-	-	-	-	-
BP-1-SW	07/23/13	8480000	304000	343000	1000000	84	2000	14000	<0.5	<0.010	<1000	<0.05	<0.010	<0.05	<0.05	<5	<5	7.2	41000	8.07	5000	83	<1.0	26000	434	4.66	0.664	0.425	7.41	7.65
	12/22/14	1000000	38000	68000	120000	56	270	1900	5.5	0.012	<100	0.19	0.019	0.21	0.11	18	2.3	1.1	6300	8.42	680	54	1.3	3500	60.8	1.58	0.248	0.007	8.17	8.41
	07/27/15	7100000	260000	300000	870000	88	1500	13000	1.1	0.018	<1000	0.11	0.011	0.12	0.05	6.8	<5.0	0.6	37000	7.83	4300	87	<1.0	23000	393	0.97	0.369	0.131	7.46	7.7
	11/18/15	650000	27000	52000	71000	58	190	1200	5.4	0.015	<100	0.14	<0.010	0.14	0.064	25	3.3	1.0	4200	8.00	420	57	<1.0	2200	38.8	1.80	-0.189	-0.432	8.19	8.44
	07/22/16	7500000	280000	300000	910000	92	1600	13000	1	0.026	<1000	0.092	0.01	0.1	0.088	8.3	<5.0	1.2	36000	7.99	4500	91	<1.0	24000	411	1.77	0.559	0.321	7.43	7.67
	12/8/16	1200000	45000	70000	150000	52	290	2300	4.8	0.015	<100	0.21	<0.010	0.21	0.088	20	<5.0	2.1	7000	7.56	780	52	<1.0	4100	72.9	3.02	-0.642	-0.883	8.2	8.44
	8/3/17	8400000	300000	340000	1000000	98	2000	13000	0.78	0.01	<1000	<0.010	0.057	0.057	0.13	<5.0	<5.0	1.5	40000	8.05	5000	97	1	25000	405	7.68	0.698	0.46	7.35	7.59
	12/18/17	720000	28000	50000	85000	52	210	1300	5.4	0.011	<100	0.20	<0.010	0.20	0.098	21	3.5	1.6	4500	8.10	480	52	<1.0	2400	42	0.51	-0.166	-0.409	8.26	8.51
	07-25-18	8300000	290000	330000	980000	98	1900	12000	0.81	0.022	<1000	0.051	0.012	0.063	0.076	9	2.4	1.1	39,000	8.14	4800	96	1.3	24,000	377	10.3	0.767	0.529	7.37	7.61
	11-23-18	860000	33,000	62000	98000	60	250	1600	5	<0.010	<100	0.16	0.011	0.17	0.075	24	3.9	1.8	5500	8.74	560	56	2.9	3000	52.7	3.16	0.573	0.331	8.17	8.41
	07/29/19	6900000	250,000	280000	860000	94	1700	12000	0.69	<0.010	<1000	<0.010	<0.050	<0.050	0.060	8.7	2.6	0.96	36000	8.26	4200	92	1.6	22000	382	1.23	0.788	0.55	7.47	7.71
NARROWS	12/22/14	600000	24000	58000	74000	57	170	1100	5.6	0.013	<100	0.22	0.016	0.24	0.11	16	2	1	3900	8.56	450	55	1.9	2100	36	0.1	0.403	0.16	8.15	8.4
	07/27/15	7200000	270000	300000	900000	91	1300	13000	1.2	<0.010	<1000	0.067	<0.010	0.067	0.067	7.4	<5.0	0.36	37000	7.96	4400	90	<1.0	23000	383	3.36	0.502	0.265	7.45	7.69
	11/18/15	330000	15000	38000	36000	55	110	640	5.8	0.016	<100	0.15	<0.010	0.15	0.053	21	3.7	1.7	2400	7.86	240	55	<1.0	1200	21.6	4.13	-0.398	-0.643	8.26	8.50
	07/22/16	7500000	270000	300000	900000	93	1400	12000	1.3	0.017	<1000	0.05	0.01	0.06	0.08	9.9	2.3	1.2	36000	7.97	4400	92	<1.0	23000	378	5.2	0.533	0.295	7.44	7.68
	12/8/16	1000000	38000	72000	130000	61	270	1900	6.1	0.016	<100	0.21	<0.010	0.21	0.082	21	<5.0	1.2	6200	7.67	700	61	<1.0	3500	60.8	0.65	-0.418	-0.66	8.09	8.33
	8/3/17	8300000	300000	340000	990000	97	2000	12000	1.1	0.016	<1000	<0.010	0.077	0.077	0.21	<5.0	<5.0	1.4	40000	7.8	4900	97	<1.0	24000	392	8.83	0.45	0.213	7.36	7.59
	12/18/17	440000	18000	45000	53000	52	150	820	6.0	0.010	<100	0.21	<0.010	0.21	0.076	21	3.5	2.1	2900	7.82	330	52	<1.0	1600	27	2.06	-0.428	-0.672	8.25	8.49
	07-25-18	6600000	240000	300000	780000	97	1700	11000	2.0	0.018	<1000	0.064	0.012	0.076	0.09	8.3	<5	0.73	34000	8.08	3900	96	1.1	20000	334	5.38	0.641	0.404	7.44	7.68
	11-23-18	530000	21,000	50000	60000	58	180	1100	5.3	<0.010	<100	0.18	<0.010	0.18	0.076	28	4.1	1.7	3700	8.78	370	54	3.1	1900	34.5	5.13	0.574	0.331	8.21	8.45
	07/29/19	6800000	250,000	280000	850000	93	1700	12000	1.3	<0.010	<1000	<0.010	<0.050	<0.050	0.088	7.8	<5.0 *	1.4	35000	7.88	4200	93	<1.0	22000	376	1.51	0.415	0.177	7.47	7.70

NOTES:
FD - Field Duplicate

NM - Not Measured or not analyzed

mg/L - milligrams per liter

UCL - Upper Concentration Limit

- No applicable guideline criteria

* Elevated reporting limit due to sample matrix

1 - Nova Scotia Environment Tier I Environmental Quality Standards (EQS) for surface water (freshwater and marine) 2013

2 - Canadian Council of Ministers of the Environment (CCME) for the protection of aquatic life (freshwater and marine) 2017

3 - Guideline value for NH3 is based on a pH value of 8 and a temperature of 10 C

4 - Guideline for chromium is based on CR6+

5 - Guideline value for aluminum based on a pH >6.5

6 - CCME FWAL guideline value for copper is based on a hardness value. If value is unknown, the guideline is 2µg/L

7 - CCME FWAL guideline value for lead is based on a hardness value. If value is unknown, the guideline is 1µg/L

8 - CCME FWAL guideline value for lead is based on a hardness value. If value is unknown, the guideline is 25µg/L

Bold	Concentration exceeds Tier I EQS for surface water (freshwater)
Underline	Concentration exceeds Tier I EQS for surface water (marine)
Shading	Concentration exceeds CCME FWAL
Shading	Concentration exceeds CCME MAL
Double Underline	Concentration exceeds Upstream Calculated 95% UCL
Dashed Border	Concentration exceeds Battery Point/Narrows Calculated 95% Upper Concentration Limit
Red	Concentration exceeds Pre-Construction/Baseline Calculated 95% Upper Concentration Limit
italics	Laboratory detection limit is higher than guideline criteria

This summary is to be used in conjunction with, not as a replacement of, the Laboratory Certificates of Analysis

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2019

Sample Location	Sample Date	Al	Sb	As	Ba	Be	Bi	B	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	Sr	Tl	Sn	Ti	U	V	Zn
	Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
	NSE Tier 1 EQS Marine Water [1]	-	500	12.5	500	100	-	1200	0.12	-	-	2	-	2	-	0.016	-	8.3	2	1.5	-	21.3	-	-	100	50	10
	CCME MAL [2]	-	-	12.5	-	-	-	-	0.12	1.5 [5]	-	-	-	-	-	0.016	-	-	-	-	-	-	-	-	-	-	-
	Battery Point/Narrows Calculated 95% UCL	-	-	-	-	-	-	-	-	-	0.9	-	190	-	70	0.189	-	-	-	-	7000	-	-	-	-	-	-
BP-1-SW	07/23/13	168	<10	<10	41	<10	<20	3700	0.14	*<10*	*<4.0*	*<20*	1990	*<5.0*	109	<0.013	<20	*<20*	*<10*	<1.0	6130	<1	<20	<20	2.6	<20	*<50*
	12/22/14	110	<1.0	<1.0	19	<1.0	<2.0	480	0.028	<1.0	<0.40	<2.0	240	<0.50	61	<0.013	<2.0	<2.0	<1.0	<0.10	950	<0.10	<2.0	<2.0	0.41	<2.0	7.2
	07/27/15	86	<10	<10	19	<10	<20	2900	<0.10	*<10*	*<4.0*	<20	*<500*	*<5.0*	59	<0.013	<20	*<20*	*<10*	<1.0	5300	<1.0	<20	<20	2.1	<20	*<50*
	11/18/15	140	<1.0	<1.0	16	<1.0	<2.0	330	0.014	<1.0	<0.40	<2.0	*410*	<0.50	57	0.070	<2.0	<2.0	*<1.0*	<0.10	580	<0.10	<2.0	<2.0	0.29	<2.0	41
	07/22/16	63	<10	<10	23	<10	<20	3600	<0.10	<10	*<4.0*	<20	*<500*	*<5.0*	71	<0.013	<20	*<20*	*<10*	<1.0	5500	<1.0	<20	<20	2.4	<20	*<50*
	12/8/16	86	<1.0	<1.0	20	<1.0	<2.0	520	0.025	<1.0	<0.40	<2.0	280	<0.50	100	<0.013	<2.0	<2.0	<1.0	<0.10	1000	<0.10	<2.0	<2.0	0.48	<2.0	<5.0
	8/3/17	<50	<10	<10	25	<10	<20	3600	<0.10	*<10*	*<4.0*	*<20*	*<500*	*<5.0*	110	<0.013	<20	*<20*	*<10*	<1.0	6100	<1.0	<20	<20	2.5	<20	*<50*
	12/18/17	95	<1.0	<1.0	17	<1.0	<2.0	340	0.020	<1.0	<0.40	<2.0	220	<0.50	60	<0.013	<2.0	<2.0	<1.0	<0.10	630	<0.10	<2.0	3.6	0.35	<2.0	<5.0
	07-25-18	58	<10	<10	23	<10	<20	3500	<0.10	*<10*	*<4.0*	*<20*	1000	*<5.0*	94	<0.013	<20	*<20*	*<10*	<1.0	5900	<1.0	<20	<20	2.5	<20	*<50*
	11-23-18	86	<1.0	<1.0	18	<1.0	<2.0	420	0.024	<1.0	<0.40	<2.0	240	<0.50	50	<0.013	<2.0	<2.0	<1.0	<0.10	730	<0.10	<2.0	<2.0	0.4	<2.0	<5.0
	07/29/19	<50	<10	<10	18	<10	<20	3100	<0.10	*<10*	*<4.0*	5.6	*<500*	*<5.0*	50	<0.013	<20	*<20*	*<10*	<1.0	5000	<1.0	<20	<20	2.4	<20	*<50*
NARROWS	12/22/14	110	<1.0	<1.0	19	<1.0	<2.0	300	0.027	<1.0	<0.40	<2.0	250	<0.50	63	<0.013	<2.0	<2.0	<1.0	<0.10	610	<0.10	<2.0	2.4	0.32	<2.0	7.3
	07/27/15	140	<10	<10	21	<10	<20	3100	<0.10	*<10*	*<4.0*	*<20*	*<500*	*<5.0*	100	<0.013	<20	*<20*	*<10*	<1.0	5400	<1.0	<20	<20	2.2	<20	*<50*
	11/18/15	76	1.8	<1.0	15	<1.0	<2.0	180	0.012	<1.0	<0.40	<2.0	*320*	<0.50	45	<0.013	<2.0	<2.0	*<1.0*	<0.10	370	<0.10	<2.0	<2.0	0.22	<2.0	63
	07/22/16	51	<10	<10	28	<10	<20	3500	<0.10	<10	*<4.0*	*<20*	*<500*	*<5.0*	120	<0.013	<20	*<20*	*<10*	<1.0	5400	<1.0	<20	<20	2.1	<20	*<50*
	12/8/16	75	<1.0	<1.0	20	<1.0	<2.0	460	0.029	<1.0	<0.40	<2.0	250	<0.50	110	<0.013	<2.0	<2.0	<1.0	<0.10	890	<0.10	<2.0	<2.0	0.58	<2.0	15
	8/3/17	<50	<10	<10	26	<10	<20	3600	<0.10	*<10*	*<4.0*	*<20*	*<500*	*<5.0*	110	<0.013	<20	*<20*	*<10*	<1.0	6100	<1.0	<20	<20	2.4	<20	*<50*
	12/18/17	110	<1.0	<1.0	17	<1.0	<2.0	210	0.018	<1.0	<0.40	<2.0	280	<0.50	72	<0.013	<2.0	<2.0	<1.0	<0.10	450	<0.10	<2.0	3.6	0.27	<2.0	5.8
	07-25-18	56	<10	<10	29	<10	<20	2800	<0.10	*<10*	*<4.0*	*<20*	*<500*	*<5.0*	100	<0.013	<20	*<20*	*<10*	<1.0	5000	<1.0	<20	<20	2	<20	*<50*
	11-23-18	86	<1.0	<1.0	17	<1.0	<2.0	260	0.021	<1.0	<0.40	<2.0	220	<0.50	52	<0.013	<2.0	<2.0	<1.0	<0.10	500	<0.10	<2.0	<2.0	0.32	<2.0	8.8
	07/29/19	110	<10	<10	21	<10	<20	3000	<0.10	*<10*	*<4.0*	*<5.0*	*<500*	*<5.0*	120	<0.013	<20	*<20*	*<10*	<1.0	5000	<1.0	<20	<20	2.0	<20	*<50*

NOTES:
FD - Field Duplicate

NM - Not Measured or not analyzed

mg/L - milligrams per liter

UCL - Upper Concentration Limit

- No applicable guideline criteria

* Elevated reporting limit due to sample matrix

1 - Nova Scotia Environment Tier I Environmental Quality Standards (EQS) for surface water (freshwater and marine) 2013

2 - Canadian Council of Ministers of the Environment (CCME) for the protection of aquatic life (freshwater and marine) 2017

3 - Guideline value for NH3 is based on a pH value of 8 and a temperature of 10 C

4 - Guideline for chromium is based on CR6+

5 - Guideline value for aluminum based on a pH >6.5

6 - CCME FWAL guideline value for copper is based on a hardness value. If value is unknown, the guideline is 2µg/L

7 - CCME FWAL guideline value for lead is based on a hardness value. If value is unknown, the guideline is 1µg/L

8 - CCME FWAL guideline value for lead is based on a hardness value. If value is unknown, the guideline is 25µg/L

Bold	Concentration exceeds Tier I EQS for surface water (freshwater)
Underline	Concentration exceeds Tier I EQS for surface water (marine)
Shading	Concentration exceeds CCME FWAL
Shading	Concentration exceeds CCME MAL
Double Underline	Concentration exceeds Upstream Calculated 95% UCL
Dashed Border	Concentration exceeds Battery Point/Narrows Calculated 95% Upper Concentration Limit
Red	Concentration exceeds Pre-Construction/Baseline Calculated 95% Upper Concentration Limit
italics	Laboratory detection limit is higher than guideline criteria

This summary is to be used in conjunction with, not as a replacement of, the Laboratory Certificates of Analysis

APPENDIX C
LABORATORY CERTIFICATE

Your Project #: 14-1360
Site#: NS Lands SW Program

Attention: Nadine Wambolt

Dillon Consulting Limited
275 Charlotte St
Sydney, NS
CANADA B1P 1C6

Report Date: 2019/08/07
Report #: R5829191
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K8417
Received: 2019/07/29, 13:50

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide (1)	8	N/A	2019/08/06	N/A	SM 23 4500-CO2 D
Alkalinity (1)	8	N/A	2019/08/07	ATL SOP 00013	EPA 310.2 R1974 m
Benzo(b/j)fluoranthene Sum (water) (1)	8	N/A	2019/08/06	N/A	Auto Calc.
Chloride (1)	6	N/A	2019/08/06	ATL SOP 00014	SM 23 4500-Cl- E m
Chloride (1)	2	N/A	2019/08/07	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	8	N/A	2019/08/06	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	8	N/A	2019/08/06	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3) (1)	8	N/A	2019/08/01	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL) (1)	8	2019/08/06	2019/08/06	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS (1)	1	2019/08/01	2019/08/01	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS (1)	4	2019/08/02	2019/08/02	ATL SOP 00058	EPA 6020B R2 m
Metals Water Total MS (1)	3	2019/08/02	2019/08/06	ATL SOP 00058	EPA 6020B R2 m
Ion Balance (% Difference) (1)	8	N/A	2019/08/07	N/A	Auto Calc.
Anion and Cation Sum (1)	1	N/A	2019/08/06	N/A	Auto Calc.
Anion and Cation Sum (1)	7	N/A	2019/08/07	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	1	N/A	2019/08/01	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen Ammonia - water (1)	7	N/A	2019/08/06	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	8	N/A	2019/08/06	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	8	N/A	2019/08/06	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	8	N/A	2019/08/06	ATL SOP 00018	ASTM D3867-16
PAH in Water by GC/MS (SIM) (1)	7	2019/07/31	2019/08/01	ATL SOP 00103	EPA 8270E R6 m
PAH in Water by GC/MS (SIM) (1)	1	2019/07/31	2019/08/03	ATL SOP 00103	EPA 8270E R6 m
pH (1, 2)	8	N/A	2019/08/06	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	8	N/A	2019/08/07	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	8	N/A	2019/08/07	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	8	N/A	2019/08/07	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	8	N/A	2019/08/06	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	8	N/A	2019/08/06	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	8	N/A	2019/08/07	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	3	N/A	2019/08/03	ATL SOP 00203	SM 23 5310B m
Organic carbon - Total (TOC) (1, 3)	5	N/A	2019/08/06	ATL SOP 00203	SM 23 5310B m
Turbidity (1)	8	N/A	2019/08/06	ATL SOP 00011	EPA 180.1 R2 m

Your Project #: 14-1360
Site#: NS Lands SW Program

Attention: Nadine Wambolt

Dillon Consulting Limited
275 Charlotte St
Sydney, NS
CANADA B1P 1C6

Report Date: 2019/08/07
Report #: R5829191
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9K8417
Received: 2019/07/29, 13:50

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by BV Labs Bedford
(2) The APHA Standard Method require pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the APHA Standard Method holding time.
(3) TOC / DOC present in the sample should be considered as non-purgeable TOC / DOC.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Natalie MacAskill, Key Account Specialist
Email: Natalie.MacAskill@bvlabs.com
Phone# (902)567-1255 Ext:17
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9K8417
Report Date: 2019/08/07

Dillon Consulting Limited
Client Project #: 14-1360

RESULTS OF ANALYSES OF WATER

BV Labs ID		KJP867			KJP886			KJP887		
Sampling Date		2019/07/29			2019/07/29			2019/07/29		
	UNITS	NRC-1-SW	RDL	QC Batch	COB-A-SW	RDL	QC Batch	COB-4-SW	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	2.32	N/A	6252784	6.09	N/A	6252784	4.88	N/A	6252784
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	52	1.0	6252774	140	1.0	6252774	96	1.0	6252774
Calculated TDS	mg/L	130	1.0	6252793	360	1.0	6252793	280	1.0	6252793
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	6252774	1.4	1.0	6252774	<1.0	1.0	6252774
Cation Sum	me/L	2.23	N/A	6252784	5.76	N/A	6252784	4.54	N/A	6252784
Hardness (CaCO3)	mg/L	57	1.0	6252780	220	1.0	6252780	150	1.0	6252780
Ion Balance (% Difference)	%	1.98	N/A	6252782	2.78	N/A	6252782	3.61	N/A	6252782
Langelier Index (@ 20C)	N/A	-0.508		6252790	0.611		6252790	0.0810		6252790
Langelier Index (@ 4C)	N/A	-0.759		6252791	0.363		6252791	-0.168		6252791
Nitrate (N)	mg/L	0.077	0.050	6252786	<0.050	0.050	6252786	0.11	0.050	6252786
Saturation pH (@ 20C)	N/A	8.37		6252790	7.41		6252790	7.72		6252790
Saturation pH (@ 4C)	N/A	8.62		6252791	7.66		6252791	7.97		6252791
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	52	5.0	6261368	140	25	6261368	97	10	6261368
Dissolved Chloride (Cl-)	mg/L	34	1.0	6261369	40	1.0	6261369	53	1.0	6261369
Colour	TCU	49	5.0	6261375	9.2	5.0	6261375	18	5.0	6261375
Nitrate + Nitrite (N)	mg/L	0.077	0.050	6261379	<0.050	0.050	6261379	0.11	0.050	6261379
Nitrite (N)	mg/L	<0.010	0.010	6261381	<0.010	0.010	6261381	<0.010	0.010	6261381
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6261258	<0.050	0.050	6261258	0.074	0.050	6259367
Total Organic Carbon (C)	mg/L	6.2	0.50	6264494	2.6	0.50	6263334	4.1	0.50	6264494
Orthophosphate (P)	mg/L	<0.010	0.010	6261377	<0.010	0.010	6261377	<0.010	0.010	6261377
pH	pH	7.86	N/A	6261739	8.02	N/A	6261736	7.80	N/A	6261739
Reactive Silica (SiO2)	mg/L	6.6	0.50	6261371	15	0.50	6261371	10	0.50	6261371
Dissolved Sulphate (SO4)	mg/L	15	2.0	6261370	100	10	6261370	69	2.0	6261370
Turbidity	NTU	2.7	0.10	6264273	0.84	0.10	6264269	1.4	0.10	6264273
Conductivity	uS/cm	220	1.0	6261742	550	1.0	6261737	470	1.0	6261742

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KJP888			KJP889		KJP890		
Sampling Date		2019/07/29			2019/07/29		2019/07/29		
	UNITS	COB-6-SW	RDL	QC Batch	WB-1-SW	RDL	NARROWS	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	5.63	N/A	6252784	2.89	N/A	376	N/A	6252784
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	96	1.0	6252774	35	1.0	93	1.0	6252774
Calculated TDS	mg/L	320	1.0	6252793	160	1.0	22000	1.0	6252793
Carb. Alkalinity (calc. as CaCO3)	mg/L	4.3	1.0	6252774	<1.0	1.0	<1.0	1.0	6252774
Cation Sum	me/L	5.13	N/A	6252784	2.60	N/A	388	N/A	6252784
Hardness (CaCO3)	mg/L	160	1.0	6252780	55	1.0	4200	1.0	6252780
Ion Balance (% Difference)	%	4.65	N/A	6252782	5.28	N/A	1.51	N/A	6252782
Langelier Index (@ 20C)	N/A	0.986		6252790	-1.09		0.415		6252790
Langelier Index (@ 4C)	N/A	0.737		6252791	-1.34		0.177		6252791
Nitrate (N)	mg/L	0.064	0.050	6252786	0.091	0.050	<0.050	0.050	6252786
Saturation pH (@ 20C)	N/A	7.70		6252790	8.64		7.47		6252790
Saturation pH (@ 4C)	N/A	7.95		6252791	8.89		7.70		6252791
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	100	25	6261368	35	5.0	93	5.0	6261368
Dissolved Chloride (Cl-)	mg/L	72	1.0	6261369	67	1.0	12000	500	6261369
Colour	TCU	16	5.0	6261375	43	5.0	7.8	5.0	6261375
Nitrate + Nitrite (N)	mg/L	0.064	0.050	6261379	0.091	0.050	<0.050	0.050	6261379
Nitrite (N)	mg/L	<0.010	0.010	6261381	<0.010	0.010	<0.010	0.010	6261381
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	0.050	6261258	<0.050	0.050	0.088	0.050	6261258
Total Organic Carbon (C)	mg/L	4.1	0.50	6263334	5.3	0.50	<5.0 (1)	5.0	6264344
Orthophosphate (P)	mg/L	<0.010	0.010	6261377	<0.010	0.010	<0.010	0.010	6261377
pH	pH	8.68	N/A	6261739	7.55	N/A	7.88	N/A	6261739
Reactive Silica (SiO2)	mg/L	8.9	0.50	6261371	4.0	0.50	1.3	0.50	6261371
Dissolved Sulphate (SO4)	mg/L	76	2.0	6261370	14	2.0	1700	40	6261370
Turbidity	NTU	1.0	0.10	6264273	0.79	0.10	1.4	0.10	6264276
Conductivity	uS/cm	530	1.0	6261742	300	1.0	35000	1.0	6261742

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Elevated reporting limit due to sample matrix.

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RESULTS OF ANALYSES OF WATER

BV Labs ID		KJP891			KJP892		
Sampling Date		2019/07/29			2019/07/29		
	UNITS	BP-1-SW	RDL	QC Batch	FD-15	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	382	N/A	6252784	3.23	N/A	6252784
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	92	1.0	6252774	36	1.0	6252774
Calculated TDS	mg/L	22000	1.0	6252793	180	1.0	6252793
Carb. Alkalinity (calc. as CaCO3)	mg/L	1.6	1.0	6252774	<1.0	1.0	6252774
Cation Sum	me/L	392	N/A	6252784	2.94	N/A	6252784
Hardness (CaCO3)	mg/L	4200	1.0	6252780	60	1.0	6252780
Ion Balance (% Difference)	%	1.23	N/A	6252782	4.70	N/A	6252782
Langelier Index (@ 20C)	N/A	0.788		6252790	-1.08		6252790
Langelier Index (@ 4C)	N/A	0.550		6252791	-1.33		6252791
Nitrate (N)	mg/L	<0.050	0.050	6252786	0.13	0.050	6252786
Saturation pH (@ 20C)	N/A	7.47		6252790	8.62		6252790
Saturation pH (@ 4C)	N/A	7.71		6252791	8.87		6252791
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	94	5.0	6261368	36	5.0	6261368
Dissolved Chloride (Cl-)	mg/L	12000	500	6261369	77	1.0	6261369
Colour	TCU	8.7	5.0	6261375	40	5.0	6261375
Nitrate + Nitrite (N)	mg/L	<0.050	0.050	6261379	0.13	0.050	6261379
Nitrite (N)	mg/L	<0.010	0.010	6261381	<0.010	0.010	6261381
Nitrogen (Ammonia Nitrogen)	mg/L	0.060	0.050	6261258	<0.050	0.050	6261258
Total Organic Carbon (C)	mg/L	2.6	0.50	6263334	5.2	0.50	6264494
Orthophosphate (P)	mg/L	<0.010	0.010	6261377	<0.010	0.010	6261377
pH	pH	8.26	N/A	6261739	7.54	N/A	6261736
Reactive Silica (SiO2)	mg/L	0.69	0.50	6261371	3.9	0.50	6261371
Dissolved Sulphate (SO4)	mg/L	1700	40	6261370	16	2.0	6261370
Turbidity	NTU	0.96	0.10	6264273	0.91	0.10	6264273
Conductivity	uS/cm	36000	1.0	6261742	320	1.0	6261737

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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MERCURY BY COLD VAPOUR AA (WATER)

BV Labs ID		KJP867	KJP886	KJP887	KJP888	KJP889	KJP890	KJP891		
Sampling Date		2019/07/29	2019/07/29	2019/07/29	2019/07/29	2019/07/29	2019/07/29	2019/07/29		
	UNITS	NRC-1-SW	COB-A-SW	COB-4-SW	COB-6-SW	WB-1-SW	NARROWS	BP-1-SW	RDL	QC Batch
Metals										
Total Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.013	6264259

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs ID		KJP892		
Sampling Date		2019/07/29		
	UNITS	FD-15	RDL	QC Batch
Metals				
Total Mercury (Hg)	ug/L	<0.013	0.013	6264259

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ICP/MS (WATER)

BV Labs ID		KJP867	KJP886	KJP887	KJP888		KJP889		
Sampling Date		2019/07/29	2019/07/29	2019/07/29	2019/07/29		2019/07/29		
	UNITS	NRC-1-SW	COB-A-SW	COB-4-SW	COB-6-SW	QC Batch	WB-1-SW	RDL	QC Batch
Metals									
Total Aluminum (Al)	ug/L	46	10	28	37	6260986	69	5.0	6258641
Total Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	6260986	<1.0	1.0	6258641
Total Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	6260986	<1.0	1.0	6258641
Total Barium (Ba)	ug/L	9.7	18	26	25	6260986	20	1.0	6258641
Total Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	6260986	<1.0	1.0	6258641
Total Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Boron (B)	ug/L	<50	53	<50	<50	6260986	<50	50	6258641
Total Cadmium (Cd)	ug/L	0.018	<0.010	<0.010	<0.010	6260986	0.020	0.010	6258641
Total Calcium (Ca)	ug/L	19000	75000	51000	56000	6260986	16000	100	6258641
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	6260986	<1.0	1.0	6258641
Total Cobalt (Co)	ug/L	<0.40	<0.40	<0.40	<0.40	6260986	<0.40	0.40	6258641
Total Copper (Cu)	ug/L	0.77	<0.50	1.2	1.2	6260986	0.94	0.50	6258641
Total Iron (Fe)	ug/L	1400	240	370	130	6260986	290	50	6258641
Total Lead (Pb)	ug/L	<0.50	<0.50	<0.50	<0.50	6260986	<0.50	0.50	6258641
Total Magnesium (Mg)	ug/L	2400	9000	5000	4300	6260986	3900	100	6258641
Total Manganese (Mn)	ug/L	130	290	150	31	6260986	64	2.0	6258641
Total Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Phosphorus (P)	ug/L	<100	<100	<100	<100	6260986	<100	100	6258641
Total Potassium (K)	ug/L	630	1700	1700	2100	6260986	1500	100	6258641
Total Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	6260986	<1.0	1.0	6258641
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	6260986	<0.10	0.10	6258641
Total Sodium (Na)	ug/L	24000	29000	35000	44000	6260986	33000	100	6258641
Total Strontium (Sr)	ug/L	55	240	230	300	6260986	120	2.0	6258641
Total Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	6260986	<0.10	0.10	6258641
Total Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Titanium (Ti)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Uranium (U)	ug/L	<0.10	0.49	0.35	0.39	6260986	<0.10	0.10	6258641
Total Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	6260986	<2.0	2.0	6258641
Total Zinc (Zn)	ug/L	<5.0	<5.0	<5.0	<5.0	6260986	<5.0	5.0	6258641

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ICP/MS (WATER)

BV Labs ID		KJP890	KJP891		KJP892		
Sampling Date		2019/07/29	2019/07/29		2019/07/29		
	UNITS	NARROWS	BP-1-SW	RDL	FD-15	RDL	QC Batch
Metals							
Total Aluminum (Al)	ug/L	110	<50	50	71	5.0	6260986
Total Antimony (Sb)	ug/L	<10	<10	10	<1.0	1.0	6260986
Total Arsenic (As)	ug/L	<10	<10	10	<1.0	1.0	6260986
Total Barium (Ba)	ug/L	21	18	10	21	1.0	6260986
Total Beryllium (Be)	ug/L	<10	<10	10	<1.0	1.0	6260986
Total Bismuth (Bi)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Boron (B)	ug/L	3000	3100	500	<50	50	6260986
Total Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	0.021	0.010	6260986
Total Calcium (Ca)	ug/L	280000	280000	1000	16000	100	6260986
Total Chromium (Cr)	ug/L	<10	<10	10	<1.0	1.0	6260986
Total Cobalt (Co)	ug/L	<4.0	<4.0	4.0	<0.40	0.40	6260986
Total Copper (Cu)	ug/L	<5.0	5.6	5.0	0.89	0.50	6260986
Total Iron (Fe)	ug/L	<500	<500	500	310	50	6260986
Total Lead (Pb)	ug/L	<5.0	<5.0	5.0	<0.50	0.50	6260986
Total Magnesium (Mg)	ug/L	850000	860000	1000	4800	100	6260986
Total Manganese (Mn)	ug/L	120	50	20	71	2.0	6260986
Total Molybdenum (Mo)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Nickel (Ni)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Phosphorus (P)	ug/L	<1000	<1000	1000	<100	100	6260986
Total Potassium (K)	ug/L	250000	250000	1000	1500	100	6260986
Total Selenium (Se)	ug/L	<10	<10	10	<1.0	1.0	6260986
Total Silver (Ag)	ug/L	<1.0	<1.0	1.0	<0.10	0.10	6260986
Total Sodium (Na)	ug/L	6800000	6900000	1000	39000	100	6260986
Total Strontium (Sr)	ug/L	5000	5000	20	120	2.0	6260986
Total Thallium (Tl)	ug/L	<1.0	<1.0	1.0	<0.10	0.10	6260986
Total Tin (Sn)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Titanium (Ti)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Uranium (U)	ug/L	2.0	2.4	1.0	<0.10	0.10	6260986
Total Vanadium (V)	ug/L	<20	<20	20	<2.0	2.0	6260986
Total Zinc (Zn)	ug/L	<50	<50	50	<5.0	5.0	6260986

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJP867	KJP886	KJP887	KJP888	KJP889	KJP890		
Sampling Date		2019/07/29	2019/07/29	2019/07/29	2019/07/29	2019/07/29	2019/07/29		
	UNITS	NRC-1-SW	COB-A-SW	COB-4-SW	COB-6-SW	WB-1-SW	NARROWS	RDL	QC Batch
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6256694
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	6256694
Acenaphthene	ug/L	0.016	<0.010	0.029	<0.010	<0.010	0.031	0.010	6256694
Acenaphthylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.023	0.010	6256694
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(b/j)fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6252853
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Chrysene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	0.010	6256694
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.035	0.010	6256694
Fluorene	ug/L	<0.010	<0.010	0.016	<0.010	<0.010	0.028	0.010	6256694
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	6256694
Naphthalene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6256694
Perylene	ug/L	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	0.020	6256694
Phenanthrene	ug/L	0.016	<0.010	0.013	<0.010	<0.010	0.029	0.010	6256694
Pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.029	0.010	6256694
Surrogate Recovery (%)									
D10-Anthracene	%	90	100	90	93	90	87		6256694
D14-Terphenyl	%	89	97	90	94	89	89		6256694
D8-Acenaphthylene	%	87	97	86	90	84	84		6256694

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Elevated RDL(s) due to detected levels in the method blank.

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

BV Labs ID		KJP891			KJP892		
Sampling Date		2019/07/29			2019/07/29		
	UNITS	BP-1-SW	RDL	QC Batch	FD-15	RDL	QC Batch
Polyaromatic Hydrocarbons							
1-Methylnaphthalene	ug/L	<0.050	0.050	6256694	<0.050	0.050	6256738
2-Methylnaphthalene	ug/L	<0.050	0.050	6256694	<0.050	0.050	6256738
Acenaphthene	ug/L	0.017	0.010	6256694	<0.010	0.010	6256738
Acenaphthylene	ug/L	<0.020 (1)	0.020	6256694	<0.010	0.010	6256738
Anthracene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(a)anthracene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(a)pyrene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(b)fluoranthene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(b/j)fluoranthene	ug/L	<0.020	0.020	6252084	<0.020	0.020	6252084
Benzo(g,h,i)perylene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(j)fluoranthene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Benzo(k)fluoranthene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Chrysene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Dibenz(a,h)anthracene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Fluoranthene	ug/L	0.011	0.010	6256694	<0.010	0.010	6256738
Fluorene	ug/L	0.016	0.010	6256694	<0.010	0.010	6256738
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Naphthalene	ug/L	<0.20	0.20	6256694	<0.20	0.20	6256738
Perylene	ug/L	<0.020 (2)	0.020	6256694	<0.010	0.010	6256738
Phenanthrene	ug/L	0.016	0.010	6256694	0.017	0.010	6256738
Pyrene	ug/L	<0.010	0.010	6256694	<0.010	0.010	6256738
Surrogate Recovery (%)							
D10-Anthracene	%	91		6256694	86		6256738
D14-Terphenyl	%	92		6256694	88		6256738
D8-Acenaphthylene	%	89		6256694	83		6256738

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.
(2) Elevated RDL(s) due to detected levels in the method blank.

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GENERAL COMMENTS

Sample KJP889 [WB-1-SW] : Poor RCAp Ion Balance due to sample matrix.

Sample KJP890 [NARROWS] : Elevated reporting limits for trace metals due to sample matrix.

Sample KJP891 [BP-1-SW] : Elevated reporting limits for trace metals due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6256694	KKE	Matrix Spike [KJP886-06]	D10-Anthracene	2019/08/01		95	%	50 - 130
			D14-Terphenyl	2019/08/01		96	%	50 - 130
			D8-Acenaphthylene	2019/08/01		94	%	50 - 130
			1-Methylnaphthalene	2019/08/01		96	%	50 - 130
			2-Methylnaphthalene	2019/08/01		99	%	50 - 130
			Acenaphthene	2019/08/01		103	%	50 - 130
			Acenaphthylene	2019/08/01		100	%	50 - 130
			Anthracene	2019/08/01		100	%	50 - 130
			Benzo(a)anthracene	2019/08/01		94	%	50 - 130
			Benzo(a)pyrene	2019/08/01		100	%	50 - 130
			Benzo(b)fluoranthene	2019/08/01		105	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/01		102	%	50 - 130
			Benzo(j)fluoranthene	2019/08/01		98	%	50 - 130
			Benzo(k)fluoranthene	2019/08/01		100	%	50 - 130
			Chrysene	2019/08/01		110	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/01		98	%	50 - 130
			Fluoranthene	2019/08/01		101	%	50 - 130
			Fluorene	2019/08/01		109	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/01		99	%	50 - 130
			Naphthalene	2019/08/01		102	%	50 - 130
			Perylene	2019/08/01		96 (1)	%	50 - 130
			Phenanthrene	2019/08/01		108	%	50 - 130
			Pyrene	2019/08/01		102	%	50 - 130
6256694	KKE	Spiked Blank	D10-Anthracene	2019/08/01		102	%	50 - 130
			D14-Terphenyl	2019/08/01		99	%	50 - 130
			D8-Acenaphthylene	2019/08/01		98	%	50 - 130
			1-Methylnaphthalene	2019/08/01		101	%	50 - 130
			2-Methylnaphthalene	2019/08/01		104	%	50 - 130
			Acenaphthene	2019/08/01		107	%	50 - 130
			Acenaphthylene	2019/08/01		103	%	50 - 130
			Anthracene	2019/08/01		98	%	50 - 130
			Benzo(a)anthracene	2019/08/01		97	%	50 - 130
			Benzo(a)pyrene	2019/08/01		101	%	50 - 130
			Benzo(b)fluoranthene	2019/08/01		107	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/01		104	%	50 - 130
			Benzo(j)fluoranthene	2019/08/01		100	%	50 - 130
			Benzo(k)fluoranthene	2019/08/01		101	%	50 - 130
			Chrysene	2019/08/01		112	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/01		100	%	50 - 130
			Fluoranthene	2019/08/01		107	%	50 - 130
			Fluorene	2019/08/01		113	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/01		100	%	50 - 130
			Naphthalene	2019/08/01		107	%	50 - 130
			Perylene	2019/08/01		100 (1)	%	50 - 130
			Phenanthrene	2019/08/01		122	%	50 - 130
			Pyrene	2019/08/01		107	%	50 - 130
6256694	KKE	Method Blank	D10-Anthracene	2019/08/01		98	%	50 - 130
			D14-Terphenyl	2019/08/01		98	%	50 - 130
			D8-Acenaphthylene	2019/08/01		97	%	50 - 130
			1-Methylnaphthalene	2019/08/01	<0.050		ug/L	
			2-Methylnaphthalene	2019/08/01	<0.050		ug/L	
			Acenaphthene	2019/08/01	<0.010		ug/L	
			Acenaphthylene	2019/08/01	<0.010		ug/L	
			Anthracene	2019/08/01	<0.010		ug/L	
			Benzo(a)anthracene	2019/08/01	<0.010		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2019/08/01	<0.010		ug/L	
			Benzo(b)fluoranthene	2019/08/01	<0.010		ug/L	
			Benzo(g,h,i)perylene	2019/08/01	<0.010		ug/L	
			Benzo(j)fluoranthene	2019/08/01	<0.010		ug/L	
			Benzo(k)fluoranthene	2019/08/01	<0.010		ug/L	
			Chrysene	2019/08/01	<0.010		ug/L	
			Dibenz(a,h)anthracene	2019/08/01	<0.010		ug/L	
			Fluoranthene	2019/08/01	<0.010		ug/L	
			Fluorene	2019/08/01	<0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2019/08/01	<0.010		ug/L	
			Naphthalene	2019/08/01	<0.20		ug/L	
			Perylene	2019/08/01	0.015, RDL=0.010		ug/L	
			Phenanthrene	2019/08/01	<0.010		ug/L	
			Pyrene	2019/08/01	<0.010		ug/L	
6256694	KKE	RPD [KJP867-06]	1-Methylnaphthalene	2019/08/01	NC		%	40
			2-Methylnaphthalene	2019/08/01	NC		%	40
			Acenaphthene	2019/08/01	3.8		%	40
			Acenaphthylene	2019/08/01	NC		%	40
			Anthracene	2019/08/01	NC		%	40
			Benzo(a)anthracene	2019/08/01	NC		%	40
			Benzo(a)pyrene	2019/08/01	NC		%	40
			Benzo(b)fluoranthene	2019/08/01	NC		%	40
			Benzo(g,h,i)perylene	2019/08/01	NC		%	40
			Benzo(j)fluoranthene	2019/08/01	NC		%	40
			Benzo(k)fluoranthene	2019/08/01	NC		%	40
			Chrysene	2019/08/01	NC		%	40
			Dibenz(a,h)anthracene	2019/08/01	NC		%	40
			Fluoranthene	2019/08/01	NC		%	40
			Fluorene	2019/08/01	NC		%	40
			Indeno(1,2,3-cd)pyrene	2019/08/01	NC		%	40
			Naphthalene	2019/08/01	NC		%	40
			Perylene	2019/08/01	NC (1)		%	40
			Phenanthrene	2019/08/01	1.9		%	40
			Pyrene	2019/08/01	NC		%	40
6256738	KKE	Matrix Spike [KJP892-06]	D10-Anthracene	2019/08/03		87	%	50 - 130
			D14-Terphenyl	2019/08/03		90	%	50 - 130
			D8-Acenaphthylene	2019/08/03		87	%	50 - 130
			1-Methylnaphthalene	2019/08/03		92	%	50 - 130
			2-Methylnaphthalene	2019/08/03		96	%	50 - 130
			Acenaphthene	2019/08/03		94	%	50 - 130
			Acenaphthylene	2019/08/03		102	%	50 - 130
			Anthracene	2019/08/03		100	%	50 - 130
			Benzo(a)anthracene	2019/08/03		95	%	50 - 130
			Benzo(a)pyrene	2019/08/03		90	%	50 - 130
			Benzo(b)fluoranthene	2019/08/03		94	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/03		87	%	50 - 130
			Benzo(j)fluoranthene	2019/08/03		89	%	50 - 130
			Benzo(k)fluoranthene	2019/08/03		87	%	50 - 130
			Chrysene	2019/08/03		108	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/03		84	%	50 - 130
			Fluoranthene	2019/08/03		101	%	50 - 130
			Fluorene	2019/08/03		105	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/03		87	%	50 - 130
			Naphthalene	2019/08/03		98	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Perylene	2019/08/03		86	%	50 - 130
			Phenanthrene	2019/08/03		103	%	50 - 130
			Pyrene	2019/08/03		101	%	50 - 130
6256738	KKE	Spiked Blank	D10-Anthracene	2019/08/03		98	%	50 - 130
			D14-Terphenyl	2019/08/03		98	%	50 - 130
			D8-Acenaphthylene	2019/08/03		97	%	50 - 130
			1-Methylnaphthalene	2019/08/03		102	%	50 - 130
			2-Methylnaphthalene	2019/08/03		105	%	50 - 130
			Acenaphthene	2019/08/03		103	%	50 - 130
			Acenaphthylene	2019/08/03		114	%	50 - 130
			Anthracene	2019/08/03		111	%	50 - 130
			Benzo(a)anthracene	2019/08/03		105	%	50 - 130
			Benzo(a)pyrene	2019/08/03		99	%	50 - 130
			Benzo(b)fluoranthene	2019/08/03		105	%	50 - 130
			Benzo(g,h,i)perylene	2019/08/03		96	%	50 - 130
			Benzo(j)fluoranthene	2019/08/03		98	%	50 - 130
			Benzo(k)fluoranthene	2019/08/03		96	%	50 - 130
			Chrysene	2019/08/03		119	%	50 - 130
			Dibenz(a,h)anthracene	2019/08/03		95	%	50 - 130
			Fluoranthene	2019/08/03		112	%	50 - 130
			Fluorene	2019/08/03		116	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2019/08/03		98	%	50 - 130
			Naphthalene	2019/08/03		107	%	50 - 130
			Perylene	2019/08/03		93	%	50 - 130
			Phenanthrene	2019/08/03		115	%	50 - 130
			Pyrene	2019/08/03		112	%	50 - 130
6256738	KKE	Method Blank	D10-Anthracene	2019/08/03		90	%	50 - 130
			D14-Terphenyl	2019/08/03		94	%	50 - 130
			D8-Acenaphthylene	2019/08/03		91	%	50 - 130
			1-Methylnaphthalene	2019/08/03	<0.050		ug/L	
			2-Methylnaphthalene	2019/08/03	<0.050		ug/L	
			Acenaphthene	2019/08/03	<0.010		ug/L	
			Acenaphthylene	2019/08/03	<0.010		ug/L	
			Anthracene	2019/08/03	<0.010		ug/L	
			Benzo(a)anthracene	2019/08/03	<0.010		ug/L	
			Benzo(a)pyrene	2019/08/03	<0.010		ug/L	
			Benzo(b)fluoranthene	2019/08/03	<0.010		ug/L	
			Benzo(g,h,i)perylene	2019/08/03	<0.010		ug/L	
			Benzo(j)fluoranthene	2019/08/03	<0.010		ug/L	
			Benzo(k)fluoranthene	2019/08/03	<0.010		ug/L	
			Chrysene	2019/08/03	<0.010		ug/L	
			Dibenz(a,h)anthracene	2019/08/03	<0.010		ug/L	
			Fluoranthene	2019/08/03	<0.010		ug/L	
			Fluorene	2019/08/03	<0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2019/08/03	<0.010		ug/L	
			Naphthalene	2019/08/03	<0.20		ug/L	
			Perylene	2019/08/03	<0.010		ug/L	
			Phenanthrene	2019/08/03	<0.010		ug/L	
			Pyrene	2019/08/03	<0.010		ug/L	
6256738	KKE	RPD	1-Methylnaphthalene	2019/08/03	32		%	40
			2-Methylnaphthalene	2019/08/03	NC		%	40
			Acenaphthene	2019/08/03	7.0		%	40
			Acenaphthylene	2019/08/03	1.9		%	40
			Anthracene	2019/08/03	NC (2)		%	40
			Benzo(a)anthracene	2019/08/03	0.42		%	40

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2019/08/03	2.2		%	40
			Benzo(b)fluoranthene	2019/08/03	1.5		%	40
			Benzo(g,h,i)perylene	2019/08/03	2.7		%	40
			Benzo(j)fluoranthene	2019/08/03	1.7		%	40
			Benzo(k)fluoranthene	2019/08/03	1.9		%	40
			Chrysene	2019/08/03	1.6		%	40
			Dibenz(a,h)anthracene	2019/08/03	2.5		%	40
			Fluoranthene	2019/08/03	2.9		%	40
			Fluorene	2019/08/03	0.42		%	40
			Indeno(1,2,3-cd)pyrene	2019/08/03	2.6		%	40
			Naphthalene	2019/08/03	NC		%	40
			Perylene	2019/08/03	2.7		%	40
			Phenanthrene	2019/08/03	NC (2)		%	40
			Pyrene	2019/08/03	1.3		%	40
6258641	AFM	Matrix Spike	Total Aluminum (Al)	2019/08/01		93	%	80 - 120
			Total Antimony (Sb)	2019/08/01		111	%	80 - 120
			Total Arsenic (As)	2019/08/01		99	%	80 - 120
			Total Barium (Ba)	2019/08/01		100	%	80 - 120
			Total Beryllium (Be)	2019/08/01		101	%	80 - 120
			Total Bismuth (Bi)	2019/08/01		103	%	80 - 120
			Total Boron (B)	2019/08/01		102	%	80 - 120
			Total Cadmium (Cd)	2019/08/01		101	%	80 - 120
			Total Calcium (Ca)	2019/08/01		NC	%	80 - 120
			Total Chromium (Cr)	2019/08/01		95	%	80 - 120
			Total Cobalt (Co)	2019/08/01		96	%	80 - 120
			Total Copper (Cu)	2019/08/01		93	%	80 - 120
			Total Iron (Fe)	2019/08/01		98	%	80 - 120
			Total Lead (Pb)	2019/08/01		102	%	80 - 120
			Total Magnesium (Mg)	2019/08/01		98	%	80 - 120
			Total Manganese (Mn)	2019/08/01		97	%	80 - 120
			Total Molybdenum (Mo)	2019/08/01		106	%	80 - 120
			Total Nickel (Ni)	2019/08/01		96	%	80 - 120
			Total Phosphorus (P)	2019/08/01		99	%	80 - 120
			Total Potassium (K)	2019/08/01		103	%	80 - 120
			Total Selenium (Se)	2019/08/01		101	%	80 - 120
			Total Silver (Ag)	2019/08/01		102	%	80 - 120
			Total Sodium (Na)	2019/08/01		90	%	80 - 120
			Total Strontium (Sr)	2019/08/01		104	%	80 - 120
			Total Thallium (Tl)	2019/08/01		104	%	80 - 120
			Total Tin (Sn)	2019/08/01		109	%	80 - 120
			Total Titanium (Ti)	2019/08/01		99	%	80 - 120
			Total Uranium (U)	2019/08/01		109	%	80 - 120
			Total Vanadium (V)	2019/08/01		98	%	80 - 120
			Total Zinc (Zn)	2019/08/01		97	%	80 - 120
6258641	AFM	Spiked Blank	Total Aluminum (Al)	2019/08/01		99	%	80 - 120
			Total Antimony (Sb)	2019/08/01		110	%	80 - 120
			Total Arsenic (As)	2019/08/01		99	%	80 - 120
			Total Barium (Ba)	2019/08/01		102	%	80 - 120
			Total Beryllium (Be)	2019/08/01		102	%	80 - 120
			Total Bismuth (Bi)	2019/08/01		104	%	80 - 120
			Total Boron (B)	2019/08/01		105	%	80 - 120
			Total Cadmium (Cd)	2019/08/01		100	%	80 - 120
			Total Calcium (Ca)	2019/08/01		105	%	80 - 120
			Total Chromium (Cr)	2019/08/01		96	%	80 - 120
			Total Cobalt (Co)	2019/08/01		98	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Copper (Cu)	2019/08/01		96	%	80 - 120
			Total Iron (Fe)	2019/08/01		101	%	80 - 120
			Total Lead (Pb)	2019/08/01		103	%	80 - 120
			Total Magnesium (Mg)	2019/08/01		102	%	80 - 120
			Total Manganese (Mn)	2019/08/01		100	%	80 - 120
			Total Molybdenum (Mo)	2019/08/01		106	%	80 - 120
			Total Nickel (Ni)	2019/08/01		99	%	80 - 120
			Total Phosphorus (P)	2019/08/01		102	%	80 - 120
			Total Potassium (K)	2019/08/01		106	%	80 - 120
			Total Selenium (Se)	2019/08/01		99	%	80 - 120
			Total Silver (Ag)	2019/08/01		100	%	80 - 120
			Total Sodium (Na)	2019/08/01		95	%	80 - 120
			Total Strontium (Sr)	2019/08/01		105	%	80 - 120
			Total Thallium (Tl)	2019/08/01		104	%	80 - 120
			Total Tin (Sn)	2019/08/01		109	%	80 - 120
			Total Titanium (Ti)	2019/08/01		103	%	80 - 120
			Total Uranium (U)	2019/08/01		109	%	80 - 120
			Total Vanadium (V)	2019/08/01		99	%	80 - 120
			Total Zinc (Zn)	2019/08/01		99	%	80 - 120
6258641	AFM	Method Blank	Total Aluminum (Al)	2019/08/01	<5.0		ug/L	
			Total Antimony (Sb)	2019/08/01	<1.0		ug/L	
			Total Arsenic (As)	2019/08/01	<1.0		ug/L	
			Total Barium (Ba)	2019/08/01	<1.0		ug/L	
			Total Beryllium (Be)	2019/08/01	<1.0		ug/L	
			Total Bismuth (Bi)	2019/08/01	<2.0		ug/L	
			Total Boron (B)	2019/08/01	<50		ug/L	
			Total Cadmium (Cd)	2019/08/01	<0.010		ug/L	
			Total Calcium (Ca)	2019/08/01	<100		ug/L	
			Total Chromium (Cr)	2019/08/01	<1.0		ug/L	
			Total Cobalt (Co)	2019/08/01	<0.40		ug/L	
			Total Copper (Cu)	2019/08/01	<0.50		ug/L	
			Total Iron (Fe)	2019/08/01	<50		ug/L	
			Total Lead (Pb)	2019/08/01	<0.50		ug/L	
			Total Magnesium (Mg)	2019/08/01	<100		ug/L	
			Total Manganese (Mn)	2019/08/01	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/08/01	<2.0		ug/L	
			Total Nickel (Ni)	2019/08/01	<2.0		ug/L	
			Total Phosphorus (P)	2019/08/01	<100		ug/L	
			Total Potassium (K)	2019/08/01	<100		ug/L	
			Total Selenium (Se)	2019/08/01	<1.0		ug/L	
			Total Silver (Ag)	2019/08/01	<0.10		ug/L	
			Total Sodium (Na)	2019/08/01	<100		ug/L	
			Total Strontium (Sr)	2019/08/01	<2.0		ug/L	
			Total Thallium (Tl)	2019/08/01	<0.10		ug/L	
			Total Tin (Sn)	2019/08/01	<2.0		ug/L	
			Total Titanium (Ti)	2019/08/01	<2.0		ug/L	
			Total Uranium (U)	2019/08/01	<0.10		ug/L	
			Total Vanadium (V)	2019/08/01	<2.0		ug/L	
			Total Zinc (Zn)	2019/08/01	<5.0		ug/L	
6258641	AFM	RPD	Total Aluminum (Al)	2019/08/01	1.6		%	20
			Total Antimony (Sb)	2019/08/01	NC		%	20
			Total Arsenic (As)	2019/08/01	NC		%	20
			Total Barium (Ba)	2019/08/01	NC		%	20
			Total Beryllium (Be)	2019/08/01	NC		%	20
			Total Bismuth (Bi)	2019/08/01	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Boron (B)	2019/08/01	NC		%	20
			Total Cadmium (Cd)	2019/08/01	NC		%	20
			Total Calcium (Ca)	2019/08/01	1.8		%	20
			Total Chromium (Cr)	2019/08/01	NC		%	20
			Total Cobalt (Co)	2019/08/01	NC		%	20
			Total Copper (Cu)	2019/08/01	4.4		%	20
			Total Iron (Fe)	2019/08/01	NC		%	20
			Total Lead (Pb)	2019/08/01	NC		%	20
			Total Magnesium (Mg)	2019/08/01	1.1		%	20
			Total Manganese (Mn)	2019/08/01	NC		%	20
			Total Molybdenum (Mo)	2019/08/01	NC		%	20
			Total Nickel (Ni)	2019/08/01	NC		%	20
			Total Phosphorus (P)	2019/08/01	NC		%	20
			Total Potassium (K)	2019/08/01	NC		%	20
			Total Selenium (Se)	2019/08/01	NC		%	20
			Total Silver (Ag)	2019/08/01	NC		%	20
			Total Sodium (Na)	2019/08/01	1.4		%	20
			Total Strontium (Sr)	2019/08/01	NC		%	20
			Total Thallium (Tl)	2019/08/01	NC		%	20
			Total Tin (Sn)	2019/08/01	NC		%	20
			Total Titanium (Ti)	2019/08/01	NC		%	20
			Total Uranium (U)	2019/08/01	8.1		%	20
			Total Vanadium (V)	2019/08/01	2.4		%	20
			Total Zinc (Zn)	2019/08/01	NC		%	20
6259367	MCN	Matrix Spike [KJP887-03]	Nitrogen (Ammonia Nitrogen)	2019/08/01		94	%	80 - 120
6259367	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/08/02		102	%	80 - 120
6259367	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/08/02	<0.050		mg/L	
6259367	MCN	RPD [KJP887-03]	Nitrogen (Ammonia Nitrogen)	2019/08/01	NC		%	20
6260986	BAN	Matrix Spike [KJP867-02]	Total Aluminum (Al)	2019/08/02		99	%	80 - 120
			Total Antimony (Sb)	2019/08/02		102	%	80 - 120
			Total Arsenic (As)	2019/08/02		98	%	80 - 120
			Total Barium (Ba)	2019/08/02		97	%	80 - 120
			Total Beryllium (Be)	2019/08/02		99	%	80 - 120
			Total Bismuth (Bi)	2019/08/02		98	%	80 - 120
			Total Boron (B)	2019/08/02		100	%	80 - 120
			Total Cadmium (Cd)	2019/08/02		98	%	80 - 120
			Total Calcium (Ca)	2019/08/02		98	%	80 - 120
			Total Chromium (Cr)	2019/08/02		97	%	80 - 120
			Total Cobalt (Co)	2019/08/02		98	%	80 - 120
			Total Copper (Cu)	2019/08/02		96	%	80 - 120
			Total Iron (Fe)	2019/08/02		NC	%	80 - 120
			Total Lead (Pb)	2019/08/02		98	%	80 - 120
			Total Magnesium (Mg)	2019/08/02		102	%	80 - 120
			Total Manganese (Mn)	2019/08/02		NC	%	80 - 120
			Total Molybdenum (Mo)	2019/08/02		101	%	80 - 120
			Total Nickel (Ni)	2019/08/02		97	%	80 - 120
			Total Phosphorus (P)	2019/08/02		102	%	80 - 120
			Total Potassium (K)	2019/08/02		102	%	80 - 120
			Total Selenium (Se)	2019/08/02		101	%	80 - 120
			Total Silver (Ag)	2019/08/02		96	%	80 - 120
			Total Sodium (Na)	2019/08/02		95	%	80 - 120
			Total Strontium (Sr)	2019/08/02		99	%	80 - 120
			Total Thallium (Tl)	2019/08/02		100	%	80 - 120
			Total Tin (Sn)	2019/08/02		103	%	80 - 120
			Total Titanium (Ti)	2019/08/02		98	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Uranium (U)	2019/08/02		104	%	80 - 120
			Total Vanadium (V)	2019/08/02		100	%	80 - 120
			Total Zinc (Zn)	2019/08/02		101	%	80 - 120
6260986	BAN	Spiked Blank	Total Aluminum (Al)	2019/08/02		95	%	80 - 120
			Total Antimony (Sb)	2019/08/02		96	%	80 - 120
			Total Arsenic (As)	2019/08/02		94	%	80 - 120
			Total Barium (Ba)	2019/08/02		95	%	80 - 120
			Total Beryllium (Be)	2019/08/02		98	%	80 - 120
			Total Bismuth (Bi)	2019/08/02		97	%	80 - 120
			Total Boron (B)	2019/08/02		99	%	80 - 120
			Total Cadmium (Cd)	2019/08/02		95	%	80 - 120
			Total Calcium (Ca)	2019/08/02		97	%	80 - 120
			Total Chromium (Cr)	2019/08/02		94	%	80 - 120
			Total Cobalt (Co)	2019/08/02		96	%	80 - 120
			Total Copper (Cu)	2019/08/02		94	%	80 - 120
			Total Iron (Fe)	2019/08/02		96	%	80 - 120
			Total Lead (Pb)	2019/08/02		96	%	80 - 120
			Total Magnesium (Mg)	2019/08/02		101	%	80 - 120
			Total Manganese (Mn)	2019/08/02		97	%	80 - 120
			Total Molybdenum (Mo)	2019/08/02		97	%	80 - 120
			Total Nickel (Ni)	2019/08/02		95	%	80 - 120
			Total Phosphorus (P)	2019/08/02		98	%	80 - 120
			Total Potassium (K)	2019/08/02		97	%	80 - 120
			Total Selenium (Se)	2019/08/02		96	%	80 - 120
			Total Silver (Ag)	2019/08/02		91	%	80 - 120
			Total Sodium (Na)	2019/08/02		95	%	80 - 120
			Total Strontium (Sr)	2019/08/02		96	%	80 - 120
			Total Thallium (Tl)	2019/08/02		99	%	80 - 120
			Total Tin (Sn)	2019/08/02		96	%	80 - 120
			Total Titanium (Ti)	2019/08/02		98	%	80 - 120
			Total Uranium (U)	2019/08/02		100	%	80 - 120
			Total Vanadium (V)	2019/08/02		96	%	80 - 120
			Total Zinc (Zn)	2019/08/02		96	%	80 - 120
6260986	BAN	Method Blank	Total Aluminum (Al)	2019/08/02	<5.0		ug/L	
			Total Antimony (Sb)	2019/08/02	<1.0		ug/L	
			Total Arsenic (As)	2019/08/02	<1.0		ug/L	
			Total Barium (Ba)	2019/08/02	<1.0		ug/L	
			Total Beryllium (Be)	2019/08/02	<1.0		ug/L	
			Total Bismuth (Bi)	2019/08/02	<2.0		ug/L	
			Total Boron (B)	2019/08/02	<50		ug/L	
			Total Cadmium (Cd)	2019/08/02	<0.010		ug/L	
			Total Calcium (Ca)	2019/08/02	<100		ug/L	
			Total Chromium (Cr)	2019/08/02	<1.0		ug/L	
			Total Cobalt (Co)	2019/08/02	<0.40		ug/L	
			Total Copper (Cu)	2019/08/02	<0.50		ug/L	
			Total Iron (Fe)	2019/08/02	<50		ug/L	
			Total Lead (Pb)	2019/08/02	<0.50		ug/L	
			Total Magnesium (Mg)	2019/08/02	<100		ug/L	
			Total Manganese (Mn)	2019/08/02	<2.0		ug/L	
			Total Molybdenum (Mo)	2019/08/02	<2.0		ug/L	
			Total Nickel (Ni)	2019/08/02	<2.0		ug/L	
			Total Phosphorus (P)	2019/08/02	<100		ug/L	
			Total Potassium (K)	2019/08/02	<100		ug/L	
			Total Selenium (Se)	2019/08/02	<1.0		ug/L	
			Total Silver (Ag)	2019/08/02	<0.10		ug/L	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2019/08/02	<100		ug/L	
			Total Strontium (Sr)	2019/08/02	<2.0		ug/L	
			Total Thallium (Tl)	2019/08/02	<0.10		ug/L	
			Total Tin (Sn)	2019/08/02	<2.0		ug/L	
			Total Titanium (Ti)	2019/08/02	<2.0		ug/L	
			Total Uranium (U)	2019/08/02	<0.10		ug/L	
			Total Vanadium (V)	2019/08/02	<2.0		ug/L	
			Total Zinc (Zn)	2019/08/02	<5.0		ug/L	
6260986	BAN	RPD	Total Aluminum (Al)	2019/08/02	NC		%	20
			Total Antimony (Sb)	2019/08/02	NC		%	20
			Total Arsenic (As)	2019/08/02	0.037		%	20
			Total Barium (Ba)	2019/08/02	1.5		%	20
			Total Boron (B)	2019/08/02	0.32		%	20
			Total Cadmium (Cd)	2019/08/02	NC		%	20
			Total Calcium (Ca)	2019/08/02	1.3		%	20
			Total Chromium (Cr)	2019/08/02	NC		%	20
			Total Copper (Cu)	2019/08/02	0.51		%	20
			Total Iron (Fe)	2019/08/02	0.35		%	20
			Total Lead (Pb)	2019/08/02	NC		%	20
			Total Magnesium (Mg)	2019/08/02	1.9		%	20
			Total Manganese (Mn)	2019/08/02	2.2		%	20
			Total Potassium (K)	2019/08/02	0.99		%	20
			Total Selenium (Se)	2019/08/02	NC		%	20
			Total Sodium (Na)	2019/08/02	1.3		%	20
			Total Uranium (U)	2019/08/02	0.42		%	20
			Total Zinc (Zn)	2019/08/02	1.3		%	20
6261258	MCN	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2019/08/06		101	%	80 - 120
6261258	MCN	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2019/08/06		101	%	80 - 120
6261258	MCN	Method Blank	Nitrogen (Ammonia Nitrogen)	2019/08/06	<0.050		mg/L	
6261258	MCN	RPD	Nitrogen (Ammonia Nitrogen)	2019/08/06	1.5		%	20
6261368	SRM	Matrix Spike	Total Alkalinity (Total as CaCO3)	2019/08/06		108	%	80 - 120
6261368	SRM	Spiked Blank	Total Alkalinity (Total as CaCO3)	2019/08/07		111	%	80 - 120
6261368	SRM	Method Blank	Total Alkalinity (Total as CaCO3)	2019/08/07	<5.0		mg/L	
6261368	SRM	RPD	Total Alkalinity (Total as CaCO3)	2019/08/06	4.4		%	25
6261369	SRM	Matrix Spike	Dissolved Chloride (Cl-)	2019/08/06		103	%	80 - 120
6261369	SRM	Spiked Blank	Dissolved Chloride (Cl-)	2019/08/06		102	%	80 - 120
6261369	SRM	Method Blank	Dissolved Chloride (Cl-)	2019/08/06	<1.0		mg/L	
6261369	SRM	RPD	Dissolved Chloride (Cl-)	2019/08/06	2.2		%	25
6261370	SRM	Matrix Spike	Dissolved Sulphate (SO4)	2019/08/06		107	%	80 - 120
6261370	SRM	Spiked Blank	Dissolved Sulphate (SO4)	2019/08/06		104	%	80 - 120
6261370	SRM	Method Blank	Dissolved Sulphate (SO4)	2019/08/06	<2.0		mg/L	
6261370	SRM	RPD	Dissolved Sulphate (SO4)	2019/08/06	1.1		%	25
6261371	SRM	Matrix Spike	Reactive Silica (SiO2)	2019/08/06		98	%	80 - 120
6261371	SRM	Spiked Blank	Reactive Silica (SiO2)	2019/08/06		100	%	80 - 120
6261371	SRM	Method Blank	Reactive Silica (SiO2)	2019/08/06	<0.50		mg/L	
6261371	SRM	RPD	Reactive Silica (SiO2)	2019/08/06	0.57		%	25
6261375	SRM	Spiked Blank	Colour	2019/08/06		113	%	80 - 120
6261375	SRM	Method Blank	Colour	2019/08/06	<5.0		TCU	
6261375	SRM	RPD	Colour	2019/08/06	NC		%	20
6261377	SRM	Matrix Spike	Orthophosphate (P)	2019/08/07		90	%	80 - 120
6261377	SRM	Spiked Blank	Orthophosphate (P)	2019/08/07		97	%	80 - 120
6261377	SRM	Method Blank	Orthophosphate (P)	2019/08/07	<0.010		mg/L	
6261377	SRM	RPD	Orthophosphate (P)	2019/08/07	NC		%	25
6261379	SRM	Matrix Spike	Nitrate + Nitrite (N)	2019/08/06		NC	%	80 - 120
6261379	SRM	Spiked Blank	Nitrate + Nitrite (N)	2019/08/06		88	%	80 - 120

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6261379	SRM	Method Blank	Nitrate + Nitrite (N)	2019/08/06	<0.050		mg/L	
6261379	SRM	RPD	Nitrate + Nitrite (N)	2019/08/06	0.40		%	25
6261381	SRM	Matrix Spike	Nitrite (N)	2019/08/06		99	%	80 - 120
6261381	SRM	Spiked Blank	Nitrite (N)	2019/08/06		100	%	80 - 120
6261381	SRM	Method Blank	Nitrite (N)	2019/08/06	<0.010		mg/L	
6261381	SRM	RPD	Nitrite (N)	2019/08/06	NC		%	20
6261736	EMT	QC Standard	pH	2019/08/06		101	%	97 - 103
6261736	EMT	RPD	pH	2019/08/06	2.1		%	N/A
6261737	EMT	Spiked Blank	Conductivity	2019/08/06		103	%	80 - 120
6261737	EMT	Method Blank	Conductivity	2019/08/06	<1.0		uS/cm	
6261737	EMT	RPD	Conductivity	2019/08/06	1.5		%	10
6261739	EMT	QC Standard	pH	2019/08/06		101	%	97 - 103
6261739	EMT	RPD [KJP887-01]	pH	2019/08/06	0.72		%	N/A
6261742	EMT	Spiked Blank	Conductivity	2019/08/06		101	%	80 - 120
6261742	EMT	Method Blank	Conductivity	2019/08/06	<1.0		uS/cm	
6261742	EMT	RPD [KJP887-01]	Conductivity	2019/08/06	1.1		%	10
6263334	KMC	Matrix Spike	Total Organic Carbon (C)	2019/08/03		95	%	85 - 115
6263334	KMC	Spiked Blank	Total Organic Carbon (C)	2019/08/03		96	%	80 - 120
6263334	KMC	Method Blank	Total Organic Carbon (C)	2019/08/03	<0.50		mg/L	
6263334	KMC	RPD	Total Organic Carbon (C)	2019/08/03	NC		%	15
6264259	NHU	Matrix Spike	Total Mercury (Hg)	2019/08/06		101	%	80 - 120
6264259	NHU	Spiked Blank	Total Mercury (Hg)	2019/08/06		102	%	80 - 120
6264259	NHU	Method Blank	Total Mercury (Hg)	2019/08/06	<0.013		ug/L	
6264259	NHU	RPD	Total Mercury (Hg)	2019/08/06	NC		%	20
6264269	EMT	QC Standard	Turbidity	2019/08/06		106	%	80 - 120
6264269	EMT	Spiked Blank	Turbidity	2019/08/06		101	%	80 - 120
6264269	EMT	Method Blank	Turbidity	2019/08/06	<0.10		NTU	
6264269	EMT	RPD	Turbidity	2019/08/06	NC		%	20
6264273	EMT	QC Standard	Turbidity	2019/08/06		105	%	80 - 120
6264273	EMT	Spiked Blank	Turbidity	2019/08/06		100	%	80 - 120
6264273	EMT	Method Blank	Turbidity	2019/08/06	<0.10		NTU	
6264273	EMT	RPD	Turbidity	2019/08/06	5.9		%	20
6264276	EMT	QC Standard	Turbidity	2019/08/06		105	%	80 - 120
6264276	EMT	Spiked Blank	Turbidity	2019/08/06		101	%	80 - 120
6264276	EMT	Method Blank	Turbidity	2019/08/06	<0.10		NTU	
6264276	EMT	RPD	Turbidity	2019/08/06	18		%	20
6264344	SSI	Matrix Spike	Total Organic Carbon (C)	2019/08/06		93	%	85 - 115
6264344	SSI	Spiked Blank	Total Organic Carbon (C)	2019/08/06		94	%	80 - 120
6264344	SSI	Method Blank	Total Organic Carbon (C)	2019/08/06	<0.50		mg/L	
6264344	SSI	RPD	Total Organic Carbon (C)	2019/08/06	8.2		%	15
6264494	SSI	Matrix Spike	Total Organic Carbon (C)	2019/08/06		93	%	85 - 115
6264494	SSI	Spiked Blank	Total Organic Carbon (C)	2019/08/06		99	%	80 - 120
6264494	SSI	Method Blank	Total Organic Carbon (C)	2019/08/06	<0.50		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6264494	SSI	RPD	Total Organic Carbon (C)	2019/08/06	8.6		%	15

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Elevated RDL(s) due to detected levels in the method blank.

(2) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Mike MacGillivray, Scientific Specialist (Inorganics)

Rosemarie MacDonald, Scientific Specialist (Organics)

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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APPENDIX D
MANN-KENDALL TABLES

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.005	0.037	0.021	0.01	0.005	0.005	0.005	0.005	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	1	1	0	0	0	0	3
Row 2: Compare to Event 2:			0	1	1	1	0	0	0	0	3
Row 3: Compare to Event 3:				1	1	1	0	0	0	0	3
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-6**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							X
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.019	0.005	0.005	0.14	0.005	0.027	0.005	0.01	0.005	0.005	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	1	-1	1	-1	-1	-1	-1	-5
Row 2: Compare to Event 2:			0	1	0	1	0	1	0	0	3
Row 3: Compare to Event 3:				1	0	1	0	1	0	0	3
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	0	1	0	0	2
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-8**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							X
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.005	0.068	0.005	0.011	0.005	0.005	0.005	0.005	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	0	1	0	0	0	0	2
Row 2: Compare to Event 2:			0	1	0	1	0	0	0	0	2
Row 3: Compare to Event 3:				1	0	1	0	0	0	0	2
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	0	0	0	0	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-3**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.021	0.022	0.019	0.14	0.016	0.025	0.016	0.012	0.015	0.018	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	-1	-1	-1	-3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	-1	-1	-1	-4
Row 3: Compare to Event 3:				1	-1	1	-1	-1	-1	-1	-3
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	0	-1	-1	1	0
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								-1	-1	1	-1
Row 8: Compare to Event 8:									1	1	2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-18**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							X
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
X	Trend Is Present (≥90% Confidence)	
X	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	64.7	32	54	36	52	34	31	60	35	55	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to Event 2:			1	1	1	1	-1	1	1	1	6
Row 3: Compare to Event 3:				-1	-1	-1	-1	1	-1	1	-3
Row 4: Compare to Event 4:					1	-1	-1	1	-1	1	0
Row 5: Compare to Event 5:						-1	-1	1	-1	1	-1
Row 6: Compare to Event 6:							-1	1	1	1	2
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = -3

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	5.3	9.1	11	27	2.5	2.5	2.5	2.5	6.7	2.5	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	-1	-1	-1	-1	1	-1	-1
Row 2: Compare to Event 2:			1	1	-1	-1	-1	-1	-1	-1	-4
Row 3: Compare to Event 3:				1	-1	-1	-1	-1	-1	-1	-5
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-13**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							X
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	25	25	25	25	25	25	25	25	25	25	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	0	0
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	0	0
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							X
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: NRC-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Suphate	19	20	22	15	15	16	21	12	17	15	
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	-1	-1	-1	1	-1	-1	-1	-3
Row 2: Compare to Event 2:			1	-1	-1	-1	1	-1	-1	-1	-4
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					0	1	1	-1	1	0	2
Row 5: Compare to Event 5:						1	1	-1	1	0	2
Row 6: Compare to Event 6:							1	-1	1	-1	0
Row 7: Compare to Event 7:								-1	-1	-1	-3
Row 8: Compare to Event 8:									1	1	2
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = -12

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							X
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.005	0.005	0.005	0.005	0.005				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	18/1123	29-Jul-19				
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	0	0
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	0	0
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0				X			
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.005	0.01	0.005	0.005	0.005	0.005	0.005				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		1	0	0	0	0	0	0	0	0	1
Row 2: Compare to Event 2:			-1	-1	-1	-1	-1	0	0	0	-5
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-4**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4				X			
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.005	0.005	0.005	0.005	0.005				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	0	0
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	0	0
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0				X			
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.015	0.005	0.005	0.005	0.058	0.005	0.005				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		-1	-1	-1	1	-1	-1	0	0	0	-4
Row 2: Compare to Event 2:			0	0	1	0	0	0	0	0	1
Row 3: Compare to Event 3:				0	1	0	0	0	0	0	1
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	0	0	0	-2
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-3**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3				X			
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	671	260	260	250	270	210	240				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	0	0	0	-6
Row 2: Compare to Event 2:			0	-1	1	-1	-1	0	0	0	-2
Row 3: Compare to Event 3:				-1	1	-1	-1	0	0	0	-2
Row 4: Compare to Event 4:					1	-1	-1	0	0	0	-1
Row 5: Compare to Event 5:						-1	-1	0	0	0	-2
Row 6: Compare to Event 6:							1	0	0	0	1
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-12**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12				X			
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
X	Trend Is Present (≥90% Confidence)	
X	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	2.5	2.5	2.5	2.5	14	2.5	2.5				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		0	0	0	1	0	0	0	0	0	1
Row 2: Compare to Event 2:			0	0	1	0	0	0	0	0	1
Row 3: Compare to Event 3:				0	1	0	0	0	0	0	1
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	0	0	0	-2
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **2**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2				X			
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	415	25	25	85	58	25	53				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	0	0	0	-6
Row 2: Compare to Event 2:			0	1	1	0	1	0	0	0	3
Row 3: Compare to Event 3:				1	1	0	1	0	0	0	3
Row 4: Compare to Event 4:					-1	-1	-1	0	0	0	-3
Row 5: Compare to Event 5:						-1	-1	0	0	0	-2
Row 6: Compare to Event 6:							1	0	0	0	1
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-4**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4				X			
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-A-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	740	160	170	150	100	110	100				
	23-Jul-13	22-Dec-14	18-Nov-15	8-Dec-16	25-Jul-18	23-Nov-18	29-Jul-19				
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	0	0	0	-6
Row 2: Compare to Event 2:			1	-1	-1	-1	-1	0	0	0	-3
Row 3: Compare to Event 3:				-1	-1	-1	-1	0	0	0	-4
Row 4: Compare to Event 4:					-1	-1	-1	0	0	0	-3
Row 5: Compare to Event 5:						1	0	0	0	0	1
Row 6: Compare to Event 6:							-1	0	0	0	-1
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-16**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16				X			
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
X	Trend Is Present (≥90% Confidence)	
X	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.12	0.005	0.013	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	1	0	1	0	0	0	0	0	2
Row 2: Compare to Event 2:			1	0	1	0	0	0	0	0	2
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-7**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							X
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.005	0.012	0.74	0.005	0.04	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	0	1	0	0	0	0	0	3
Row 2: Compare to Event 2:			1	-1	1	-1	-1	-1	-1	-1	-4
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-12**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							X
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.39	0.005	0.028	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	1	0	1	0	0	0	0	0	2
Row 2: Compare to Event 2:			1	0	1	0	0	0	0	0	2
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-7**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							X
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.014	0.005	0.29	0.005	0.014	0.011	0.01	0.005	0.014	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	1	-1	0	-1	-1	-1	0	-1	-5
Row 2: Compare to Event 2:			1	0	1	1	1	0	1	0	5
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					1	1	1	0	1	0	4
Row 5: Compare to Event 5:						-1	-1	-1	0	-1	-4
Row 6: Compare to Event 6:							-1	-1	1	-1	-2
Row 7: Compare to Event 7:								-1	1	-1	-1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-10**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							X
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	140	250	150	280	110	450	110	430	130	230	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	-1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	-1	-2
Row 3: Compare to Event 3:				1	-1	1	-1	1	-1	1	1
Row 4: Compare to Event 4:					-1	1	-1	1	-1	-1	-2
Row 5: Compare to Event 5:						1	0	1	1	1	4
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **2**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							X
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	7.2	10	96	2.5	2.5	2.5	5.1	2.5	2.5	2.5	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	-1	-1	-1	-1	-1	-1	-1	-5
Row 2: Compare to Event 2:			1	-1	-1	-1	-1	-1	-1	-1	-6
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					0	0	1	0	0	0	1
Row 5: Compare to Event 5:						0	1	0	0	0	1
Row 6: Compare to Event 6:							1	0	0	0	1
Row 7: Compare to Event 7:								-1	-1	-1	-3
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-18**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							X
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
X	Trend Is Present (≥90% Confidence)	
X	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	25	60	25	25	25	63	25	57	25	25	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	0	0	0	1	0	1	0	0	3
Row 2: Compare to Event 2:			-1	-1	-1	1	-1	-1	-1	-1	-6
Row 3: Compare to Event 3:				0	0	1	0	1	0	0	2
Row 4: Compare to Event 4:					0	1	0	1	0	0	2
Row 5: Compare to Event 5:						1	0	1	0	0	2
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-2**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							X
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-4-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	47	100	41	74	39	110	42	100	41	69	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	1	-1	1	1
Row 2: Compare to Event 2:			-1	-1	-1	1	-1	0	-1	-1	-5
Row 3: Compare to Event 3:				1	-1	1	1	1	0	1	4
Row 4: Compare to Event 4:					-1	1	-1	1	-1	-1	-2
Row 5: Compare to Event 5:						1	1	1	1	1	5
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	-1	1	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-1**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	0	1	0	0	0	0	0	1
Row 2: Compare to Event 2:			0	0	1	0	0	0	0	0	1
Row 3: Compare to Event 3:				0	1	0	0	0	0	0	1
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-1**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.013	0.005	0.03	0.005	0.038	0.017	0.012	0.005	0.01	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	1	-1	1	1	-1	-1	-1	-1	-3
Row 2: Compare to Event 2:			1	0	1	1	1	0	1	0	5
Row 3: Compare to Event 3:				-1	1	-1	-1	-1	-1	-1	-5
Row 4: Compare to Event 4:					1	1	1	0	1	0	4
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								-1	-1	-1	-3
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-11**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							X
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.015	0.005	0.027	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	1	0	1	0	0	0	0	0	2
Row 2: Compare to Event 2:			1	0	1	0	0	0	0	0	2
Row 3: Compare to Event 3:				-1	1	-1	-1	-1	-1	-1	-5
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-5**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.01	0.005	0.018	0.005	0.015	0.011	0.01	0.005	0.015	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	1	-1	1	1	0	-1	1	-1	0
Row 2: Compare to Event 2:			1	0	1	1	1	0	1	0	5
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					1	1	1	0	1	0	4
Row 5: Compare to Event 5:						-1	-1	-1	0	-1	-4
Row 6: Compare to Event 6:							-1	-1	1	-1	-2
Row 7: Compare to Event 7:								-1	1	-1	-1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-5**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**	**Event 7**	**Event 8**	**Event 9**	**Event 10**	**Sum Rows**
Strontium	180	300	180	300	160	500	160	350	140	300	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	0	1	-1	1	-1	1	-1	1	2
Row 2: Compare to Event 2:			-1	0	-1	1	-1	1	-1	0	-2
Row 3: Compare to Event 3:				1	-1	1	-1	1	-1	1	1
Row 4: Compare to Event 4:					-1	1	-1	1	-1	0	-1
Row 5: Compare to Event 5:						1	0	1	-1	1	2
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	-1	1	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-2**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							X
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	6	7.4	2.5	2.5	2.5	2.5	2.5	2.5	6.4	2.5	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	-1	-1	-1	-1	-1	1	-1	-5
Row 2: Compare to Event 2:			-1	-1	-1	-1	-1	-1	-1	-1	-8
Row 3: Compare to Event 3:				0	0	0	0	0	1	0	1
Row 4: Compare to Event 4:					0	0	0	0	1	0	1
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-8**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							X
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	25	52	25	25	25	59	25	62	25	25	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	0	0	0	1	0	1	0	0	3
Row 2: Compare to Event 2:			-1	-1	-1	1	-1	1	-1	-1	-4
Row 3: Compare to Event 3:				0	0	1	0	1	0	0	2
Row 4: Compare to Event 4:					0	1	0	1	0	0	2
Row 5: Compare to Event 5:						1	0	1	0	0	2
Row 6: Compare to Event 6:							-1	1	-1	-1	-2
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **2**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							X
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: COB-6-SW										
	Event 1	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**	**Event 7**	**Event 8**	**Event 9**	**Event 10**	**Sum Rows**
Sulphate	56	91	44	64	41	110	48	95	45	76	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	1	-1	1	1
Row 2: Compare to Event 2:			-1	-1	-1	1	-1	1	-1	-1	-4
Row 3: Compare to Event 3:				1	-1	1	1	1	1	1	5
Row 4: Compare to Event 4:					-1	1	-1	1	-1	1	0
Row 5: Compare to Event 5:						1	1	1	1	1	5
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	-1	1	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **3**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.005	0.025	0.005	0.005	0.005	0.005	0.97	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	0	0	0	0	1	0	2
Row 2: Compare to Event 2:			0	1	0	0	0	0	1	0	2
Row 3: Compare to Event 3:				1	0	0	0	0	1	0	2
Row 4: Compare to Event 4:					-1	-1	-1	-1	1	-1	-4
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **5**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.005	0.005	0.005	0.092	0.005	0.027	0.005	0.005	2.5	2.5	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	0	1	0	0	1	1	4
Row 2: Compare to Event 2:			0	1	0	1	0	0	1	1	4
Row 3: Compare to Event 3:				1	0	1	0	0	1	1	4
Row 4: Compare to Event 4:					-1	-1	-1	-1	1	1	-2
Row 5: Compare to Event 5:						1	0	0	1	1	3
Row 6: Compare to Event 6:							-1	-1	1	1	0
Row 7: Compare to Event 7:								0	1	1	2
Row 8: Compare to Event 8:									1	1	2
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **17**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							X
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
X	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
X	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.005	0.025	0.005	0.005	0.005	0.005	1.3	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	0	0	0	0	1	0	2
Row 2: Compare to Event 2:			0	1	0	0	0	0	1	0	2
Row 3: Compare to Event 3:				1	0	0	0	0	1	0	2
Row 4: Compare to Event 4:					-1	-1	-1	-1	1	-1	-4
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **5**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.038	0.012	0.005	0.035	0.026	0.27	0.27	0.024	0.15	0.021	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-16	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-09	
Row 1: Compare to Event 1:		-1	-1	-1	-1	1	1	-1	1	-1	-3
Row 2: Compare to Event 2:			-1	1	1	1	1	1	1	1	6
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	1	-1	1	-1	0
Row 5: Compare to Event 5:						1	1	-1	1	-1	1
Row 6: Compare to Event 6:							0	-1	-1	-1	-3
Row 7: Compare to Event 7:								-1	-1	-1	-3
Row 8: Compare to Event 8:									1	-1	0
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **4**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							X
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	53	100	73	1300	61	940	49	320	50	120	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	1	1	-1	1	-1	1	5
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	1	0
Row 3: Compare to Event 3:				1	-1	1	-1	1	-1	1	1
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-1**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	10	7.9	2.5	11	2.5	2.5	2.5	6	160	2.5	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	1	-1	-1	-1	-1	1	-1	-5
Row 2: Compare to Event 2:			-1	1	-1	-1	-1	-1	1	-1	-4
Row 3: Compare to Event 3:				1	0	0	0	1	1	0	3
Row 4: Compare to Event 4:					-1	-1	-1	-1	1	-1	-4
Row 5: Compare to Event 5:						0	0	1	1	0	2
Row 6: Compare to Event 6:							0	1	1	0	2
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									1	-1	0
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-5**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	25	25	25	690	25	430	25	110	25	25	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	1	0	1	0	1	0	0	3
Row 2: Compare to Event 2:			0	1	0	1	0	1	0	0	3
Row 3: Compare to Event 3:				1	0	1	0	1	0	0	3
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	0	1	0	0	2
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							X
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: WB-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	7.9	10	8.3	410	8.5	230	8	71	6.5	16	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	1	1	1	1	-1	1	7
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	1	0
Row 3: Compare to Event 3:				1	1	1	-1	1	-1	1	3
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	-1	1	1
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **1**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.011	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	1	0	1
Row 2: Compare to Event 2:			0	0	0	0	0	0	1	0	1
Row 3: Compare to Event 3:				0	0	0	0	0	1	0	1
Row 4: Compare to Event 4:					0	0	0	0	1	0	1
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **7**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							X
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.036	0.005	0.022	0.005	0.016	0.005	0.018	0.005	0.031	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to Event 2:			1	0	1	0	1	0	1	0	4
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	1	-1	-5
Row 4: Compare to Event 4:					1	0	1	0	1	0	3
Row 5: Compare to Event 5:						-1	1	-1	1	-1	-1
Row 6: Compare to Event 6:							1	0	1	0	2
Row 7: Compare to Event 7:								-1	1	-1	-1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-7**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							X
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)anthracene	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	0	0
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	0	0
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart

S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							X
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding		
	X	CV<=1	Plume is Stable
		CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)		
		S < 0	Diminishing Plume
		S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.028	0.05	0.014	0.05	0.025	0.05	0.02	0.05	0.024	0.05	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	1	-1	1	1
Row 2: Compare to Event 2:			-1	0	-1	0	-1	0	-1	0	-4
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **3**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	950	5300	580	5500	1000	6100	630	5900	730	5000	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	-1	-2
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	-1	1	-1	-1	-2
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **5**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

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NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	7.2	25	41	25	2.5	25	2.5	25	2.5	25	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	-1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			1	0	-1	0	-1	0	-1	0	-2
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	0	1	0	1	3
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	0	1	2
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-6**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							X
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	480	2900	330	3600	520	3600	340	3500	420	3100	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	1	0
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	0	-1	-1	-1	-1	-5
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **4**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							X
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: BP-1-SW										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	270	1500	190	1600	290	2000	210	1900	250	1700	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	1	0
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	-1	1	-1	1	0
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **9**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							X
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Anthracene	0.014	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.11	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	1	-1	-7
Row 2: Compare to Event 2:			0	0	0	0	0	0	1	0	1
Row 3: Compare to Event 3:				0	0	0	0	0	1	0	1
Row 4: Compare to Event 4:					0	0	0	0	1	0	1
Row 5: Compare to Event 5:						0	0	0	1	0	1
Row 6: Compare to Event 6:							0	0	1	0	1
Row 7: Compare to Event 7:								0	1	0	1
Row 8: Compare to Event 8:									1	0	1
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-1**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Pyrene	0.03	0.014	0.019	0.005	0.016	0.005	0.018	0.13	0.035	0.029	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	1	1	-1	-5
Row 2: Compare to Event 2:			1	-1	1	-1	1	1	1	1	4
Row 3: Compare to Event 3:				-1	-1	-1	-1	1	1	1	-1
Row 4: Compare to Event 4:					1	0	1	1	1	1	5
Row 5: Compare to Event 5:						-1	1	1	1	1	3
Row 6: Compare to Event 6:							1	1	1	1	4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	-1	-2
Row 9: Compare to Event 9:										-1	-1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **10**

Confidence Level Chart

S Value	Total No. of Sampling Events						
	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							X
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results

X	No Trend Indicated, Plume Not Diminishing or Expanding	
	CV<=1	Plume is Stable
X	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
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MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Benzo(a)pyrene	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	0	0
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	0	0
Row 3: Compare to Event 3:				0	0	0	0	0	0	0	0
Row 4: Compare to Event 4:					0	0	0	0	0	0	0
Row 5: Compare to Event 5:						0	0	0	0	0	0
Row 6: Compare to Event 6:							0	0	0	0	0
Row 7: Compare to Event 7:								0	0	0	0
Row 8: Compare to Event 8:									0	0	0
Row 9: Compare to Event 9:										0	0

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **0**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							X
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.027	0.05	0.012	0.05	0.029	0.05	0.018	0.05	0.021	0.05	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	0	-1	0	-1	0	-1	0	-4
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **5**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							X
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	610	5400	370	5400	890	6100	450	5000	500	5000	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	0	-1	1	-1	-1	-1	-1	-5
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	-1	-1	-1	-1	-4
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **1**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							X
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Zinc	7.3	25	63	25	15	25	5.8	25	8.8	25	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	1	1	1	1	-1	1	1	1	7
Row 2: Compare to Event 2:			1	0	-1	0	-1	0	-1	0	-2
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	-1	-7
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **-3**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Boron	300	3100	180	3500	460	3600	210	2800	260	3000	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	1	3
Row 2: Compare to Event 2:			-1	1	-1	1	-1	-1	-1	-1	-4
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	-1	-1	-1	-1	-4
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	1	0
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **3**

Confidence Level Chart							
S	**Total No. of Sampling Events**						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							X
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	MONITORING WELL NO: Narrows										
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	170	1300	110	1400	270	2000	150	1700	180	1700	
	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	29-Jul-19	
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	1	1	5
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	1	0
Row 3: Compare to Event 3:				1	1	1	1	1	1	1	7
Row 4: Compare to Event 4:					-1	1	-1	1	-1	1	0
Row 5: Compare to Event 5:						1	-1	1	-1	1	1
Row 6: Compare to Event 6:							-1	-1	-1	-1	-4
Row 7: Compare to Event 7:								1	1	1	3
Row 8: Compare to Event 8:									-1	0	-1
Row 9: Compare to Event 9:										1	1

1/2 detection limit used for analytical results having no concentrations detected; historical data assumed EQL of 0.001 mg/L

Mann-Kendall (S) Statistic = **12**

Confidence Level Chart							
S	Total No. of Sampling Events						
Value	4	5	6	7	8	9	10
0							
± 1							
± 2							
± 3							
± 4							
± 5							
± 6							
± 7							
±8							
± 9							
± 10							
± 11							
± 12							X
± 13							
± 14							
± 15							
± 16							
± 17							
± 18							
± 19							
± 20							
± 21							
± 22							
± 23							
± 24	Not Physically possible						
± 25							
± 26							
± 27							
± 28							
± 29							
± 30							
± 31							
± 32							
± 33							
± 34							
± 35							
± 36							
± 37							
± 38							
± 39							
± 40							
± 41							
± 42							
± 43							
± 44							
± 45							

Unshaded area indicates no trend
stable trend (if CV=<1)
fluctuating (if CV>1)

Shaded area indicates
Expanding trend if S>0
Declining trend if S<0

Stability Evaulation Results		
X	No Trend Indicated, Plume Not Diminishing or Expanding	
X	CV<=1	Plume is Stable
	CV>1	Plume is Fluctuating
	Trend Is Present (≥90% Confidence)	
	S < 0	Diminishing Plume
	S > 0	Expanding Plume