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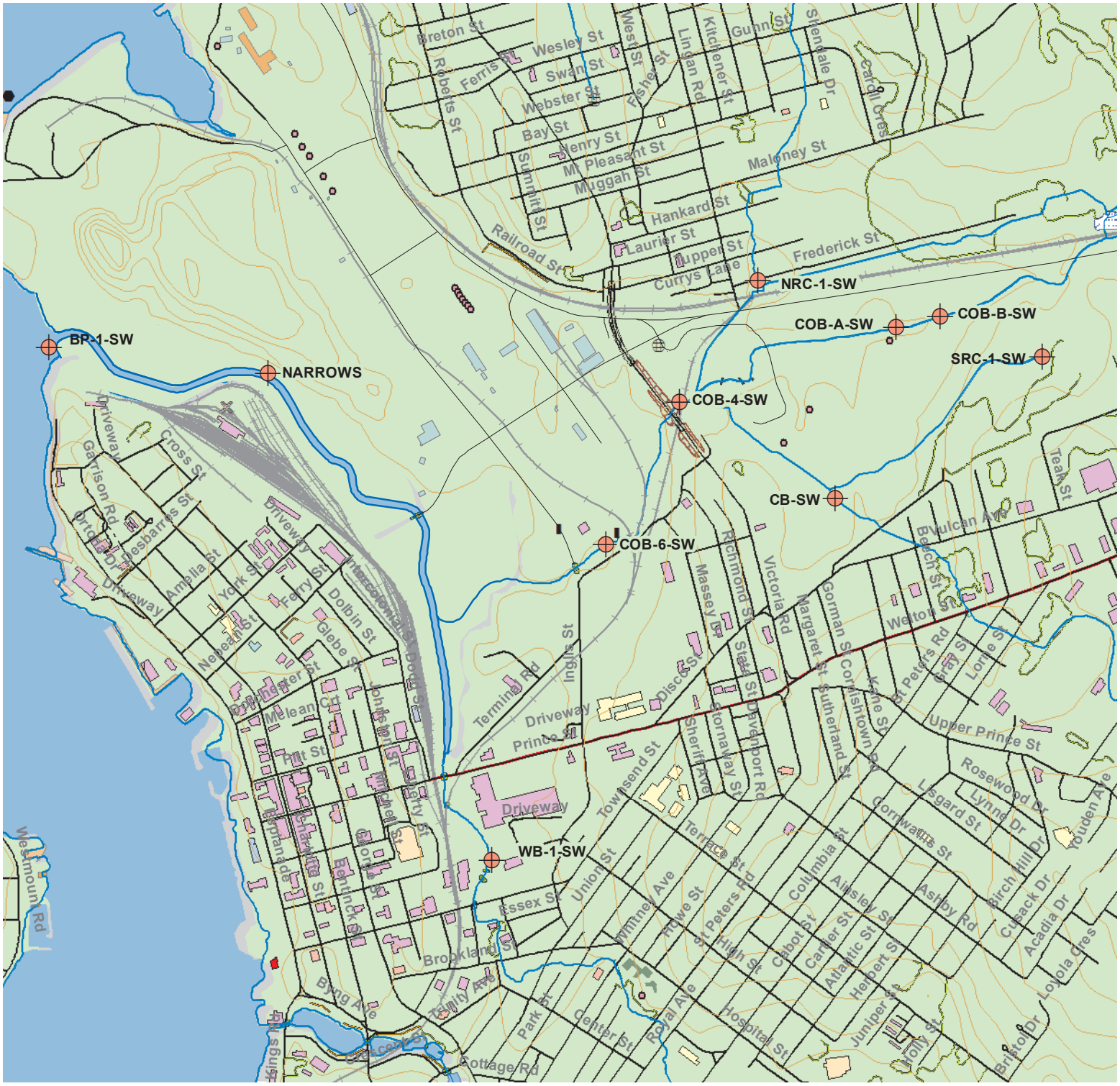
Long Term Maintenance and Monitoring
Semi-Annual Surface Water Quality Monitoring Program - Fall 2018
Final Report

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 fall (November 2018) LTMM Surface Water Quality Monitoring Program, the details of which are provided herein.

PROJECT METHODOLOGY

The fall surface water quality monitoring program, which was completed on November 23, 2018, 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 fall 2018 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 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).



NS Lands
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LONG TERM MAINTENANCE
AND MONITORING
SURFACE WATER QUALITY MONITORING PROGRAM
November 2018

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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DILLON CONSULTING

PROJECT: 14-1360

Date: 12/18/2018

A summary of the surface water stations included in the fall 2018 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 November 23, 2018 surface water monitoring program was approximately 277.2 millimeters (mm). No significant rainfall was recorded on the day of, or the two days leading up to, the sampling event.

Tidal information obtained from Meteo365 (https://www.tide-forecast.com) for November 23, 2018, indicated a high tide level of 1.25 m and a low tide level of 0.32 m.

FIELD OBSERVATIONS AND MEASUREMENTS

Observations at the ten surface water stations during the fall 2018 monitoring program are summarized in Table 2. Field measurements are summarized in Table 3.

Table 2 – Fall 2018 Surface Water Quality Monitoring Station Field Observations

Monitoring Station ID	Field Observations	Corresponding Photograph Number
CB-SW	Snow cover on the brook banks. No debris observed.	1
NRC-1-SW	Snow cover on the brook banks. Debris (i.e., cardboard and plastic) observed in the channel and on the channel banks.	2
SRC-1-SW	Thin ice patches on the surface of the water. Concrete channel walls had extensive spray painted graffiti visibly dissolving at the high water point. No debris observed.	3
COB-A-SW	Brook banks had snow cover. Edges of water had thin ice cover. Algae and moss observed in stream. No debris observed.	4
COB-B-SW	Snow cover on brook banks. Edges of water had thin ice cover. Vegetation observed in brook. Groundwater observed flowing from the ground and into the brook down gradient of the surface water sampling point. No debris observed.	5 and 6
COB-4-SW	Brook banks had snow cover. Edges of water had thin ice cover. Debris (i.e., wood and metal) observed on the brook banks.	7

Table 2 – Fall 2018 Surface Water Quality Monitoring Station Field Observations

Monitoring Station ID	Field Observations	Corresponding Photograph Number
COB-6-SW	Brook banks had snow cover. Ducks observed in the water. Debris (i.e., plastic) observed on the brook banks.	8
WB-1-SW	Brook banks had snow cover. Portions of the brook had thin ice cover. Debris (i.e., wood and plastic) observed on the brook banks.	9
NARROWS	Channel banks had snow and ice cover. Seaweed and algae observed in the channel and on the banks. No debris observed.	10
BP-1-SW	Channel banks had snow and ice cover. Seaweed and algae observed in the channel and on the banks. No debris observed.	11

Note:
1 Photographs are presented in Appendix A.

Table 3 – Fall 2018 Surface Water Quality Monitoring Station Field Measurements

Monitoring Station ID	pH	Turbidity (NTU)	Conductivity (mS/cm)	Salinity (%)	Stream Flow[1] (m^3/s)
CB-SW	7.59	6.1	0.571	0.27	0.003
NRC-1-SW	8.46	4.8	0.370	0	0.08
SRC-1-SW	7.68	18	0.548	0.26	0.06
COB-A-SW	7.72	0	0.566	0.26	0.05
COB-B-SW	7.63	15.2	0.527	0.24	0.01
COB-4-SW	8.54	6.3	0.536	0.25	0.34
COB-6-SW	9.13	6.7	0.457	0.21	0.04
WB-1-SW	8.49	184	0.132	0.06	0.23
NARROWS	8.65	4.1	3.69	1.84	4.83
BP-1-SW[2]	7.83	32	6.56	3.28	7.34

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 fall 2018 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 fall 2018 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 Maxxam Analytics in Sydney, Nova Scotia (Maxxam) for analysis. Maxxam is accredited through the Standard Council of Canada (SCC) and is a member of the Canadian Association for Laboratory Accreditation (CALA).

Review of the November 2018 data indicates:

- PAH results:
  - The concentrations of anthracene (0.84 ug/L and 0.97 ug/L), benzo(a)anthracene (1.6 ug/L), benzo(a)pyrene (1.3 ug/L and 1.1 ug/L), fluoranthene (3.3 ug/L and 3.1 ug/L), phenanthrene (2.3 ug/L and 2.1 ug/L) and pyrene (2.5 ug/L) in WB-1-SW and the field duplicate sample for WB-1-SW each exceeded their corresponding NSE Tier I EQS and CCME FWAL guidelines of 0.012 ug/L, 0.018 ug/L, 0.015 ug/L, 0.04 ug/L, 0.4 ug/L and 0.025 ug/L, respectively. The benzo(a)pyrene concentration in WB-1-SW and the field duplicate sample for WB-1-SW also exceeded the Pre-Construction/Baseline Calculated 95% UCL of 0.05 ug/L. The concentrations of benzo(b)fluoranthene (1.1 ug/L and 0.99 ug/L), benzo(g,h,i)perylene (0.69 ug/L and 0.60 ug/L), benzo(j)fluoranthene (0.61 ug/L and 0.56 ug/L), benzo(k)fluoranthene (0.67 ug/L and 0.59 ug/L), chrysene (1.7 ug/L) and indeno(1,2,3-cd)pyrene (0.64 ug/L and 0.58 ug/L) in WB-1-SW and the field duplicate sample collected from WB-

1-SW also exceeded the respective Tier I EQSs of 0.48 ug/L, 0.17 ug/L, 0.48 ug/L, 0.48 ug/L, 1.4 ug/L and 0.21 ug/L. These are the first Tier I EQS exceedances of anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and phenanthrene at WB-1-SW since the LTMM program commenced; and,

- The pyrene concentrations in the Narrows (0.035 ug/L) and BP-1-SW (0.031 ug/L) exceeded the Tier I EQS (marine) of 0.02 ug/L. This is the first pyrene exceedance at the Narrows since 2014 and at BP-1-SW since 2015.

The remaining PAH parameters analyzed were below the applicable Tier I EQS. A summary of concentrations of select organic parameters (i.e., naphthalene and benzo(a)pyrene) at each station recorded during the fall 2018 event relative to the calculated 95% UCLs is provided in Table 4. There were no exceedances of the relative calculated 95% UCLs for naphthalene during the fall 2018 monitoring event. As noted above, one exceedance of the Pre-Construction/Baseline Calculated 95% UCL occurred at WB-1-SW.

- General chemistry and metals results:
  - Concentrations of aluminum ranging from 7.0 ug/L to 1800 ug/L exceeded the Tier I EQS (fresh water) of 5 ug/L in CB-SW, NRC-1-SW, SRC-1-SW, COB-A-SW, COB-B-SW, COB-4-SW, COB-6-SW, WB-1- SW and the field duplicate sample of WB-1-SW. Aluminum concentrations ranging from 140 ug/L to 1800 ug/L at SRC-1-SW, COB-4-SW, COB-6-SW, WB-1- SW, and the field duplicate sample of WB-1-SW exceeded the CCME FWAL guideline of 100 ug/L. Aluminum concentrations ranging from 320 ug/L to 1800 ug/L in SRC-1-SW, WB-1-SW and the field duplicate sample of WB-1-SW also exceeded the Upstream Calculated 95% UCL of 220 ug/L;
  - The arsenic concentrations of 4.3 ug/L to 3.9 ug/L at WB-1-SW and the field duplicate sample of WB-1-SW exceeded both the Upstream Calculated 95% UCL of 1.6 ug/L and Pre-Construction/Baseline Calculated 95% UCL of 1.98 ug/L;
  - Cadmium concentrations ranging from 0.014 ug/L to 0.15 ug/L in CB-SW, NRC-1-SW, SRC-1-SW, COB-4-SW, COB-6-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 cadmium concentration of 0.14 ug/L in WB-1-SW and 0.15 ug/L in the field duplicate of WB-1-SW also exceeded the CCME FWAL guideline of 0.09 ug/L and the Upstream Calculated 95% UCL of 0.1 ug/L;
  - The chloride concentration of 130 ug/L in CB-SW exceeded the CCME FWAL guideline of 120 ug/L. This is the first chloride exceedance at CB-SW since the LTMM commenced. The chloride concentrations in the remaining sampling stations were comparative to historical findings, with the exception of NRC-1-SW. Sample location NRC-1-SW also had an elevated chloride concentration that was below the CCME FWAL guideline;
  - The chromium concentration of 3.5 ug/L in WB-1-SW and 3.3 ug/L in the field duplicate of WB-1-SW exceeded the CCME FWAL guideline of 1 ug/L;
  - The concentrations of copper ranging from 2.7 ug/L to 9.7 ug/L in SRC-1-SW, WB-1-SW and the field duplicate sample of WB-1-SW exceeded the Tier I EQS and CCME FWAL guideline of 2 ug/L;

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
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

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

- Iron concentrations ranging from 360 ug/L to 3700 ug/L in SRC-1-SW, COB-A-SW, COB-6-SW, WB-1-SW and the field duplicate sample of WB-1-SW exceeded the Tier I EQS (fresh water) and CCME FWAL guideline of 300 ug/L. The iron concentration of 3500 ug/L in WB-1-SW and 3700 ug/L in the field duplicate sample for WB-1-SW also exceeded the Upstream Calculated 95% UCL of 3318 ug/L and Pre-Construction/Baseline Calculated 95% UCL of 1900 ug/L. The iron concentrations of 220 ug/L and 240 ug/L in the Narrows and BP-1-SW, respectively, exceeded the Battery Point/Narrows Calculated 95% UCL of 190 ug/L;
- Lead concentrations ranging from 1.3 ug/L to 29 ug/L in SRC-1-SW, WB-1-SW and the field duplicate sample of WB-1-SW, exceeded the Tier I EQS (fresh water) and CCME FWAL guideline of 1 ug/L and the Upstream Calculated 95% UCL of 1.2 ug/L;
- The mercury concentrations of 0.037 ug/L and 0.033 ug/L in WB-1-SW and the field duplicate sample of WB-1-SW exceeded the Tier I EQS (fresh water) and CCME FWAL guideline of 0.026 ug/L. These concentrations are the first recorded exceedances for mercury at WB-1-SW;
- The pH concentrations of 8.78 and 8.74 in the Narrows and BP-1-SW, respectively, exceeded the CCME MAL guideline of 7.0-8.7. These are the only pH exceedances observed in the surface water stations since the LTMM commenced;
- The silver concentrations of 1.7 ug/L and 1.5 ug/L in WB-1-SW and the field duplicate sample of WB-1-SW exceeded the Tier I EQS (fresh water) of 0.1 ug/L and CCME FWAL guideline of 0.25 ug/L. This is the first silver exceedance observed in the surface water stations since the LTMM commenced.
- Concentrations of strontium ranging from 140 ug/L to 210 ug/L in COB-A-SW, COB-B-SW and COB-6-SW were above the Upstream 95% UCL of 132 ug/L;
- Sulphate concentrations ranging from of 32 mg/L to 110 mg/L at CB-SW, SRC-1-SW, COB-A-SW, COB-B-SW, COB-4-SW and COB-6-SW exceeded the Upstream Calculated 95% UCL of 26 mg/L. Sulphate concentrations of 110 mg/L at COB-A-SW and COB-B-SW were also above the Pre-Construction/Baseline Calculated 95% UCL of 84 mg/L; and,
- The zinc concentration of 160 mg/L in the field duplicate sample of WB-1-SW exceeded the Tier I EQS (fresh water) of 30 ug/L and the CCME FWAL guideline of 7 ug/L. It is noted that the zinc concentration in the WB-1-SW original (or parent) sample was below the applicable comparison criteria.

The remaining general chemistry parameters were below applicable criteria. Table 5 provides a summary of concentrations for select inorganic parameters from the fall 2018 sampling event relative to the calculated 95% UCLs. Inorganic parameter exceedances relative to the calculated 95% UCLs were noted in each of the analyzed samples from the fall 2018 monitoring event, with the exception of NRC-1-SW.

TREND ANALYSIS

The surface water quality trend analysis for the fall 2018 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 SRC-1-SW, which indicated a generally expanding plume. Mann-Kendall results are presented in Appendix D.

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
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
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
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**
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**
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
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**
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
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
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

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

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 reporting limit for fluoranthene, due to sample matrix/co-extractive interference, was reported for COB-4-SW;
- The laboratory reported <10% of compounds in multi-component analysis in violation for the spiked blank for benzo(a)anthracene and chrysene in the field duplicate sample of WB-1-SW, Narrows and BP-1-SW; and,
- A poor RCAp Ion Balance, due to sample matrix, was reported for CB-SW, NRC-1-SW, SRC-1-SW and the Narrows.

One field duplicate of sample WB-1-SW was collected during the fall 2018 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 for three (i.e., aluminum, vanadium and zinc) of the seventy-four analyzed parameters were above the acceptable RPD (i.e., 40% for organics and 25% for inorganics) with calculated RPDs ranging from 4% to 68%.

Further review of the concentrations for these three parameters indicate that although the RPD was above the recommended criteria, the findings for both the original sample and the duplicate sample were consistent (i.e., both the original and the duplicate sample results were either both below the comparison criteria or both exceeded the same comparison criteria), with the exception of zinc, which exhibited a Tier I EQS (fresh water) and CCME FWAL exceedance in the field duplicate sample only. Overall, the data quality is considered acceptable and the results representative. There were no holding time exceedances.

SUMMARY

Analytical results of the fall 2018 surface water monitoring program indicate that concentrations of the majority of the analyzed parameters are 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 November 2018

Parameter	Location (Criteria and/or 95% UCL Exceedance)
PAHs	
Anthracene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
Benzo(a) anthracene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
benzo(b) fluoranthene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Benzo(a)pyrene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water), CCME FWAL and Pre-Construction/Baseline Calculated 95% UCL)

Table 6 - Summary of Surface Water Station Criteria and 95 % UCL Exceedances November 2018

Parameter	Location (Criteria and/or 95% UCL Exceedance)
Benzo(g,h,i) perylene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Benzo(j) fluoranthene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Benzo(k) fluoranthene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Chrysene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Indeno(1,2,3-cd)pyrene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water))
Fluoranthene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
Phenanthrene	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
Pyrene	· WB-1-SW (and the field duplicate sample of WB-1-SW (Tier I EQS (fresh water) and CCME FWAL) · Narrows (Tier I EQS (marine)) · BP-1-SW (Tier I EQS (marine))
General Chemistry and Metals	
Aluminum	· CB-SW (Tier I EQS (fresh water)) · NRC-1-SW (Tier I EQS (fresh water)) · SRC-1-SW (Tier I EQS (fresh water), CCME FWAL and Upstream Calculated 95% UCL · COB-A-SW (Tier I EQS (fresh water)) · COB-B-SW (Tier I EQS (fresh water)) · COB-4-SW (Tier I EQS (fresh water) and CCME FWAL) · COB-6-SW (Tier I EQS (fresh water) and CCME FWAL) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water), CCME FWAL and Upstream Calculated 95% UCL)
Arsenic	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Upstream Calculated 95% UCL and Pre-Construction/Baseline Calculated 95% UCL)
Cadmium	· CB-SW (Tier I EQS (fresh water)) · NRC-1-SW (Tier I EQS (fresh water)) · SRC-1-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) and CCME FWAL)
Chloride	· CB-1-SW (CCME FWAL)
Chromium	· WB-1-SW (and the field duplicate sample of WB-1-SW) (CCME FWAL)

Table 6 - Summary of Surface Water Station Criteria and 95 % UCL Exceedances November 2018

Parameter	Location (Criteria and/or 95% UCL Exceedance)
Copper	· SRC-1-SW (and the field duplicate sample of SRC-1-SW) (Tier I EQS (fresh water) and CCME FWAL) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
Iron	· SRC-1-SW (Tier I EQS (fresh water) and CCME FWAL) · COB-A-SW (Tier I EQS (fresh water) and CCME FWAL) · COB-6-SW (Tier I EQS (fresh water) and CCME FWAL) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water), CCME FWAL and the Upstream Calculated 95% UCL) · Narrows (Battery Point/Narrows Calculated 95% UCL) · BP-1-SW (Battery Point/Narrows Calculated 95% UCL)
Lead	· SRC-1-SW (Tier I EQS (fresh water), CCME FWAL and the Upstream Calculated 95% UCL) · WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water), CCME FWAL and the Upstream Calculated 95% UCL)
Mercury	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
pH	· Narrows (CCME MAL) · BP-1-SW (CCME MAL)
Silver	· WB-1-SW (and the field duplicate sample of WB-1-SW) (Tier I EQS (fresh water) and CCME FWAL)
Strontium	· COB-A-SW (Upstream 95% UCL) · COB-B-SW (Upstream 95% UCL) · COB-6-SW (Upstream 95% UCL)
Sulphate	· CB-SW (Upstream 95% UCL) · SRC-1-SW (Upstream 95% UCL) · COB-A-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) · COB-B-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) · COB-4-SW (Upstream 95% UCL) · COB-6-SW (Upstream 95% UCL)
Zinc	· Field duplicate sample of WB-1-SW (Tier I EQS (fresh water) and CCME FWAL)

Review of the surface water analytical data from the fall 2018 monitoring event indicates findings are generally consistent with past LTMM events, with the following exceptions:

- The anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene and phenanthrene exceedances of the Tier I EQS and/or CCME FWAL guidelines at WB-1-SW are the first exceedances reported for these parameters at this surface water station since the LTMM program commenced;
- The pyrene exceedance of the Tier I EQS (marine) at the Narrows is the first since 2014 and the first at BP-1-SW since 2015;

- The mercury exceedance of the Tier I EQS (fresh water) and CCME FWAL guideline is the first recorded exceedance for mercury at WB-1-SW;
- The pH concentrations in the Narrows and BP-1-SW exceeded the CCME MAL guideline. These are the only pH exceedances observed in the surface water stations since the LTMM commenced; and,
- The silver concentrations in WB-1-SW exceeded the Tier I EQS (fresh water) and CCME FWAL guideline. This is the first silver exceedance observed in the surface water stations since the LTMM commenced.

It is noted that the water level of WB-1-SW was higher during the November 2018 monitoring event than previously observed during the LTMM. Further, turbidity levels were significantly higher than previous levels reported for WB-1-SW, which may be a contributing factor to the elevated PAH and metal concentrations. Additionally, based on a review of indicator parameters, the elevated PAH and metals concentrations in WB-1-SW appear to be related to off-site source(s). Discussions with NS Lands indicate that the 2018 concentrations observed in WB-1-SW may be related to the replacement of an upstream culvert on Whitney Avenue, resulting in elevated siltation in November and early December 2018.

RECOMMENDATIONS

The next surface water monitoring event will be conducted in the summer (e.g., July 2019). It is recommended that summer 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

NJW:kme

APPENDIX A
SITE PHOTOGRAPHS

PHOTO 1: View of CB-SW looking southeast.

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

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

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

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

PHOTO 6: View of groundwater seepage observed down gradient of the COB-B-SW sampling location.

PHOTO 7: View of COB-4-SW looking northeast.

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 northwest.

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 - 2018

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
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
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
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

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2018

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-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
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
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
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**

TABLE B-1
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2018

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
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

NOTES:

FD - Field Duplicate

NM - Not Measured or not analyzed

mg/L - milligrams per liter

UCL - Upper Concentration Limit

- 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 - 2018

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
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
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
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
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

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2018

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
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
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
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
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

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2018

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-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
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	84	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
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
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	3.00E+03	52.7	3.16	0.573	0.331	8.17	8.41
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	1.90E+03	34.5	5.13	0.574	0.331	8.21	8.45

TABLE B-2
SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - 2018

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-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
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
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**
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
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

NOTES:
FD - Field Duplicate
NM - Not Measured or not analyzed
mg/L - milligrams per liter
UCL - Upper Concentration Limit
- 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) 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

Maxxam
A Bureau Veritas Group Company

Your Project #: 14-1360
Site Location: NS LANDS SW PROGRAM
Your C.O.C. #: 691523

Attention: Nadine Wambolt

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

Report Date: 2018/12/03
Report #: R5509331
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8V4748
Received: 2018/11/23, 16:22

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide (1)	11	N/A	2018/11/30	N/A	SM 23 4500-CO2 D
Alkalinity (1)	11	N/A	2018/11/30	ATL SOP 00013	EPA 310.2 R1974 m
Benzo(b/j)fluoranthene Sum (water) (1)	8	N/A	2018/11/30	N/A	Auto Calc.
Benzo(b/j)fluoranthene Sum (water) (1)	3	N/A	2018/12/03	N/A	Auto Calc.
Chloride (1)	11	N/A	2018/12/03	ATL SOP 00014	SM 23 4500-Cl- E m
Colour (1)	11	N/A	2018/11/30	ATL SOP 00020	SM 23 2120C m
Conductance - water (1)	11	N/A	2018/11/30	ATL SOP 00004	SM 23 2510B m
Hardness (calculated as CaCO3) (1)	7	N/A	2018/11/30	ATL SOP 00048	Auto Calc
Hardness (calculated as CaCO3) (1)	4	N/A	2018/12/03	ATL SOP 00048	Auto Calc
Mercury - Total (CVAA,LL) (1)	11	2018/11/28	2018/11/30	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS (1)	7	2018/11/28	2018/11/28	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS (1)	3	2018/11/28	2018/11/30	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS (1)	1	2018/11/28	2018/12/01	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference) (1)	11	N/A	2018/12/03	N/A	Auto Calc.
Anion and Cation Sum (1)	7	N/A	2018/11/30	N/A	Auto Calc.
Anion and Cation Sum (1)	4	N/A	2018/12/03	N/A	Auto Calc.
Nitrogen Ammonia - water (1)	11	N/A	2018/11/28	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	11	N/A	2018/11/30	ATL SOP 00016	USGS I-2547-11m
Nitrogen - Nitrite (1)	11	N/A	2018/11/30	ATL SOP 00017	SM 23 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	11	N/A	2018/11/30	ATL SOP 00018	ASTM D3867-16
PAH in Water by GC/MS (SIM) (1)	8	2018/11/28	2018/11/29	ATL SOP 00103	EPA 8270D 2014 m
PAH in Water by GC/MS (SIM) (1)	3	2018/11/30	2018/11/30	ATL SOP 00103	EPA 8270D 2014 m
pH (1, 2)	11	N/A	2018/11/30	ATL SOP 00003	SM 23 4500-H+ B m
Phosphorus - ortho (1)	11	N/A	2018/11/30	ATL SOP 00021	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C) (1)	11	N/A	2018/12/03	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	11	N/A	2018/12/03	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	11	N/A	2018/11/30	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	11	N/A	2018/11/30	ATL SOP 00023	ASTM D516-16 m
Total Dissolved Solids (TDS calc) (1)	11	N/A	2018/12/03	N/A	Auto Calc.
Organic carbon - Total (TOC) (1, 3)	11	N/A	2018/11/30	ATL SOP 00203	SM 23 5310B m

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A Bureau Veritas Group Company

Your Project #: 14-1360
Site Location: NS LANDS SW PROGRAM
Your C.O.C. #: 691523

Attention: Nadine Wambolt

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

Report Date: 2018/12/03
Report #: R5509331
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8V4748
Received: 2018/11/23, 16:22

Sample Matrix: Water
Samples Received: 11

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Turbidity (1)	11	N/A	2018/11/30	ATL SOP 00011	EPA 180.1 R2 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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 Maxxam 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.

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Your Project #: 14-1360
Site Location: NS LANDS SW PROGRAM
Your C.O.C. #: 691523

Attention: Nadine Wambolt

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

Report Date: 2018/12/03
Report #: R5509331
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8V4748
Received: 2018/11/23, 16:22

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Natalie MacAskill, Key Account Specialist
Email: NMacAskill@maxxam.ca
Phone# (902)567-1255 Ext:17
==========
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

RESULTS OF ANALYSES OF WATER

Maxxam ID		IJQ532		IJQ533	IJQ534		IJQ535		
Sampling Date		2018/11/23		2018/11/23	2018/11/23		2018/11/23		
COC Number		691523		691523	691523		691523		
	UNITS	CB-SW	QC Batch	NRC-1-SW	SRC-1-SW	RDL	COB-A-SW	RDL	QC Batch
Calculated Parameters									
Anion Sum	me/L	5.38	5856103	3.24	5.32	N/A	5.42	N/A	5856103
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	58	5856099	21	90	1.0	110	1.0	5856099
Calculated TDS	mg/L	300	5856110	190	300	1.0	330	1.0	5856110
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	5856099	<1.0	<1.0	1.0	<1.0	1.0	5856099
Cation Sum	me/L	4.76	5856103	2.91	4.66	N/A	5.33	N/A	5856103
Hardness (CaCO3)	mg/L	88	5856101	38	120	1.0	220	1.0	5856101
Ion Balance (% Difference)	%	6.11	5856102	5.37	6.61	N/A	0.840	N/A	5856102
Langelier Index (@ 20C)	N/A	-0.494	5856108	-1.99	-0.152		0.216		5856108
Langelier Index (@ 4C)	N/A	-0.743	5856109	-2.24	-0.401		-0.0330		5856109
Nitrate (N)	mg/L	0.19	5856105	0.14	0.19	0.050	0.24	0.050	5856105
Saturation pH (@ 20C)	N/A	8.19	5856108	8.97	7.86		7.56		5856108
Saturation pH (@ 4C)	N/A	8.44	5856109	9.22	8.11		7.81		5856109
Inorganics									
Total Alkalinity (Total as CaCO3)	mg/L	58	5860774	21	91	5.0	110	25	5860774
Dissolved Chloride (Cl-)	mg/L	130	5860777	87	90	1.0	32	1.0	5860777
Colour	TCU	36	5860781	12	22	5.0	6.2	5.0	5860781
Nitrate + Nitrite (N)	mg/L	0.19	5860786	0.14	0.20	0.050	0.24	0.050	5860786
Nitrite (N)	mg/L	<0.010	5860787	<0.010	0.011	0.010	<0.010	0.010	5860787
Nitrogen (Ammonia Nitrogen)	mg/L	0.059	5860201	<0.050	0.41	0.050	0.050	0.050	5860191
Total Organic Carbon (C)	mg/L	5.8	5864494	2.7	5.3	0.50	2.3	0.50	5864494
Orthophosphate (P)	mg/L	0.010	5860783	<0.010	<0.010	0.010	<0.010	0.010	5860783
pH	pH	7.70	5862349	6.98	7.71	N/A	7.78	N/A	5862349
Reactive Silica (SiO2)	mg/L	6.5	5860780	5.0	7.7	0.50	13	0.50	5860780
Dissolved Sulphate (SO4)	mg/L	32	5860778	17	46	2.0	110	10	5860778
Turbidity	NTU	1.2	5864609	0.89	6.8	0.10	14	0.10	5864609
Conductivity	uS/cm	550	5862351	350	530	1.0	540	1.0	5862351

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

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

RESULTS OF ANALYSES OF WATER

Maxxam ID		IJQ536			IJQ537		IJQ538	IJQ539		
Sampling Date		2018/11/23			2018/11/23		2018/11/23	2018/11/23		
COC Number		691523			691523		691523	691523		
	UNITS	COB-B-SW	RDL	QC Batch	COB-4-SW	QC Batch	COB-6-SW	WB-1-SW	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	5.10	N/A	5856103	5.07	5856103	4.19	1.21	N/A	5856103
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	94	1.0	5856099	72	5856099	55	17	1.0	5856099
Calculated TDS	mg/L	310	1.0	5856110	290	5856110	240	75	1.0	5856110
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	5856099	<1.0	5856099	<1.0	<1.0	1.0	5856099
Cation Sum	me/L	4.97	N/A	5856103	4.70	5856103	3.89	1.32	N/A	5856103
Hardness (CaCO3)	mg/L	200	1.0	5856101	110	5856101	96	26	1.0	5856101
Ion Balance (% Difference)	%	1.29	N/A	5856102	3.79	5856102	3.71	4.35	N/A	5856102
Langelier Index (@ 20C)	N/A	-0.229		5856108	-0.130	5856108	-0.191	-1.58		5856108
Langelier Index (@ 4C)	N/A	-0.478		5856109	-0.379	5856109	-0.440	-1.83		5856109
Nitrate (N)	mg/L	0.30	0.050	5856105	0.26	5856105	0.20	0.091	0.050	5856105
Saturation pH (@ 20C)	N/A	7.64		5856108	7.98	5856108	8.14	9.21		5856108
Saturation pH (@ 4C)	N/A	7.88		5856109	8.23	5856109	8.39	9.47		5856109
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	95	5.0	5860774	73	5860774	56	17	5.0	5860774
Dissolved Chloride (Cl-)	mg/L	32	1.0	5860777	97	5860777	76	26	1.0	5860777
Colour	TCU	6.2	5.0	5860781	23	5860781	15	38	5.0	5860781
Nitrate + Nitrite (N)	mg/L	0.30	0.050	5860786	0.26	5860786	0.20	0.091	0.050	5860786
Nitrite (N)	mg/L	<0.010	0.010	5860787	<0.010	5860787	<0.010	<0.010	0.010	5860787
Nitrogen (Ammonia Nitrogen)	mg/L	0.065	0.050	5860194	0.12	5860191	0.084	<0.050	0.050	5860194
Total Organic Carbon (C)	mg/L	2.2	0.50	5864494	5.0	5864494	3.5	6.3	0.50	5864494
Orthophosphate (P)	mg/L	<0.010	0.010	5860783	<0.010	5860783	<0.010	<0.010	0.010	5860783
pH	pH	7.41	N/A	5862349	7.85	5862349	7.95	7.63	N/A	5862349
Reactive Silica (SiO2)	mg/L	11	0.50	5860780	7.1	5860780	7.6	3.0	0.50	5860780
Dissolved Sulphate (SO4)	mg/L	110	10	5860778	41	5860778	45	6.5	2.0	5860778
Turbidity	NTU	1.1	0.10	5864609	2.0	5864609	1.8	83	0.10	5864609
Conductivity	uS/cm	520	1.0	5862351	520	5862351	440	130	1.0	5862351

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

RESULTS OF ANALYSES OF WATER

Maxxam ID		IJQ540			IJQ541			IJQ542		
Sampling Date		2018/11/23			2018/11/23			2018/11/23		
COC Number		691523			691523			691523		
	UNITS	NARROWS	RDL	QC Batch	BP-1-SW	RDL	QC Batch	FD-09	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	34.5	N/A	5856103	52.7	N/A	5856103	1.20	N/A	5856103
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	54	1.0	5856099	56	1.0	5856099	16	1.0	5856099
Calculated TDS	mg/L	1900	1.0	5856110	3000	1.0	5856110	75	1.0	5856110
Carb. Alkalinity (calc. as CaCO3)	mg/L	3.1	1.0	5856099	2.9	1.0	5856099	<1.0	1.0	5856099
Cation Sum	me/L	31.2	N/A	5856103	49.5	N/A	5856103	1.36	N/A	5856103
Hardness (CaCO3)	mg/L	370	1.0	5856101	560	1.0	5856101	26	1.0	5856101
Ion Balance (% Difference)	%	5.13	N/A	5856102	3.16	N/A	5856102	6.25	N/A	5856102
Langelier Index (@ 20C)	N/A	0.574		5856108	0.573		5856108	-1.93		5856108
Langelier Index (@ 4C)	N/A	0.331		5856109	0.331		5856109	-2.18		5856109
Nitrate (N)	mg/L	0.18	0.050	5856105	0.16	0.050	5856105	0.12	0.050	5856105
Saturation pH (@ 20C)	N/A	8.21		5856108	8.17		5856108	9.22		5856108
Saturation pH (@ 4C)	N/A	8.45		5856109	8.41		5856109	9.47		5856109
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	58	5.0	5860774	60	5.0	5860774	16	5.0	5860774
Dissolved Chloride (Cl-)	mg/L	1100	15	5860777	1600	20	5860777	26	1.0	5860777
Colour	TCU	28	5.0	5860781	24	5.0	5860781	39	5.0	5860781
Nitrate + Nitrite (N)	mg/L	0.18	0.050	5860786	0.17	0.050	5860786	0.12	0.050	5860786
Nitrite (N)	mg/L	<0.010	0.010	5860787	0.011	0.010	5860787	<0.010	0.010	5860787
Nitrogen (Ammonia Nitrogen)	mg/L	0.076	0.050	5860191	0.075	0.050	5860201	0.41	0.050	5860191
Total Organic Carbon (C)	mg/L	4.1	0.50	5864494	3.9	0.50	5864494	6.2 (1)	5.0	5864494
Orthophosphate (P)	mg/L	<0.010	0.010	5860783	<0.010	0.010	5860783	<0.010	0.010	5860783
pH	pH	8.78	N/A	5862349	8.74	N/A	5862349	7.29	N/A	5862349
Reactive Silica (SiO2)	mg/L	5.3	0.50	5860780	5.0	0.50	5860780	3.0	0.50	5860780
Dissolved Sulphate (SO4)	mg/L	180	10	5860778	250	10	5860778	6.5	2.0	5860778
Turbidity	NTU	1.7	0.10	5864609	1.8	0.10	5864609	50	0.10	5864609
Conductivity	uS/cm	3700	1.0	5862351	5500	1.0	5862351	130	1.0	5862351

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

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

MERCURY BY COLD VAPOUR AA (WATER)

Maxxam ID		IJQ532	IJQ533	IJQ534	IJQ535	IJQ536	IJQ537	IJQ538		
Sampling Date		2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23		
COC Number		691523	691523	691523	691523	691523	691523	691523		
	UNITS	CB-SW	NRC-1-SW	SRC-1-SW	COB-A-SW	COB-B-SW	COB-4-SW	COB-6-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	5860294

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		IJQ539	IJQ540	IJQ541	IJQ542		
Sampling Date		2018/11/23	2018/11/23	2018/11/23	2018/11/23		
COC Number		691523	691523	691523	691523		
	UNITS	WB-1-SW	NARROWS	BP-1-SW	FD-09	RDL	QC Batch
Metals							
Total Mercury (Hg)	ug/L	0.037	<0.013	<0.013	0.033	0.013	5860294

RDL = Reportable Detection Limit
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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		IJQ532	IJQ533	IJQ534	IJQ535	IJQ536	IJQ537	IJQ538		
Sampling Date		2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23		
COC Number		691523	691523	691523	691523	691523	691523	691523		
	UNITS	CB-SW	NRC-1-SW	SRC-1-SW	COB-A-SW	COB-B-SW	COB-4-SW	COB-6-SW	RDL	QC Batch
Metals										
Total Aluminum (Al)	ug/L	91	36	320	46	7.0	140	150	5.0	5860025
Total Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5860025
Total Arsenic (As)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5860025
Total Barium (Ba)	ug/L	16	13	16	16	17	17	20	1.0	5860025
Total Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5860025
Total Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5860025
Total Boron (B)	ug/L	<50	<50	74	<50	<50	<50	<50	50	5860025
Total Cadmium (Cd)	ug/L	0.014	0.015	0.027	<0.010	<0.010	0.014	0.015	0.010	5860025
Total Calcium (Ca)	ug/L	29000	12000	40000	70000	65000	38000	33000	100	5860025
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5860025
Total Cobalt (Co)	ug/L	<0.40	<0.40	<0.40	<0.40	0.46	<0.40	<0.40	0.40	5860025
Total Copper (Cu)	ug/L	<2.0	<2.0	2.7	<2.0	<2.0	2.0	<2.0	2.0	5860025
Total Iron (Fe)	ug/L	210	130	420	810	200	230	360	50	5860025
Total Lead (Pb)	ug/L	<0.50	<0.50	1.3	<0.50	<0.50	0.55	0.87	0.50	5860025
Total Magnesium (Mg)	ug/L	3500	1700	4400	10000	9200	4200	3400	100	5860025
Total Manganese (Mn)	ug/L	210	61	160	300	500	99	130	2.0	5860025
Total Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5860025
Total Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5860025
Total Phosphorus (P)	ug/L	<100	<100	<100	<100	<100	<100	<100	100	5860025
Total Potassium (K)	ug/L	1300	710	2200	2300	2200	1800	1500	100	5860025
Total Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	5860025
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5860025
Total Sodium (Na)	ug/L	68000	49000	50000	21000	21000	56000	44000	100	5860025
Total Strontium (Sr)	ug/L	77	35	130	210	200	130	140	2.0	5860025
Total Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	5860025
Total Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5860025
Total Titanium (Ti)	ug/L	2.4	<2.0	9.3	2.0	<2.0	3.6	4.8	2.0	5860025
Total Uranium (U)	ug/L	0.19	<0.10	0.32	0.31	0.27	0.27	0.22	0.10	5860025
Total Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	5860025
Total Zinc (Zn)	ug/L	5.5	6.7	6.2	<5.0	<5.0	<5.0	6.4	5.0	5860025

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		IJQ539		IJQ540	IJQ541	IJQ542		
Sampling Date		2018/11/23		2018/11/23	2018/11/23	2018/11/23		
COC Number		691523		691523	691523	691523		
	UNITS	WB-1-SW	QC Batch	NARROWS	BP-1-SW	FD-09	RDL	QC Batch
Metals								
Total Aluminum (Al)	ug/L	1800	5860025	86	86	1200	5.0	5860427
Total Antimony (Sb)	ug/L	<1.0	5860025	<1.0	<1.0	<1.0	1.0	5860427
Total Arsenic (As)	ug/L	4.3	5860025	<1.0	<1.0	3.9	1.0	5860427
Total Barium (Ba)	ug/L	37	5860025	17	18	40	1.0	5860427
Total Beryllium (Be)	ug/L	<1.0	5860025	<1.0	<1.0	<1.0	1.0	5860427
Total Bismuth (Bi)	ug/L	<2.0	5860025	<2.0	<2.0	<2.0	2.0	5860427
Total Boron (B)	ug/L	<50	5860025	260	420	<50	50	5860427
Total Cadmium (Cd)	ug/L	0.14	5860025	0.021	0.024	0.15	0.010	5860427
Total Calcium (Ca)	ug/L	7700	5860025	50000	62000	8000	100	5860427
Total Chromium (Cr)	ug/L	3.5	5860025	<1.0	<1.0	3.3	1.0	5860427
Total Cobalt (Co)	ug/L	1.2	5860025	<0.40	<0.40	1.2	0.40	5860427
Total Copper (Cu)	ug/L	9.7	5860025	<2.0	<2.0	9.2	2.0	5860427
Total Iron (Fe)	ug/L	3500	5860025	220	240	3700	50	5860427
Total Lead (Pb)	ug/L	29	5860025	<0.50	<0.50	28	0.50	5860427
Total Magnesium (Mg)	ug/L	1600	5860025	60000	98000	1500	100	5860427
Total Manganese (Mn)	ug/L	210	5860025	52	50	200	2.0	5860427
Total Molybdenum (Mo)	ug/L	<2.0	5860025	<2.0	<2.0	<2.0	2.0	5860427
Total Nickel (Ni)	ug/L	2.8	5860025	<2.0	<2.0	2.3	2.0	5860427
Total Phosphorus (P)	ug/L	160	5860025	<100	<100	150	100	5860427
Total Potassium (K)	ug/L	820	5860025	21000	33000	780	100	5860427
Total Selenium (Se)	ug/L	<1.0	5860025	<1.0	<1.0	<1.0	1.0	5860427
Total Silver (Ag)	ug/L	1.7	5860025	<0.10	<0.10	1.5	0.10	5860427
Total Sodium (Na)	ug/L	15000	5860025	530000	860000	15000	100	5860427
Total Strontium (Sr)	ug/L	50	5860025	500	730	50	2.0	5860427
Total Thallium (Tl)	ug/L	<0.10	5860025	<0.10	<0.10	<0.10	0.10	5860427
Total Tin (Sn)	ug/L	<2.0	5860025	<2.0	<2.0	<2.0	2.0	5860427
Total Titanium (Ti)	ug/L	25	5860025	<2.0	<2.0	23	2.0	5860427
Total Uranium (U)	ug/L	0.17	5860025	0.32	0.40	0.15	0.10	5860427
Total Vanadium (V)	ug/L	6.8	5860025	<2.0	<2.0	5.2	2.0	5860427
Total Zinc (Zn)	ug/L	79	5860025	8.8	<5.0	160	5.0	5860427

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		IJQ532	IJQ533	IJQ534	IJQ535	IJQ536		IJQ537		
Sampling Date		2018/11/23	2018/11/23	2018/11/23	2018/11/23	2018/11/23		2018/11/23		
COC Number		691523	691523	691523	691523	691523		691523		
	UNITS	CB-SW	NRC-1-SW	SRC-1-SW	COB-A-SW	COB-B-SW	RDL	COB-4-SW	RDL	QC Batch
Polyaromatic Hydrocarbons										
1-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	<0.050	0.050	5860125
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	<0.050	0.050	5860125
Acenaphthene	ug/L	0.026	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Acenaphthylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(b/j)fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	<0.020	0.020	5856275
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Chrysene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Fluoranthene	ug/L	<0.010	<0.010	0.011	<0.010	<0.010	0.010	<0.020 (1)	0.020	5860125
Fluorene	ug/L	0.014	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Naphthalene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	<0.20	0.20	5860125
Perylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	0.010	5860125
Phenanthrene	ug/L	0.015	<0.010	0.012	<0.010	<0.010	0.010	0.012	0.010	5860125
Pyrene	ug/L	<0.010	<0.010	0.011	<0.010	<0.010	0.010	<0.010	0.010	5860125
Surrogate Recovery (%)										
D10-Anthracene	%	74	82	64	85	99		87		5860125
D14-Terphenyl	%	82	104	98	79	84		94		5860125
D8-Acenaphthylene	%	88	95	91	94	96		84		5860125

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Elevated PAH RDL(s) due to matrix / co-extractive interference.

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		IJQ538	IJQ539		IJQ540	IJQ541	IJQ542		
Sampling Date		2018/11/23	2018/11/23		2018/11/23	2018/11/23	2018/11/23		
COC Number		691523	691523		691523	691523	691523		
	UNITS	COB-6-SW	WB-1-SW	QC Batch	NARROWS	BP-1-SW	FD-09	RDL	QC Batch
Polyaromatic Hydrocarbons									
1-Methylnaphthalene	ug/L	0.13	0.059	5860125	0.065	0.064	<0.050	0.050	5864670
2-Methylnaphthalene	ug/L	0.062	0.063	5860125	<0.050	<0.050	0.057	0.050	5864670
Acenaphthene	ug/L	0.15	0.25	5860125	0.077	0.071	0.22	0.010	5864670
Acenaphthylene	ug/L	0.016	0.12	5860125	0.069	0.067	0.11	0.010	5864670
Anthracene	ug/L	<0.010	0.84	5860125	0.011	0.011	0.97	0.010	5864670
Benzo(a)anthracene	ug/L	<0.010	1.6	5860125	<0.010	<0.010	1.6	0.010	5864670
Benzo(a)pyrene	ug/L	<0.010	1.3	5860125	<0.010	<0.010	1.1	0.010	5864670
Benzo(b)fluoranthene	ug/L	<0.010	1.1	5860125	<0.010	<0.010	0.99	0.010	5864670
Benzo(b/j)fluoranthene	ug/L	<0.020	1.7	5856275	<0.020	<0.020	1.5	0.020	5856275
Benzo(g,h,i)perylene	ug/L	<0.010	0.69	5860125	<0.010	<0.010	0.60	0.010	5864670
Benzo(j)fluoranthene	ug/L	<0.010	0.61	5860125	<0.010	<0.010	0.56	0.010	5864670
Benzo(k)fluoranthene	ug/L	<0.010	0.67	5860125	<0.010	<0.010	0.59	0.010	5864670
Chrysene	ug/L	<0.010	1.7	5860125	<0.010	<0.010	1.7	0.010	5864670
Dibenz(a,h)anthracene	ug/L	<0.010	0.20	5860125	<0.010	<0.010	0.17	0.010	5864670
Fluoranthene	ug/L	0.015	3.3	5860125	0.033	0.022	3.1	0.010	5864670
Fluorene	ug/L	0.076	0.33	5860125	0.062	0.063	0.30	0.010	5864670
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	0.64	5860125	<0.010	<0.010	0.58	0.010	5864670
Naphthalene	ug/L	0.49	<0.20	5860125	0.22	0.20	<0.20	0.20	5864670
Perylene	ug/L	<0.010	0.31	5860125	<0.010	<0.010	0.27	0.010	5864670
Phenanthrene	ug/L	0.043	2.3	5860125	0.052	0.048	2.1	0.010	5864670
Pyrene	ug/L	0.010	2.5	5860125	0.035	0.031	2.5	0.010	5864670
Surrogate Recovery (%)									
D10-Anthracene	%	91	85	5860125	86	88	84		5864670
D14-Terphenyl	%	79	92 (1)	5860125	100	99	104		5864670
D8-Acenaphthylene	%	86	84	5860125	77	80	80		5864670

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) PAH sample contained sediment.

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GENERAL COMMENTS

Sample IJQ532 [CB-SW] : Poor RCAp Ion Balance due to sample matrix.

Sample IJQ533 [NRC-1-SW] : Poor RCAp Ion Balance due to sample matrix.

Sample IJQ534 [SRC-1-SW] : Poor RCAp Ion Balance due to sample matrix.

Sample IJQ540 [NARROWS] : Poor RCAp Ion Balance due to sample matrix.

Sample IJQ542 [FD-09] : RCAp Ion Balance acceptable. Anion/cation agreement within 0.2 meq/L.

Results relate only to the items tested.

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5860025	AWL	Matrix Spike	Total Aluminum (Al)	2018/11/28		94	%	80 - 120
			Total Antimony (Sb)	2018/11/28		105	%	80 - 120
			Total Arsenic (As)	2018/11/28		97	%	80 - 120
			Total Barium (Ba)	2018/11/28		95	%	80 - 120
			Total Beryllium (Be)	2018/11/28		103	%	80 - 120
			Total Bismuth (Bi)	2018/11/28		101	%	80 - 120
			Total Boron (B)	2018/11/28		106	%	80 - 120
			Total Cadmium (Cd)	2018/11/28		100	%	80 - 120
			Total Calcium (Ca)	2018/11/28		NC	%	80 - 120
			Total Chromium (Cr)	2018/11/28		98	%	80 - 120
			Total Cobalt (Co)	2018/11/28		97	%	80 - 120
			Total Copper (Cu)	2018/11/28		94	%	80 - 120
			Total Iron (Fe)	2018/11/28		104	%	80 - 120
			Total Lead (Pb)	2018/11/28		96	%	80 - 120
			Total Magnesium (Mg)	2018/11/28		102	%	80 - 120
			Total Manganese (Mn)	2018/11/28		98	%	80 - 120
			Total Molybdenum (Mo)	2018/11/28		99	%	80 - 120
			Total Nickel (Ni)	2018/11/28		98	%	80 - 120
			Total Phosphorus (P)	2018/11/28		105	%	80 - 120
			Total Potassium (K)	2018/11/28		102	%	80 - 120
			Total Selenium (Se)	2018/11/28		99	%	80 - 120
			Total Silver (Ag)	2018/11/28		99	%	80 - 120
			Total Sodium (Na)	2018/11/28		NC	%	80 - 120
			Total Strontium (Sr)	2018/11/28		NC	%	80 - 120
			Total Thallium (Tl)	2018/11/28		100	%	80 - 120
			Total Tin (Sn)	2018/11/28		103	%	80 - 120
			Total Titanium (Ti)	2018/11/28		98	%	80 - 120
			Total Uranium (U)	2018/11/28		105	%	80 - 120
			Total Vanadium (V)	2018/11/28		99	%	80 - 120
			Total Zinc (Zn)	2018/11/28		97	%	80 - 120
5860025	AWL	Spiked Blank	Total Aluminum (Al)	2018/11/28		99	%	80 - 120
			Total Antimony (Sb)	2018/11/28		102	%	80 - 120
			Total Arsenic (As)	2018/11/28		99	%	80 - 120
			Total Barium (Ba)	2018/11/28		97	%	80 - 120
			Total Beryllium (Be)	2018/11/28		100	%	80 - 120
			Total Bismuth (Bi)	2018/11/28		104	%	80 - 120
			Total Boron (B)	2018/11/28		103	%	80 - 120
			Total Cadmium (Cd)	2018/11/28		100	%	80 - 120
			Total Calcium (Ca)	2018/11/28		102	%	80 - 120
			Total Chromium (Cr)	2018/11/28		102	%	80 - 120
			Total Cobalt (Co)	2018/11/28		100	%	80 - 120
			Total Copper (Cu)	2018/11/28		98	%	80 - 120
			Total Iron (Fe)	2018/11/28		105	%	80 - 120
			Total Lead (Pb)	2018/11/28		98	%	80 - 120
			Total Magnesium (Mg)	2018/11/28		105	%	80 - 120
			Total Manganese (Mn)	2018/11/28		101	%	80 - 120
			Total Molybdenum (Mo)	2018/11/28		101	%	80 - 120
			Total Nickel (Ni)	2018/11/28		102	%	80 - 120
			Total Phosphorus (P)	2018/11/28		106	%	80 - 120
			Total Potassium (K)	2018/11/28		103	%	80 - 120
			Total Selenium (Se)	2018/11/28		98	%	80 - 120
			Total Silver (Ag)	2018/11/28		96	%	80 - 120
			Total Sodium (Na)	2018/11/28		103	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Strontium (Sr)	2018/11/28		101	%	80 - 120
			Total Thallium (Tl)	2018/11/28		101	%	80 - 120
			Total Tin (Sn)	2018/11/28		101	%	80 - 120
			Total Titanium (Ti)	2018/11/28		102	%	80 - 120
			Total Uranium (U)	2018/11/28		104	%	80 - 120
			Total Vanadium (V)	2018/11/28		102	%	80 - 120
			Total Zinc (Zn)	2018/11/28		100	%	80 - 120
5860025	AWL	Method Blank	Total Aluminum (Al)	2018/11/28	<5.0		ug/L	
			Total Antimony (Sb)	2018/11/28	<1.0		ug/L	
			Total Arsenic (As)	2018/11/28	<1.0		ug/L	
			Total Barium (Ba)	2018/11/28	<1.0		ug/L	
			Total Beryllium (Be)	2018/11/28	<1.0		ug/L	
			Total Bismuth (Bi)	2018/11/28	<2.0		ug/L	
			Total Boron (B)	2018/11/28	<50		ug/L	
			Total Cadmium (Cd)	2018/11/28	<0.010		ug/L	
			Total Calcium (Ca)	2018/11/28	<100		ug/L	
			Total Chromium (Cr)	2018/11/28	<1.0		ug/L	
			Total Cobalt (Co)	2018/11/28	<0.40		ug/L	
			Total Copper (Cu)	2018/11/28	<2.0		ug/L	
			Total Iron (Fe)	2018/11/28	<50		ug/L	
			Total Lead (Pb)	2018/11/28	<0.50		ug/L	
			Total Magnesium (Mg)	2018/11/28	<100		ug/L	
			Total Manganese (Mn)	2018/11/28	<2.0		ug/L	
			Total Molybdenum (Mo)	2018/11/28	<2.0		ug/L	
			Total Nickel (Ni)	2018/11/28	<2.0		ug/L	
			Total Phosphorus (P)	2018/11/28	<100		ug/L	
			Total Potassium (K)	2018/11/28	<100		ug/L	
			Total Selenium (Se)	2018/11/28	<1.0		ug/L	
			Total Silver (Ag)	2018/11/28	<0.10		ug/L	
			Total Sodium (Na)	2018/11/28	<100		ug/L	
			Total Strontium (Sr)	2018/11/28	<2.0		ug/L	
			Total Thallium (Tl)	2018/11/28	<0.10		ug/L	
			Total Tin (Sn)	2018/11/28	<2.0		ug/L	
			Total Titanium (Ti)	2018/11/28	<2.0		ug/L	
			Total Uranium (U)	2018/11/28	<0.10		ug/L	
			Total Vanadium (V)	2018/11/28	<2.0		ug/L	
			Total Zinc (Zn)	2018/11/28	<5.0		ug/L	
5860025	AWL	RPD	Total Aluminum (Al)	2018/11/28	7.4		%	20
			Total Antimony (Sb)	2018/11/28	NC		%	20
			Total Arsenic (As)	2018/11/28	10		%	20
			Total Barium (Ba)	2018/11/28	1.7		%	20
			Total Beryllium (Be)	2018/11/28	NC		%	20
			Total Bismuth (Bi)	2018/11/28	NC		%	20
			Total Boron (B)	2018/11/28	1.4		%	20
			Total Cadmium (Cd)	2018/11/28	NC		%	20
			Total Calcium (Ca)	2018/11/28	2.2		%	20
			Total Chromium (Cr)	2018/11/28	NC		%	20
			Total Cobalt (Co)	2018/11/28	NC		%	20
			Total Copper (Cu)	2018/11/28	0.069		%	20
			Total Iron (Fe)	2018/11/28	NC		%	20
			Total Lead (Pb)	2018/11/28	5.5		%	20
			Total Magnesium (Mg)	2018/11/28	0.87		%	20
			Total Manganese (Mn)	2018/11/28	0.63		%	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 Molybdenum (Mo)	2018/11/28	5.4		%	20
			Total Nickel (Ni)	2018/11/28	NC		%	20
			Total Phosphorus (P)	2018/11/28	NC		%	20
			Total Potassium (K)	2018/11/28	3.6		%	20
			Total Selenium (Se)	2018/11/28	NC		%	20
			Total Silver (Ag)	2018/11/28	NC		%	20
			Total Sodium (Na)	2018/11/28	1.6		%	20
			Total Strontium (Sr)	2018/11/28	0.54		%	20
			Total Thallium (Tl)	2018/11/28	NC		%	20
			Total Tin (Sn)	2018/11/28	NC		%	20
			Total Titanium (Ti)	2018/11/28	NC		%	20
			Total Uranium (U)	2018/11/28	3.5		%	20
			Total Vanadium (V)	2018/11/28	NC		%	20
			Total Zinc (Zn)	2018/11/28	NC		%	20
5860125	KKE	Matrix Spike	D10-Anthracene	2018/11/28		95	%	50 - 130
			D14-Terphenyl	2018/11/28		93	%	50 - 130
			D8-Acenaphthylene	2018/11/28		95	%	50 - 130
			1-Methylnaphthalene	2018/11/28		92	%	50 - 130
			2-Methylnaphthalene	2018/11/28		98	%	50 - 130
			Acenaphthene	2018/11/28		92	%	50 - 130
			Acenaphthylene	2018/11/28		119	%	50 - 130
			Anthracene	2018/11/28		112	%	50 - 130
			Benzo(a)anthracene	2018/11/28		107	%	50 - 130
			Benzo(a)pyrene	2018/11/28		100	%	50 - 130
			Benzo(b)fluoranthene	2018/11/28		118	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/28		113	%	50 - 130
			Benzo(j)fluoranthene	2018/11/28		109	%	50 - 130
			Benzo(k)fluoranthene	2018/11/28		110	%	50 - 130
			Chrysene	2018/11/28		114	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/28		109	%	50 - 130
			Fluoranthene	2018/11/28		104	%	50 - 130
			Fluorene	2018/11/28		99	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/28		112	%	50 - 130
			Naphthalene	2018/11/28		71	%	50 - 130
			Perylene	2018/11/28		102	%	50 - 130
			Phenanthrene	2018/11/28		116	%	50 - 130
			Pyrene	2018/11/28		99	%	50 - 130
5860125	KKE	Spiked Blank	D10-Anthracene	2018/11/28		104	%	50 - 130
			D14-Terphenyl	2018/11/28		102	%	50 - 130
			D8-Acenaphthylene	2018/11/28		101	%	50 - 130
			1-Methylnaphthalene	2018/11/28		94	%	50 - 130
			2-Methylnaphthalene	2018/11/28		92	%	50 - 130
			Acenaphthene	2018/11/28		102	%	50 - 130
			Acenaphthylene	2018/11/28		111	%	50 - 130
			Anthracene	2018/11/28		116	%	50 - 130
			Benzo(a)anthracene	2018/11/28		112	%	50 - 130
			Benzo(a)pyrene	2018/11/28		101	%	50 - 130
			Benzo(b)fluoranthene	2018/11/28		113	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/28		118	%	50 - 130
			Benzo(j)fluoranthene	2018/11/28		105	%	50 - 130
			Benzo(k)fluoranthene	2018/11/28		113	%	50 - 130
			Chrysene	2018/11/28		125	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/28		106	%	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
			Fluoranthene	2018/11/28		111	%	50 - 130
			Fluorene	2018/11/28		124	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/28		115	%	50 - 130
			Naphthalene	2018/11/28		87	%	50 - 130
			Perylene	2018/11/28		105	%	50 - 130
			Phenanthrene	2018/11/28		112	%	50 - 130
			Pyrene	2018/11/28		105	%	50 - 130
5860125	KKE	Method Blank	D10-Anthracene	2018/11/28		103	%	50 - 130
			D14-Terphenyl	2018/11/28		103	%	50 - 130
			D8-Acenaphthylene	2018/11/28		98	%	50 - 130
			1-Methylnaphthalene	2018/11/28	<0.050		ug/L	
			2-Methylnaphthalene	2018/11/28	<0.050		ug/L	
			Acenaphthene	2018/11/28	<0.010		ug/L	
			Acenaphthylene	2018/11/28	<0.010		ug/L	
			Anthracene	2018/11/28	<0.010		ug/L	
			Benzo(a)anthracene	2018/11/28	<0.010		ug/L	
			Benzo(a)pyrene	2018/11/28	<0.010		ug/L	
			Benzo(b)fluoranthene	2018/11/28	<0.010		ug/L	
			Benzo(g,h,i)perylene	2018/11/28	<0.010		ug/L	
			Benzo(j)fluoranthene	2018/11/28	<0.010		ug/L	
			Benzo(k)fluoranthene	2018/11/28	<0.010		ug/L	
			Chrysene	2018/11/28	<0.010		ug/L	
			Dibenz(a,h)anthracene	2018/11/28	<0.010		ug/L	
			Fluoranthene	2018/11/28	<0.010		ug/L	
			Fluorene	2018/11/28	<0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2018/11/28	<0.010		ug/L	
			Naphthalene	2018/11/28	<0.20		ug/L	
			Perylene	2018/11/28	<0.010		ug/L	
			Phenanthrene	2018/11/28	<0.010		ug/L	
			Pyrene	2018/11/28	<0.010		ug/L	
5860125	KKE	RPD	1-Methylnaphthalene	2018/11/28	NC		%	40
			2-Methylnaphthalene	2018/11/28	NC		%	40
			Acenaphthene	2018/11/28	NC		%	40
			Acenaphthylene	2018/11/28	NC		%	40
			Anthracene	2018/11/28	NC		%	40
			Benzo(a)anthracene	2018/11/28	NC		%	40
			Benzo(a)pyrene	2018/11/28	NC		%	40
			Benzo(b)fluoranthene	2018/11/28	NC		%	40
			Benzo(g,h,i)perylene	2018/11/28	NC		%	40
			Benzo(j)fluoranthene	2018/11/28	NC		%	40
			Benzo(k)fluoranthene	2018/11/28	NC		%	40
			Chrysene	2018/11/28	NC		%	40
			Dibenz(a,h)anthracene	2018/11/28	NC		%	40
			Fluoranthene	2018/11/28	NC		%	40
			Fluorene	2018/11/28	NC		%	40
			Indeno(1,2,3-cd)pyrene	2018/11/28	NC		%	40
			Naphthalene	2018/11/28	NC		%	40
			Perylene	2018/11/28	NC		%	40
			Phenanthrene	2018/11/28	NC (1)		%	40
			Pyrene	2018/11/28	NC		%	40
5860191	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2018/11/28		96	%	80 - 120
5860191	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28		101	%	80 - 120
5860191	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28	<0.050		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
5860191	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2018/11/28	8.8		%	20
5860194	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2018/11/28		91	%	80 - 120
5860194	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28		94	%	80 - 120
5860194	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28	<0.050		mg/L	
5860194	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2018/11/28	NC		%	20
5860201	SRM	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2018/11/28		93	%	80 - 120
5860201	SRM	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28		95	%	80 - 120
5860201	SRM	Method Blank	Nitrogen (Ammonia Nitrogen)	2018/11/28	<0.050		mg/L	
5860201	SRM	RPD	Nitrogen (Ammonia Nitrogen)	2018/11/28	NC		%	20
5860294	CCR	Matrix Spike [IJQ533-04]	Total Mercury (Hg)	2018/11/30		97	%	80 - 120
5860294	CCR	Spiked Blank	Total Mercury (Hg)	2018/11/30		99	%	80 - 120
5860294	CCR	Method Blank	Total Mercury (Hg)	2018/11/30	<0.013		ug/L	
5860294	CCR	RPD [IJQ532-04]	Total Mercury (Hg)	2018/11/30	NC		%	20
5860427	AWL	Matrix Spike	Total Aluminum (Al)	2018/11/30		100	%	80 - 120
			Total Antimony (Sb)	2018/11/30		108	%	80 - 120
			Total Arsenic (As)	2018/11/30		101	%	80 - 120
			Total Barium (Ba)	2018/11/30		101	%	80 - 120
			Total Beryllium (Be)	2018/11/30		101	%	80 - 120
			Total Bismuth (Bi)	2018/11/30		105	%	80 - 120
			Total Boron (B)	2018/11/30		105	%	80 - 120
			Total Cadmium (Cd)	2018/11/30		100	%	80 - 120
			Total Calcium (Ca)	2018/11/30		102	%	80 - 120
			Total Chromium (Cr)	2018/11/30		99	%	80 - 120
			Total Cobalt (Co)	2018/11/30		100	%	80 - 120
			Total Copper (Cu)	2018/11/30		97	%	80 - 120
			Total Iron (Fe)	2018/11/30		104	%	80 - 120
			Total Lead (Pb)	2018/11/30		102	%	80 - 120
			Total Magnesium (Mg)	2018/11/30		103	%	80 - 120
			Total Manganese (Mn)	2018/11/30		101	%	80 - 120
			Total Molybdenum (Mo)	2018/11/30		105	%	80 - 120
			Total Nickel (Ni)	2018/11/30		99	%	80 - 120
			Total Phosphorus (P)	2018/11/30		108	%	80 - 120
			Total Potassium (K)	2018/11/30		106	%	80 - 120
			Total Selenium (Se)	2018/11/30		100	%	80 - 120
			Total Silver (Ag)	2018/11/30		101	%	80 - 120
			Total Sodium (Na)	2018/11/30		102	%	80 - 120
			Total Strontium (Sr)	2018/11/30		100	%	80 - 120
			Total Thallium (Tl)	2018/11/30		105	%	80 - 120
			Total Tin (Sn)	2018/11/30		108	%	80 - 120
			Total Titanium (Ti)	2018/11/30		101	%	80 - 120
			Total Uranium (U)	2018/11/30		105	%	80 - 120
			Total Vanadium (V)	2018/11/30		103	%	80 - 120
			Total Zinc (Zn)	2018/11/30		100	%	80 - 120
5860427	AWL	Spiked Blank	Total Aluminum (Al)	2018/11/28		97	%	80 - 120
			Total Antimony (Sb)	2018/11/28		104	%	80 - 120
			Total Arsenic (As)	2018/11/28		98	%	80 - 120
			Total Barium (Ba)	2018/11/28		96	%	80 - 120
			Total Beryllium (Be)	2018/11/28		98	%	80 - 120
			Total Bismuth (Bi)	2018/11/28		104	%	80 - 120
			Total Boron (B)	2018/11/28		100	%	80 - 120
			Total Cadmium (Cd)	2018/11/28		101	%	80 - 120
			Total Calcium (Ca)	2018/11/28		102	%	80 - 120
			Total Chromium (Cr)	2018/11/28		98	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Cobalt (Co)	2018/11/28		97	%	80 - 120
			Total Copper (Cu)	2018/11/28		96	%	80 - 120
			Total Iron (Fe)	2018/11/28		103	%	80 - 120
			Total Lead (Pb)	2018/11/28		98	%	80 - 120
			Total Magnesium (Mg)	2018/11/28		102	%	80 - 120
			Total Manganese (Mn)	2018/11/28		100	%	80 - 120
			Total Molybdenum (Mo)	2018/11/28		102	%	80 - 120
			Total Nickel (Ni)	2018/11/28		97	%	80 - 120
			Total Phosphorus (P)	2018/11/28		106	%	80 - 120
			Total Potassium (K)	2018/11/28		101	%	80 - 120
			Total Selenium (Se)	2018/11/28		100	%	80 - 120
			Total Silver (Ag)	2018/11/28		98	%	80 - 120
			Total Sodium (Na)	2018/11/28		99	%	80 - 120
			Total Strontium (Sr)	2018/11/28		101	%	80 - 120
			Total Thallium (Tl)	2018/11/28		102	%	80 - 120
			Total Tin (Sn)	2018/11/28		105	%	80 - 120
			Total Titanium (Ti)	2018/11/28		96	%	80 - 120
			Total Uranium (U)	2018/11/28		104	%	80 - 120
			Total Vanadium (V)	2018/11/28		99	%	80 - 120
			Total Zinc (Zn)	2018/11/28		99	%	80 - 120
5860427	AWL	Method Blank	Total Aluminum (Al)	2018/11/30	<5.0		ug/L	
			Total Antimony (Sb)	2018/11/30	<1.0		ug/L	
			Total Arsenic (As)	2018/11/30	<1.0		ug/L	
			Total Barium (Ba)	2018/11/30	<1.0		ug/L	
			Total Beryllium (Be)	2018/11/30	<1.0		ug/L	
			Total Bismuth (Bi)	2018/11/30	<2.0		ug/L	
			Total Boron (B)	2018/11/30	<50		ug/L	
			Total Cadmium (Cd)	2018/11/30	<0.010		ug/L	
			Total Calcium (Ca)	2018/11/30	<100		ug/L	
			Total Chromium (Cr)	2018/11/30	<1.0		ug/L	
			Total Cobalt (Co)	2018/11/30	<0.40		ug/L	
			Total Copper (Cu)	2018/11/30	<2.0		ug/L	
			Total Iron (Fe)	2018/11/30	<50		ug/L	
			Total Lead (Pb)	2018/11/30	<0.50		ug/L	
			Total Magnesium (Mg)	2018/11/30	<100		ug/L	
			Total Manganese (Mn)	2018/11/30	<2.0		ug/L	
			Total Molybdenum (Mo)	2018/11/30	<2.0		ug/L	
			Total Nickel (Ni)	2018/11/30	<2.0		ug/L	
			Total Phosphorus (P)	2018/11/30	<100		ug/L	
			Total Potassium (K)	2018/11/30	<100		ug/L	
			Total Selenium (Se)	2018/11/30	<1.0		ug/L	
			Total Silver (Ag)	2018/11/30	<0.10		ug/L	
			Total Sodium (Na)	2018/11/30	<100		ug/L	
			Total Strontium (Sr)	2018/11/30	<2.0		ug/L	
			Total Thallium (Tl)	2018/11/30	<0.10		ug/L	
			Total Tin (Sn)	2018/11/30	<2.0		ug/L	
			Total Titanium (Ti)	2018/11/30	<2.0		ug/L	
			Total Uranium (U)	2018/11/30	<0.10		ug/L	
			Total Vanadium (V)	2018/11/30	<2.0		ug/L	
			Total Zinc (Zn)	2018/11/30	<5.0		ug/L	
5860427	AWL	RPD	Total Arsenic (As)	2018/11/30	NC		%	20
			Total Uranium (U)	2018/11/30	5.6		%	20
5860774	NRG	Matrix Spike	Total Alkalinity (Total as CaCO3)	2018/11/30		96	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5860774	NRG	Spiked Blank	Total Alkalinity (Total as CaCO3)	2018/11/30		102	%	80 - 120
5860774	NRG	Method Blank	Total Alkalinity (Total as CaCO3)	2018/11/30	<5.0		mg/L	
5860774	NRG	RPD	Total Alkalinity (Total as CaCO3)	2018/11/30	NC		%	25
5860777	NRG	Matrix Spike	Dissolved Chloride (Cl-)	2018/12/03		103	%	80 - 120
5860777	NRG	QC Standard	Dissolved Chloride (Cl-)	2018/12/03		107	%	80 - 120
5860777	NRG	Spiked Blank	Dissolved Chloride (Cl-)	2018/12/03		101	%	80 - 120
5860777	NRG	Method Blank	Dissolved Chloride (Cl-)	2018/12/03	<1.0		mg/L	
5860777	NRG	RPD	Dissolved Chloride (Cl-)	2018/12/03	2.2		%	25
5860778	NRG	Matrix Spike	Dissolved Sulphate (SO4)	2018/11/30		108	%	80 - 120
5860778	NRG	Spiked Blank	Dissolved Sulphate (SO4)	2018/11/30		98	%	80 - 120
5860778	NRG	Method Blank	Dissolved Sulphate (SO4)	2018/11/30	<2.0		mg/L	
5860778	NRG	RPD	Dissolved Sulphate (SO4)	2018/11/30	NC		%	25
5860780	NRG	Matrix Spike	Reactive Silica (SiO2)	2018/11/30		93	%	80 - 120
5860780	NRG	Spiked Blank	Reactive Silica (SiO2)	2018/11/30		95	%	80 - 120
5860780	NRG	Method Blank	Reactive Silica (SiO2)	2018/11/30	<0.50		mg/L	
5860780	NRG	RPD	Reactive Silica (SiO2)	2018/11/30	0.0034		%	25
5860781	NRG	Spiked Blank	Colour	2018/11/30		102	%	80 - 120
5860781	NRG	Method Blank	Colour	2018/11/30	<5.0		TCU	
5860781	NRG	RPD	Colour	2018/11/30	3.0		%	20
5860783	NRG	Matrix Spike	Orthophosphate (P)	2018/11/30		90	%	80 - 120
5860783	NRG	Spiked Blank	Orthophosphate (P)	2018/11/30		93	%	80 - 120
5860783	NRG	Method Blank	Orthophosphate (P)	2018/11/30	<0.010		mg/L	
5860783	NRG	RPD	Orthophosphate (P)	2018/11/30	4.8		%	25
5860786	NRG	Matrix Spike	Nitrate + Nitrite (N)	2018/11/30		89	%	80 - 120
5860786	NRG	Spiked Blank	Nitrate + Nitrite (N)	2018/11/30		95	%	80 - 120
5860786	NRG	Method Blank	Nitrate + Nitrite (N)	2018/11/30	<0.050		mg/L	
5860786	NRG	RPD	Nitrate + Nitrite (N)	2018/11/30	NC		%	25
5860787	NRG	Matrix Spike	Nitrite (N)	2018/11/30		93	%	80 - 120
5860787	NRG	Spiked Blank	Nitrite (N)	2018/11/30		107	%	80 - 120
5860787	NRG	Method Blank	Nitrite (N)	2018/11/30	<0.010		mg/L	
5860787	NRG	RPD	Nitrite (N)	2018/11/30	NC		%	20
5862349	NHU	QC Standard	pH	2018/11/30		100	%	97 - 103
5862349	NHU	RPD	pH	2018/11/30	6.4		%	N/A
5862351	NHU	Spiked Blank	Conductivity	2018/11/30		102	%	80 - 120
5862351	NHU	Method Blank	Conductivity	2018/11/30	1.5, RDL=1.0		uS/cm	
5862351	NHU	RPD	Conductivity	2018/11/30	0.25		%	25
5864494	HM2	Matrix Spike	Total Organic Carbon (C)	2018/11/30		101	%	85 - 115
5864494	HM2	Spiked Blank	Total Organic Carbon (C)	2018/11/30		98	%	80 - 120
5864494	HM2	Method Blank	Total Organic Carbon (C)	2018/11/30	<0.50		mg/L	
5864494	HM2	RPD	Total Organic Carbon (C)	2018/11/30	8.1		%	15
5864609	NHU	QC Standard	Turbidity	2018/11/30		98	%	80 - 120
5864609	NHU	Spiked Blank	Turbidity	2018/11/30		100	%	80 - 120
5864609	NHU	Method Blank	Turbidity	2018/11/30	<0.10		NTU	
5864609	NHU	RPD	Turbidity	2018/11/30	1.2		%	20
5864670	KKE	Matrix Spike [IJQ541-05]	D10-Anthracene	2018/11/30		82	%	50 - 130
			D14-Terphenyl	2018/11/30		86	%	50 - 130
			D8-Acenaphthylene	2018/11/30		73	%	50 - 130
			1-Methylnaphthalene	2018/11/30		74	%	50 - 130
			2-Methylnaphthalene	2018/11/30		74	%	50 - 130
			Acenaphthene	2018/11/30		86	%	50 - 130
			Acenaphthylene	2018/11/30		89	%	50 - 130
			Anthracene	2018/11/30		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
			Benzo(a)anthracene	2018/11/30		99	%	50 - 130
			Benzo(a)pyrene	2018/11/30		86	%	50 - 130
			Benzo(b)fluoranthene	2018/11/30		98	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/30		104	%	50 - 130
			Benzo(j)fluoranthene	2018/11/30		98	%	50 - 130
			Benzo(k)fluoranthene	2018/11/30		99	%	50 - 130
			Chrysene	2018/11/30		102	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/30		97	%	50 - 130
			Fluoranthene	2018/11/30		94	%	50 - 130
			Fluorene	2018/11/30		91	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/30		103	%	50 - 130
			Naphthalene	2018/11/30		73	%	50 - 130
			Perylene	2018/11/30		89	%	50 - 130
			Phenanthrene	2018/11/30		81	%	50 - 130
			Pyrene	2018/11/30		91	%	50 - 130
5864670	KKE	Spiked Blank	D10-Anthracene	2018/11/30		102	%	50 - 130
			D14-Terphenyl	2018/11/30		105	%	50 - 130
			D8-Acenaphthylene	2018/11/30		89	%	50 - 130
			1-Methylnaphthalene	2018/11/30		77	%	50 - 130
			2-Methylnaphthalene	2018/11/30		77	%	50 - 130
			Acenaphthene	2018/11/30		98	%	50 - 130
			Acenaphthylene	2018/11/30		105	%	50 - 130
			Anthracene	2018/11/30		95	%	50 - 130
			Benzo(a)anthracene	2018/11/30		134 (2)	%	50 - 130
			Benzo(a)pyrene	2018/11/30		102	%	50 - 130
			Benzo(b)fluoranthene	2018/11/30		117	%	50 - 130
			Benzo(g,h,i)perylene	2018/11/30		118	%	50 - 130
			Benzo(j)fluoranthene	2018/11/30		110	%	50 - 130
			Benzo(k)fluoranthene	2018/11/30		118	%	50 - 130
			Chrysene	2018/11/30		136 (2)	%	50 - 130
			Dibenz(a,h)anthracene	2018/11/30		101	%	50 - 130
			Fluoranthene	2018/11/30		117	%	50 - 130
			Fluorene	2018/11/30		98	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2018/11/30		114	%	50 - 130
			Naphthalene	2018/11/30		74	%	50 - 130
			Perylene	2018/11/30		108	%	50 - 130
			Phenanthrene	2018/11/30		100	%	50 - 130
			Pyrene	2018/11/30		109	%	50 - 130
5864670	KKE	Method Blank	D10-Anthracene	2018/11/30		81	%	50 - 130
			D14-Terphenyl	2018/11/30		116	%	50 - 130
			D8-Acenaphthylene	2018/11/30		88	%	50 - 130
			1-Methylnaphthalene	2018/11/30	<0.050		ug/L	
			2-Methylnaphthalene	2018/11/30	<0.050		ug/L	
			Acenaphthene	2018/11/30	<0.010		ug/L	
			Acenaphthylene	2018/11/30	<0.010		ug/L	
			Anthracene	2018/11/30	<0.010		ug/L	
			Benzo(a)anthracene	2018/11/30	<0.010		ug/L	
			Benzo(a)pyrene	2018/11/30	<0.010		ug/L	
			Benzo(b)fluoranthene	2018/11/30	<0.010		ug/L	
			Benzo(g,h,i)perylene	2018/11/30	<0.010		ug/L	
			Benzo(j)fluoranthene	2018/11/30	<0.010		ug/L	
			Benzo(k)fluoranthene	2018/11/30	<0.010		ug/L	
			Chrysene	2018/11/30	<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
			Dibenz(a,h)anthracene	2018/11/30	<0.010		ug/L	
			Fluoranthene	2018/11/30	<0.010		ug/L	
			Fluorene	2018/11/30	<0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2018/11/30	<0.010		ug/L	
			Naphthalene	2018/11/30	<0.20		ug/L	
			Perylene	2018/11/30	<0.010		ug/L	
			Phenanthrene	2018/11/30	<0.010		ug/L	
			Pyrene	2018/11/30	<0.010		ug/L	
5864670	KKE	RPD [IJQ540-05]	1-Methylnaphthalene	2018/11/30	7.3		%	40
			2-Methylnaphthalene	2018/11/30	NC		%	40
			Acenaphthene	2018/11/30	5.8		%	40
			Acenaphthylene	2018/11/30	11		%	40
			Anthracene	2018/11/30	4.6		%	40
			Benzo(a)anthracene	2018/11/30	NC		%	40
			Benzo(a)pyrene	2018/11/30	NC		%	40
			Benzo(b)fluoranthene	2018/11/30	NC		%	40
			Benzo(g,h,i)perylene	2018/11/30	NC		%	40
			Benzo(j)fluoranthene	2018/11/30	NC		%	40
			Benzo(k)fluoranthene	2018/11/30	NC		%	40
			Chrysene	2018/11/30	NC		%	40
			Dibenz(a,h)anthracene	2018/11/30	NC		%	40
			Fluoranthene	2018/11/30	1.2		%	40
			Fluorene	2018/11/30	4.3		%	40
			Indeno(1,2,3-cd)pyrene	2018/11/30	NC		%	40
			Naphthalene	2018/11/30	22		%	40
			Perylene	2018/11/30	NC		%	40
			Phenanthrene	2018/11/30	10		%	40
			Pyrene	2018/11/30	6.1		%	40

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

(2) Spike: < 10 % of compounds in multi-component analysis in violation.

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Maxxam Job #: B8V4748
Report Date: 2018/12/03

Dillon Consulting Limited
Client Project #: 14-1360
Site Location: NS LANDS SW PROGRAM

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)

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), 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	SURFACE WATER STATION :	CB-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	0.005		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
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	SURFACE WATER STATION :	CB-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	0.016	0.019	0.017	0.014	0.33	0.011	0.005		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
Row 1: Compare to Event 1:		1	1	1	1	1	1	1	0	0	7
Row 2: Compare to Event 2:			1	1	1	1	1	-1	-1	0	3
Row 3: Compare to Event 3:				1	1	-1	1	-1	-1	0	0
Row 4: Compare to Event 4:					-1	-1	1	-1	-1	0	-3
Row 5: Compare to Event 5:						-1	1	-1	-1	0	-2
Row 6: Compare to Event 6:							1	-1	-1	0	-1
Row 7: Compare to Event 7:								-1	-1	0	-2
Row 8: Compare to Event 8:									-1	0	-1
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	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
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	SURFACE WATER STATION :	CB-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	0.005	0.005		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
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	SURFACE WATER STATION :	CB-SW								
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Cadmium	0.016	0.018	0.005	0.011	0.005	0.017	0.005	0.015	0.014		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
Row 1: Compare to Event 1:		1	-1	-1	-1	1	-1	-1	-1	0	-4
Row 2: Compare to Event 2:			-1	-1	-1	-1	-1	-1	-1	0	-7
Row 3: Compare to Event 3:				1	0	1	0	1	1	0	4
Row 4: Compare to Event 4:					-1	1	-1	1	1	0	1
Row 5: Compare to Event 5:						1	0	1	1	0	3
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION :	CB-SW									
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Strontium	196	130	320	140	160	110	340	130	77		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
Row 1: Compare to Event 1:		-1	1	-1	-1	-1	1	-1	-1	0	-4
Row 2: Compare to Event 2:			1	1	1	-1	1	0	-1	0	2
Row 3: Compare to Event 3:				-1	-1	-1	1	-1	-1	0	-4
Row 4: Compare to Event 4:					1	-1	1	-1	-1	0	-1
Row 5: Compare to Event 5:						-1	1	-1	-1	0	-2
Row 6: Compare to Event 6:							1	1	-1	0	1
Row 7: Compare to Event 7:								-1	-1	0	-2
Row 8: Compare to Event 8:									-1	0	-1
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 = **-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	SURFACE WATER STATION :	CB-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	6	9	6.1	2.5	2.5	2.5	2.5	5.5		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
Row 1: Compare to Event 1:		1	1	1	0	0	0	0	1	0	4
Row 2: Compare to Event 2:			1	1	-1	-1	-1	-1	-1	0	-3
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	0	-6
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	0	-5
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:										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	
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	SURFACE WATER STATION :	CB-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		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
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	SURFACE WATER STATION :	CB-SW								
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8	Event 9	Event 10	Sum Rows
Sulphate	6.5	26	16	24	10	23	12	24	32		
	23-Jul-13	22-Dec-14	27-Jul-15	18-Nov-15	22-Jul-16	8-Dec-16	3-Aug-17	18-Dec-17	23-Nov-18		
Row 1: Compare to Event 1:		1	1	1	1	1	1	1	1	0	8
Row 2: Compare to Event 2:			-1	-1	-1	-1	-1	-1	1	0	-5
Row 3: Compare to Event 3:				1	-1	1	-1	1	1	0	2
Row 4: Compare to Event 4:					-1	-1	-1	0	1	0	-2
Row 5: Compare to Event 5:						1	1	1	1	0	4
Row 6: Compare to Event 6:							-1	1	1	0	1
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									1	0	1
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 = **11**

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						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	SURFACE WATER STATION :	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		
	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		
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	0	-5
Row 5: Compare to Event 5:						-1	-1	-1	-1	0	-4
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		-1	-1	1	-1	1	-1	-1	-1	0	-4
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	0	-5
Row 5: Compare to Event 5:						1	0	1	0	0	2
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION :	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	0.075	0.005	0.011	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		
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	0	-5
Row 5: Compare to Event 5:						1	0	0	0	0	1
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
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	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
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	-1	-1	0	-2
Row 2: Compare to Event 2:			-1	1	-1	1	-1	-1	-1	0	-3
Row 3: Compare to Event 3:				1	-1	1	-1	-1	-1	0	-2
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	0	-5
Row 5: Compare to Event 5:						1	0	-1	-1	0	-1
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								-1	-1	0	-2
Row 8: Compare to Event 8:									1	0	1
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)	
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	0	-8
Row 2: Compare to Event 2:			1	1	1	1	-1	1	1	0	5
Row 3: Compare to Event 3:				-1	-1	-1	-1	1	-1	0	-4
Row 4: Compare to Event 4:					1	-1	-1	1	-1	0	-1
Row 5: Compare to Event 5:						-1	-1	1	-1	0	-2
Row 6: Compare to Event 6:							-1	1	1	0	1
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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		
	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	1	1	-1	-1	-1	-1	1	0	0
Row 2: Compare to Event 2:			1	1	-1	-1	-1	-1	-1	0	-3
Row 3: Compare to Event 3:				1	-1	-1	-1	-1	-1	0	-4
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	0	-5
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:										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	SURFACE WATER STATION :	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		
	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		
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	1	-1	-1	-1	1	-1	-1	0	-2
Row 2: Compare to Event 2:			1	-1	-1	-1	1	-1	-1	0	-3
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	0	-6
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	0	1
Row 7: Compare to Event 7:								-1	-1	0	-2
Row 8: Compare to Event 8:									1	0	1
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	
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	SURFACE WATER STATION :	SRC-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	0.005	0.005	
	23-Jul-13	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	
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	SURFACE WATER STATION :	SRC-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	0.018	0.005	0.005	0.005	0.011	0.005	0.035	0.06	0.011	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	0	0	0	1	0	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:				0	0	1	0	1	1	1	4
Row 4: Compare to Event 4:					0	1	0	1	1	1	4
Row 5: Compare to Event 5:						1	0	1	1	1	4
Row 6: Compare to Event 6:							-1	1	1	0	1
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 = **16**

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							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)	
	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	SURFACE WATER STATION :	SRC-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	0.013	0.005	0.005	0.005	0.005	0.005	0.016	0.034	0.005	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	0	0	0	0	0	1	1	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	0	0	1	1	0	2
Row 4: Compare to Event 4:					0	0	0	1	1	0	2
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 = **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	SURFACE WATER STATION :	SRC-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	0.005	0.042	0.015	0.023	0.018	0.039	0.005	0.31	0.26	0.027	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	1	1	1	1	0	1	1	1	8
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	2
Row 5: Compare to Event 5:						1	-1	1	1	1	3
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 = **14**

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							X
± 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	SURFACE WATER STATION :	SRC-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	174	150	150	150	170	140	190	140	180	130	
	23-Jul-13	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	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	1	-1	1	-1	-5
Row 2: Compare to Event 2:			0	0	1	-1	1	-1	1	-1	0
Row 3: Compare to Event 3:				0	1	-1	1	-1	1	-1	0
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	0	1	-1	1
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 = **-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	SURFACE WATER STATION :	SRC-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	2.5	7	9.5	2.5	2.5	5.7	2.5	50	47	6.2	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	1	0	0	1	0	1	1	1	6
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	-3
Row 4: Compare to Event 4:					0	1	0	1	1	1	4
Row 5: Compare to Event 5:						1	0	1	1	1	4
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 = **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	
	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	SURFACE WATER STATION :	SRC-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	57	110	64	57	91	54	130	91	120	74	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	1	0	1	-1	1	1	1	1	6
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	4
Row 5: Compare to Event 5:						-1	1	0	1	-1	0
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 = **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	SURFACE WATER STATION :	SRC-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	40	54	47	43	51	42	54	50	43	46	
	23-Jul-13	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	
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	0	-1	-1	-1	-7
Row 3: Compare to Event 3:				-1	1	-1	1	1	-1	-1	-1
Row 4: Compare to Event 4:					1	-1	1	1	0	1	3
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 = **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	SURFACE WATER STATION :	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		
	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		
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	0	-6
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	0	-4
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	
	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	SURFACE WATER STATION : 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		
	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		
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	0	-3
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	0	-6
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	0	-4
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 = -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	
	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	SURFACE WATER STATION :	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		
	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		
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	0	-6
Row 4: Compare to Event 4:					1	0	0	0	0	0	1
Row 5: Compare to Event 5:						-1	-1	-1	-1	0	-4
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	
	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		-1	1	-1	0	-1	-1	-1	0	0	-4
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	0	-6
Row 4: Compare to Event 4:					1	1	1	0	1	0	4
Row 5: Compare to Event 5:						-1	-1	-1	0	0	-3
Row 6: Compare to Event 6:							-1	-1	1	0	-1
Row 7: Compare to Event 7:								-1	1	0	0
Row 8: Compare to Event 8:									1	0	1
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	1	1	-1	1	-1	1	-1	0	2
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	0	-1
Row 3: Compare to Event 3:				1	-1	1	-1	1	-1	0	0
Row 4: Compare to Event 4:					-1	1	-1	1	-1	0	-1
Row 5: Compare to Event 5:						1	0	1	1	0	3
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	1	-1	-1	-1	-1	-1	-1	0	-4
Row 2: Compare to Event 2:			1	-1	-1	-1	-1	-1	-1	0	-5
Row 3: Compare to Event 3:				-1	-1	-1	-1	-1	-1	0	-6
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	0	-2
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 = **-14**

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						X	
± 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	SURFACE WATER STATION :	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		
	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		
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	0	-5
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	0	-3
Row 7: Compare to Event 7:								1	0	0	1
Row 8: Compare to Event 8:									-1	0	-1
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	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	-1	1	-1	1	-1	1	-1	0	0
Row 2: Compare to Event 2:			-1	-1	-1	1	-1	0	-1	0	-4
Row 3: Compare to Event 3:				1	-1	1	1	1	0	0	3
Row 4: Compare to Event 4:					-1	1	-1	1	-1	0	-1
Row 5: Compare to Event 5:						1	1	1	1	0	4
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	-1	0	0
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION :	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	0.015	0.005	0.005	0.005	0.005	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	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to Event 2:			0	0	0	1	0	0	0	0	1
Row 3: Compare to Event 3:				0	0	1	0	0	0	0	1
Row 4: Compare to Event 4:					0	1	0	0	0	0	1
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 = **-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	SURFACE WATER STATION :	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	0.026	0.013	0.005	0.03	0.005	0.038	0.017	0.012	0.005	0.01	
	23-Jul-13	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	
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	-2
Row 3: Compare to Event 3:				1	0	1	1	1	0	1	5
Row 4: Compare to Event 4:					-1	1	-1	-1	-1	-1	-4
Row 5: Compare to Event 5:						1	1	1	0	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 = **-10**

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							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		
	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	SURFACE WATER STATION :	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	0.005	0.015	0.005	0.027	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	3-Aug-17	18-Dec-17	25-Jul-18	23-Nov-18	
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	-4
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 = **-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	SURFACE WATER STATION :	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	0.005	0.01	0.005	0.018	0.005	0.015	0.011	0.01	0.005	0.015	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	0	1	0	1	1	1	0	1	6
Row 2: Compare to Event 2:			-1	1	-1	1	1	0	-1	1	1
Row 3: Compare to Event 3:				1	0	1	1	1	0	1	5
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
Row 5: Compare to Event 5:						1	1	1	0	1	4
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								-1	-1	1	-1
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 = **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		
	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	SURFACE WATER STATION : 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	645	180	300	180	300	160	500	160	350	140	
	23-Jul-13	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	
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	-1	1	-1	1	-1	1
Row 3: Compare to Event 3:				-1	0	-1	1	-1	1	-1	-2
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	0	1	-1	1
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 = -14

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							X
± 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	SURFACE WATER STATION : 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	2.5	6	7.4	2.5	2.5	2.5	2.5	2.5	2.5	6.4	
	23-Jul-13	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	
Row 1: Compare to Event 1:		1	1	0	0	0	0	0	0	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	0	0	0	0	1	1
Row 5: Compare to Event 5:						0	0	0	0	1	1
Row 6: Compare to Event 6:							0	0	0	1	1
Row 7: Compare to Event 7:								0	0	1	1
Row 8: Compare to Event 8:									0	1	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 = -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	SURFACE WATER STATION :	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	66	25	52	25	25	25	59	25	62	25	
	23-Jul-13	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	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to Event 2:			1	0	0	0	1	0	1	0	3
Row 3: Compare to Event 3:				-1	-1	-1	1	-1	1	-1	-3
Row 4: Compare to Event 4:					0	0	1	0	1	0	2
Row 5: Compare to Event 5:						0	1	0	1	0	2
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 = **-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		
	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	SURFACE WATER STATION :	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	170	56	91	44	64	41	110	48	95	45	
	23-Jul-13	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	
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	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	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 = **-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	SURFACE WATER STATION : 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	0.005	0.025	0.005	0.005	0.005	0.005	0.97	
	23-Jul-13	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	
Row 1: Compare to Event 1:		0	0	0	1	0	0	0	0	1	2
Row 2: Compare to Event 2:			0	0	1	0	0	0	0	1	2
Row 3: Compare to Event 3:				0	1	0	0	0	0	1	2
Row 4: Compare to Event 4:					1	0	0	0	0	1	2
Row 5: Compare to Event 5:						-1	-1	-1	-1	1	-3
Row 6: Compare to Event 6:							0	0	0	1	1
Row 7: Compare to Event 7:								0	0	1	1
Row 8: Compare to Event 8:									0	1	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 = 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	
	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	SURFACE WATER STATION :	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	0.005	0.092	0.005	0.027	0.005	0.005	2.5	
	23-Jul-13	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	
Row 1: Compare to Event 1:		0	0	0	1	0	1	0	0	1	3
Row 2: Compare to Event 2:			0	0	1	0	1	0	0	1	3
Row 3: Compare to Event 3:				0	1	0	1	0	0	1	3
Row 4: Compare to Event 4:					1	0	1	0	0	1	3
Row 5: Compare to Event 5:						-1	-1	-1	-1	1	-3
Row 6: Compare to Event 6:							1	0	0	1	2
Row 7: Compare to Event 7:								-1	-1	1	-1
Row 8: Compare to Event 8:									0	1	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	
	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	SURFACE WATER STATION :	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	0.005	0.025	0.005	0.005	0.005	0.005	1.3	
	23-Jul-13	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	
Row 1: Compare to Event 1:		0	0	0	1	0	0	0	0	1	2
Row 2: Compare to Event 2:			0	0	1	0	0	0	0	1	2
Row 3: Compare to Event 3:				0	1	0	0	0	0	1	2
Row 4: Compare to Event 4:					1	0	0	0	0	1	2
Row 5: Compare to Event 5:						-1	-1	-1	-1	1	-3
Row 6: Compare to Event 6:							0	0	0	1	1
Row 7: Compare to Event 7:								0	0	1	1
Row 8: Compare to Event 8:									0	1	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 = **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	
	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	SURFACE WATER STATION :	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	0.6	0.038	0.012	0.005	0.035	0.026	0.27	0.27	0.024	0.15	
	23-Jul-13	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	
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	-2
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:						-1	1	1	-1	1	1
Row 6: Compare to Event 6:							1	1	-1	1	2
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:										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 = **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	
	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	SURFACE WATER STATION :	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	4660	53	100	73	1300	61	940	49	320	50	
	23-Jul-13	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	
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	4
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	0
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
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 = **-13**

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							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	SURFACE WATER STATION :	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	25	10	7.9	2.5	11	2.5	2.5	2.5	6	160	
	23-Jul-13	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	
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	-4
Row 3: Compare to Event 3:				-1	1	-1	-1	-1	-1	1	-3
Row 4: Compare to Event 4:					1	0	0	0	1	1	3
Row 5: Compare to Event 5:						-1	-1	-1	-1	1	-3
Row 6: Compare to Event 6:							0	0	1	1	2
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:										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	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	SURFACE WATER STATION :	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	2470	25	25	25	690	25	430	25	110	25	
	23-Jul-13	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	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	-1	-1	-9
Row 2: Compare to Event 2:			0	0	1	0	1	0	1	0	3
Row 3: Compare to Event 3:				0	1	0	1	0	1	0	3
Row 4: Compare to Event 4:					1	0	1	0	1	0	3
Row 5: Compare to Event 5:						-1	-1	-1	-1	-1	-5
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 = **-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	SURFACE WATER STATION :	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	1500	7.9	10	8.3	410	8.5	230	8	71	6.5	
	23-Jul-13	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	
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	-1
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	0
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 = -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	
	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	SURFACE WATER STATION :	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	0.005	0.011	
	23-Jul-13	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	
Row 1: Compare to Event 1:		0	0	0	0	0	0	0	0	1	1
Row 2: Compare to Event 2:			0	0	0	0	0	0	0	1	1
Row 3: Compare to Event 3:				0	0	0	0	0	0	1	1
Row 4: Compare to Event 4:					0	0	0	0	0	1	1
Row 5: Compare to Event 5:						0	0	0	0	1	1
Row 6: Compare to Event 6:							0	0	0	1	1
Row 7: Compare to Event 7:								0	0	1	1
Row 8: Compare to Event 8:									0	1	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 = **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	SURFACE WATER STATION :	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	0.01	0.036	0.005	0.022	0.005	0.016	0.005	0.018	0.005	0.031	
	23-Jul-13	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	
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	-8
Row 3: Compare to Event 3:				1	0	1	0	1	0	1	4
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	1	-4
Row 5: Compare to Event 5:						1	0	1	0	1	3
Row 6: Compare to Event 6:							-1	1	-1	1	0
Row 7: Compare to Event 7:								1	0	1	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 = **-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	SURFACE WATER STATION :	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	
	23-Jul-13	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	
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	SURFACE WATER STATION : 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	0.14	0.028	0.05	0.014	0.05	0.025	0.05	0.02	0.05	0.024	
	23-Jul-13	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	
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	0
Row 3: Compare to Event 3:				-1	0	-1	0	-1	0	-1	-4
Row 4: Compare to Event 4:					1	1	1	1	1	1	6
Row 5: Compare to Event 5:						-1	0	-1	0	-1	-3
Row 6: Compare to Event 6:							1	-1	1	-1	0
Row 7: Compare to Event 7:								-1	0	-1	-2
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 = -11

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							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	SURFACE WATER STATION : 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	6130	950	5300	580	5500	1000	6100	630	5900	730	
	23-Jul-13	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	
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	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	6
Row 5: Compare to Event 5:						-1	1	-1	1	-1	-1
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 = **-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	SURFACE WATER STATION : 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	25	7.2	25	41	25	2.5	25	2.5	25	2.5	
	23-Jul-13	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	
Row 1: Compare to Event 1:		-1	0	1	0	-1	0	-1	0	-1	-3
Row 2: Compare to Event 2:			1	1	1	-1	1	-1	1	-1	2
Row 3: Compare to Event 3:				1	0	-1	0	-1	0	-1	-2
Row 4: Compare to Event 4:					-1	-1	-1	-1	-1	-1	-6
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 = -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

MANN-KENDALL PLUME STABILITY ANALYSIS

LTMM Surface Water Monitoring
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	SURFACE WATER STATION : 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	3700	480	2900	330	3600	520	3600	340	3500	420	
	23-Jul-13	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	
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	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	6
Row 5: Compare to Event 5:						-1	0	-1	-1	-1	-4
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 = -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	SURFACE WATER STATION : 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	2000	270	1500	190	1600	290	2000	210	1900	250	
	23-Jul-13	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	
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	0	-1	-1	-1	-8
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	6
Row 5: Compare to Event 5:						-1	1	-1	1	-1	-1
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 = -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		
	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	-1	1	0	-6
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:										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	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
NS Lands
Sydney, Nova Scotia

MANN-KENDALL ANALYSIS OF PLUME	SURFACE WATER STATION : 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		
	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		
Row 1: Compare to Event 1:		-1	-1	-1	-1	-1	-1	1	1	0	-4
Row 2: Compare to Event 2:			1	-1	1	-1	1	1	1	0	3
Row 3: Compare to Event 3:				-1	-1	-1	-1	1	1	0	-2
Row 4: Compare to Event 4:					1	0	1	1	1	0	4
Row 5: Compare to Event 5:						-1	1	1	1	0	2
Row 6: Compare to Event 6:							1	1	1	0	3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION : 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		
	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		
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	SURFACE WATER STATION : 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		
	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		
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	0	2
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	0	6
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	0	0
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	0	2
Row 2: Compare to Event 2:			-1	0	-1	1	-1	-1	-1	0	-4
Row 3: Compare to Event 3:				1	1	1	1	1	1	0	6
Row 4: Compare to Event 4:					-1	1	-1	-1	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	0	0
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	1	1	1	1	-1	1	1	0	6
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	0	-6
Row 4: Compare to Event 4:					-1	0	-1	0	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	0	0
Row 6: Compare to Event 6:							-1	0	-1	0	-2
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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		
	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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	-1	0	2
Row 2: Compare to Event 2:			-1	1	-1	1	-1	-1	-1	0	-3
Row 3: Compare to Event 3:				1	1	1	1	1	1	0	6
Row 4: Compare to Event 4:					-1	1	-1	-1	-1	0	-3
Row 5: Compare to Event 5:						1	-1	1	-1	0	0
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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	SURFACE WATER STATION :	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		
	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		
Row 1: Compare to Event 1:		1	-1	1	1	1	-1	1	1	0	4
Row 2: Compare to Event 2:			-1	1	-1	1	-1	1	-1	0	-1
Row 3: Compare to Event 3:				1	1	1	1	1	1	0	6
Row 4: Compare to Event 4:					-1	1	-1	1	-1	0	-1
Row 5: Compare to Event 5:						1	-1	1	-1	0	0
Row 6: Compare to Event 6:							-1	-1	-1	0	-3
Row 7: Compare to Event 7:								1	1	0	2
Row 8: Compare to Event 8:									-1	0	-1
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							

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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