



October 27, 2015

Nova Scotia Lands
45 Wabana Court
Harbourside Commercial Park
Sydney, Nova Scotia
B1P 6H2

ATTENTION: Mr. Frank Potter
Executive Director

***Long Term Maintenance and Monitoring
Semi-Annual Surface Water Quality Monitoring Program July 2015 Final Report***

Surface water quality monitoring is an important component of long term maintenance and monitoring (LTMM), which has been implemented to provide ongoing data for design elements and compliance commitments to regulatory agencies and/or stakeholders. Nova Scotia Lands Incorporated (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 July 2015 LTMM Surface Water Quality Monitoring Program, the details of which are provided herein.

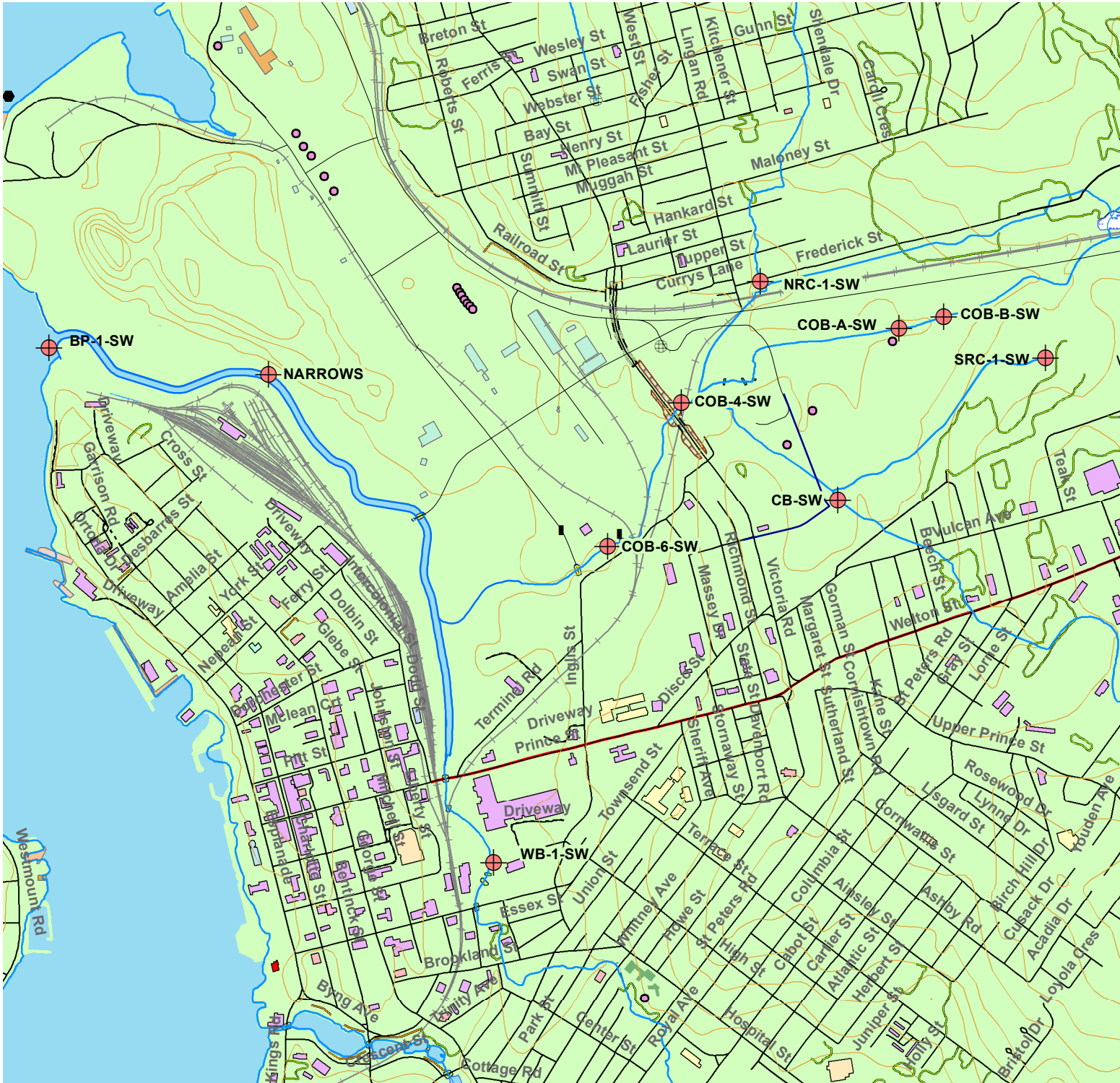
PROJECT METHODOLOGY

The July 2015 Surface Water Quality Monitoring program 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) on July 27, 2015 (**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 (e.g., Environmental Effects Monitoring and Surface Water Monitoring (EEMSWM) Program associated with the Sydney Tar Ponds remediation). Tasks associated with the July 2015 surface water monitoring included:

- Recording of observed changes in surface water quality;
- 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, salinity and turbidity) with a calibrated Horiba U-22 multi-probe;
- Manual flow measurements; and,
- Collection of surface water samples from each station for petroleum hydrocarbons (PHC), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), general chemistry and total metals (including mercury) (RCApMS) analysis.

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LONG TERM MAINTENANCE AND MONITORING
 SURFACE WATER QUALITY MONITORING PROGRAM
 JULY 2015

SURFACE WATER LOCATIONS
 FIGURE 1

LEGEND

 Surface Water Locations



MAP DRAWING INFORMATION:
 Province of Nova Scotia Mapping

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

FILE LOCATION: \\DILLON_GA\DILLON_DFS\SYDNEY
 \SYDNEYCAD\GIS\141360



PROJECT: 14-1360
 STATUS: DRAFT
 DATE: 08/07/15



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 $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ width intervals. The stream flow velocity was also measured at $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ 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. A summary of the surface water stations included in the July 2015 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.
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, CO6 and CO7/CO8.
COB-B-SW ²	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	Coke Ovens Brook	To characterize surface water quality from the upstream areas of CO1, CO6 and CO7/CO8. This sampling location is also upstream of TP6B.
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	Wash Brook	To characterize surface water quality within the urban area of Sydney upstream of TP6B and TP7.
NARROWS	North Channel, Open Hearth Park	To characterize surface water quality downgradient of the majority of the remediation sites.
BP-1-SW ¹	Battery Point	To further characterize surface water quality downgradient of the remediation sites and as it discharges to Sydney Harbour.
Notes: ¹ 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 upstream from the collection point utilized during the Construction period of the EEM Program. ² A new upstream sample, COB-B-SW, was added to the July 2015 monitoring program to further characterize the potential for impacts from the municipal landfill to COB-A-SW (as per Dillon's recommendation in the LTMM Semi-Annual Surface water Quality Monitoring Program December 2014 Final Report, dated June 11, 2015).		



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. Metals samples were preserved with nitric acid in the field to ensure that the metals remained in solution.

WEATHER CONDITIONS

The seasonally dry period for the Sydney area is typically from June to September. Weather information obtained from Environment Canada’s climate station at the Sydney Airport indicates that accumulated precipitation for the month of July 2015 was approximately 125.2 mm. Nearly half of the July 2015 amount of precipitation (58.2 mm) occurred after the date of the surface water sampling event (i.e., July 27, 2015). No significant rainfall was recorded during the five days prior to the July 2015 sampling event or on the day of the sampling event.

FIELD OBSERVATIONS AND MEASUREMENTS

Observations at the ten surface water stations during the July 2015 monitoring program are summarized in **Table 2**. Field measurements are summarized in **Table 3**.

Table 2 – Surface Water Quality Monitoring Station Field Observations – July 2015	
Monitoring Station ID	Field Observations
CB-SW	Vegetation and debris (i.e., metal and fiberglass) observed within the brook.
NRC-1-SW	Debris (i.e., plastic, geotextile, Styrofoam, cardboard, paper and food waste) observed in the channel and on the channel banks.
SRC-1-SW	Debris (i.e., lawnmower, plastic and paper) observed in the channel.
COB-A-SW	Dry (e.g., stagnant/standing water, no flow). Visible orange staining observed on the brook banks where the waterline would be during higher flow/recharge time.
COB-B-SW	Dry (e.g., stagnant/standing water, no flow). Visible orange staining observed on brook banks where the waterline would be during higher flow/recharge time.
COB-4-SW	Low surface water level. No visible groundwater interaction. No debris observed.
COB-6-SW	Debris (i.e., paper, cardboard, Styrofoam, clothesline and plastic) observed on the brook banks.
WB-1-SW	Ducks observed in the brook. Debris (i.e., metal and plastic) observed within the brook and on the brook banks.
NARROWS	Algae observed within the channel.
BP-1-SW	Sampling conducted at low tide. Algae and seaweed observed on exposed shoreline rocks. Seabirds visible in water and on shoreline. Debris (i.e., glass and plastic).



Table 3 – Surface Water Quality Monitoring Station Field Measurements – July 2015					
Monitoring Station ID	pH	Turbidity (NTU)	Conductivity (mS/cm)	Salinity (%)	Stream Flow ¹ (m ³ /s)
CB-SW	7.79	- ⁴	0.444	0	0.004
NRC-1-SW	8.50	6.1	0.126	0	0.008
SRC-1-SW	7.35	- ⁴	0.462	0	0.019
COB-A-SW	Dry				
COB-B-SW	Dry				
COB-4-SW	7.11	0.4	0.247	0	0.04
COB-6-SW	7.68	- ⁴	0.566	0	0.145
WB-1-SW	8.59	- ⁴	0.220	0	0.081
NARROWS	7.69	61.6	66.4	4.0	2.96 ³
BP-1-SW ²	7.15	- ⁴	69.4	4.0	2.60 ³

Notes:
¹ Stream flow is an approximate calculated value.
² Collected during low tide conditions.
³ As surface water stations Narrows and BP-1-SW were monitored at different times of the day during July 27, 2015, there is some difference in the calculated flow rates due to tidal fluctuation. Both locations were monitored during the noon (i.e., low tide) portion of the field program.
⁴ Equipment malfunction of turbidity sensor occurred during the field program.

REGULATORY FRAME WORK

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 July 2013 Nova Scotia Contaminated Sites Regulations (NS CSRs) Tier I Environmental Quality Standards (EQS) (Revised January 2015) for surface water (freshwater) and the Canadian Council of Ministers of the Environment (CCME) for the protection of freshwater aquatic life (FWAL), 2014. Analytical results for the remaining two surface water stations included in the July 2015 monitoring program (i.e., Narrows and BP-1-SW) were compared to the July 2013 (revised January 2015) NS CSRs Tier I EQS for surface water (marine) and the CCME guidelines for the protection of aquatic life (marine), 2014.

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. 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 RESULTS

The surface water quality results for the July 2015 event and available post-remediation surface water data are presented in the attached **Tables A-1, A-2, A-3 and A-4** in **Appendix A**. Surface water samples were analyzed for PHCs, PAHs, PCBs and RCapMS. Samples were delivered to Maxxam Analytics in Sydney, Nova Scotia (Maxxam) who were contracted directly by NS Lands to conduct the sample analysis. Maxxam is a Canadian Association for Laboratory Accreditation (CALA) certified laboratory for the parameters analyzed. Review of the data indicates:

- Petroleum hydrocarbons were not detected in the eight surface water samples analyzed;
- Although detectable concentrations of PAH parameters were reported for five of the eight surface water stations sampled, no concentrations exceeded the Tier I EQS or the calculated 95% UCLs; and,
- PCBs were not detected in the eight surface water samples analyzed.

A summary of concentrations of select organic parameters (i.e., PAHs) at each station recorded during the July 2015 event relative to the calculated 95% UCLs is provided in **Table 4**.

Surface water samples were also analyzed for general chemistry and metals (including mercury). Review of the data includes:

- Concentrations of aluminum ranging from 28 ug/L to 89 ug/L exceed the Tier I EQS (freshwater) of 5 ug/L in CB-SW, NRC-1-SW, SRC-1-SW (and its field duplicate sample), COB-4-SW, COB-6-SW and WB-1-SW;
- The boron concentrations of 2900 ug/L and 3100 ug/L at BP-1-SW and the Narrows, respectively, exceed the Tier I EQS (marine) of 1200 ug/L.
- Concentrations of cadmium ranging from 0.012 ug/L to 0.019 ug/L exceeded the Tier I EQS (freshwater) of 0.01 ug/L at NRC-1-SW, SRC-1-SW (and its field duplicate sample) and WB-1-SW;
- The copper concentration of 24 ug/L at SRC-1-SW exceeded the Tier I EQS (freshwater) of 2.0 ug/L. It is noted that the copper concentration in the field duplicate sample collected at SRC-1-SW was below laboratory detection limited. Subsequently, the laboratory reanalyzed the undigested and digested aliquots of both SRC-1-SW and the field duplicate sample with the results confirming what was reported initially. Review of field collection procedures indicates that the field duplicate sample was collected as per industry protocols. The remainder of the metal parameters in the original sample and the field duplicate sample are comparable.
- The concentrations of 1300 ug/L, 460 ug/L and 480 ug/L for iron in NRC-1-SW, COB-4-SW and WB-1-SW, respectively, exceed the Tier I EQS (freshwater) and CCME FWAL guideline of 300 ug/L. Additionally, it is noted that the laboratory detection limit for iron was elevated above the calculated 95% UCL value at Narrows and BP-1-SW;
- The lead concentration of 1.1 ug/L in SRC-1-SW exceeds the Tier I EQS (freshwater) of 1 ug/L. It is noted that the lead concentration in the field duplicate sample of SRC-1-SW was <0.050, and therefore did not exceed the Tier I EQS (freshwater). Additionally, it is noted that the laboratory detection limit for lead was elevated above the Tier I EQS guideline criteria values at Narrows and BP-1-SW;
- The manganese concentration of 100 ug/L at the Narrows is above the Battery Point/Narrows calculated 95% UCL of 70 ug/L;

Table 4 - Summary of Organic Surface Water Indicator Parameter Concentrations relative to Calculated 95% (ug/L)

Parameter	UCL ¹ 95%	Date	Sample Location									
			CB-SW	NRC-1-SW	SRC-1-SW	COB-A-SW	COB-B-SW ²	COB-4-SW	COB-6-SW	WE-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	N/A	N/A	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(a)pyrene	0.05	12/22/2014	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010
		7/27/2015	<0.010	<0.010	<0.010	N/A	N/A	<0.010	<0.010	<0.010	<0.010	<0.010

Notes:

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

² Added to the program in July 2015

Bold indicates the concentration exceeds the 95% UCL

N/A – Not analyzed as surface water station was dry.



- Concentrations of sulphate ranging from 46 ug/L to 100 ug/L are above the Upstream 95% UCL of 26 ug/L at SRC-1-SW (and its field duplicate sample), COB-4-SW and COB-6-SW. The sulphate concentrations of 100 ug/L at COB-4-SW and 91 ug/L at COB-6-SW also exceed the Pre-Construction/Baseline 95% UCL of 84 ug/L; and,
- Concentrations of strontium ranging from 54 ug/L to 320 ug/L are above the Upstream 95% UCL of 132 ug/L at CB-SW, SRC-1-SW (and its field duplicate sample), COB-4-SW and COB-6-SW. The concentrations of 320 ug/L at CB-SW, 250 ug/L at COB-4-SW and 300 ug/L at COB-6-SW also exceed the Pre-Construction/Baseline 95% UCL of 210 ug/L.

Table 5 provides a summary of concentrations for select inorganic parameters from the July 2015 sampling event relative to the calculated 95% UCLs.

QUALITY CONTROL PROCESS

One field duplicate of sample, SRC-1-SW, and one trip blank were collected during the July 2015 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). The calculated RPDs were within established limits (i.e., less than 30% RPD). Volatile organic compounds were not detected in the trip blank. There were no holding time exceedances.

The laboratory analytical certificates have 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.

The Laboratory Quality Control reports have identified the following minor issue:

- The matrix spike PAH surrogate recoveries for D10 Anthracene and D8 Acenaphthylene were 41% and 39%, respectively, which are within the QC acceptance limits (i.e., 30-130%), but outside the method limits that are scientifically and performance based (i.e., 50-130%).

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		26	220	1.6	0.1	8.3	-	3,318	1.2	583	1.9	132
Pre-Construction/Baseline Calculated 95% UCL		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	<u>320</u>
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
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
COB-A-SW	12/22.2014	<u>160</u>	16	<1.0	<0.010	<1.0	<0.40	51	<0.50	25	<1.0	<u>260</u>
	7/27/2015						Dry					
COB-B-SW ¹	7/27/2015						Dry					
COB-4-SW	12/22.2014	47	82	<1.0	0.014	<1.0	<0.40	210	<0.50	95	<1.0	140
	7/27/2015	<u>100</u>	51	<1.0	<0.010	<1.0	<0.40	460	<0.50	110	<1.0	<u>250</u>
COS-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	<u>91</u>	39	<1.0	<0.010	<1.0	<0.40	160	<0.50	23	<1.0	<u>300</u>
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
Battery Point/ Narrows Calculated 95% UCL		2,180	-	-	-	-	0.9	190	-	70	-	7,000
NARROWS	12/22.2014	170	110	<1.0	0.027	<1.0	<0.40	250	<0.50	63	<1.0	610
	7/27/2015	1,300	140	<10	<0.10	<10	<4.0	<500	<5.0	100	<10	5,400
BP-1-SW	12/22.2014	270	110	<1.0	0.028	<1.0	<0.40	240	<0.50	61	<1.0	950
	7/27/2015	1,500	86	<10	<0.10	<10	<4.0	<500	<5.0	59	<10	5,300

Notes:

Bold indicates exceedance of 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



SUMMARY

Analytical results of the July 2015 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 – July 2015	
Parameter	Location (Criteria and/or 95% UCL Exceedance)
Aluminum	<ul style="list-style-type: none"> • CB-SW (Tier I EQS) • NRC-1-SW (Tier I EQS) • SRC-1-SW and its field duplicate sample (Tier I EQS) • COB-4-SW (Tier I EQS) • COB-6-SW (Tier I EQS) • WB-1-SW (Tier I EQS)
Boron	<ul style="list-style-type: none"> • Narrows (Tier I EQS) • BP-1-SW (Tier I EQS)
Cadmium	<ul style="list-style-type: none"> • NRC-1-SW (Tier I EQS) • SRC-1-SW and its field duplicate sample (Tier I EQS) • WB-1-SW (Tier I EQS)
Copper	<ul style="list-style-type: none"> • SRC-1-SW (Tier I EQS)
Iron	<ul style="list-style-type: none"> • NRC-1-SW (Tier I EQS and CCME FWAL) • COB-4-SW (Tier I EQS and CCME FWAL) • WB-1-SW (Tier I EQS and CCME FWAL) • Narrows (Battery Point/Narrows 95% UCL) • BP-1-SW (Battery Point/Narrows 95% UCL)
Lead	<ul style="list-style-type: none"> • SRC-1-SW (Tier I EQS)
Manganese	<ul style="list-style-type: none"> • Narrows (Battery Point/Narrows 95% UCL)
Sulphate	<ul style="list-style-type: none"> • SRC-1-SW (and its field duplicate sample) (Upstream 95% UCL) • COB-4-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL) • COB-6-SW (Upstream 95% UCL and Pre-Construction/Baseline Calculated 95% UCL)
Strontium	<ul style="list-style-type: none"> • CB-SW (Upstream 95% UCL and Pre-Construction/Baseline 95% UCL) • SRC-1-SW and its field duplicate sample (Upstream 95% UCL) • COB-4-SW (Upstream 95% UCL and Pre-Construction/Baseline 95% UCL) • COB-6-SW (Upstream 95% UCL and Pre-Construction/Baseline 95% UCL)

Elevated concentrations of aluminum are likely attributed to higher background values at CB-SW, NRC-1-SW, SRC-1-SW and WB-1-SW and are not related to the site use. Elevated metal concentrations (i.e., copper, iron and lead) at SRC-1-SW indicate potential impacts related to runoff from the upgradient municipal landfill.

RECOMMENDATIONS AND CONSIDERATIONS

It is recommended that the additional upstream sample, COB-B-SW, which was scheduled to be included during the July 2015 monitoring program but was found to be dry at the time of the field program, be carried forward during the next surface water sampling event to further characterize the potential for impacts from the municipal landfill to COB-A-SW.

Water quality trend analysis will be conducted when sufficient post-remediation data is available (i.e., November 2015). The next surface water monitoring event will be conducted during high flow conditions (i.e., November 2015).

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
Our File: 14-1360-7000

Attachments

APPENDIX A
TABLES A-1 through A-4

TABLE A-1
SURFACE WATER ANALYTICAL RESULTS - BTEX/TPH
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - JULY 2015

Sample Location	Sample Date	BTEX Concentration				Petroleum Hydrocarbons				
		Benzene	Toluene	E. Benzene	Xylenes	C6 - C10	C10-C16	C16-C21	C21 - C32	Modified TPH
Units		mg/L								
NSE Tier 1 EQS Fresh Water ¹		2.1	0.77	0.32	0.33	-	-	-	-	1.5 (Gas) 0.1 (Fuel) 0.1 (Lube)
CCME FWAL ²		0.37	0.002	0.090	-	-	-	-	-	-
Calculated Upstream 95% UCL		-	-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		0.009	-	-	-	-	-	-	-	-
CB-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
NRC-1-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
SRC-1-SW	12/22/14 ^D	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15 ^D	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
COB-A-SW	11/26/12	DRY - NO SAMPLE								
	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	DRY - NO SAMPLE								
COB-B-SW	07/27/15	DRY - NO SAMPLE								
COB-4-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
COB-6-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
WB-1-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
NSE Tier 1 EQS Marine Water ¹		2.1	0.77	0.32	0.33	-	-	-	-	1.5 (Gas) 0.1 (Fuel) 0.1 (Lube)
CCME MAL ²		0.11	0.215	0.025	-	-	-	-	-	-
Battery Point/Narrows Calculated 95% UCL		-	-	-	-	-	-	-	-	-
BP-1-SW	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
NARROWS	12/22/14	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10
	07/27/15	<0.0010	<0.0010	<0.0010	<0.0020	<0.010	<0.050	<0.050	<0.10	<0.10

NOTES:

D - 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) 2015

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

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% UCL

Red Concentration exceeds Pre-Construction/Baseline Calculated 95% UCL

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

TABLE A-2
SURFACE WATER ANALYTICAL RESULTS - PAHs
LTMM SURFACE WATER QUALITY MONITORING PROGRAM - JULY 2015

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	Dibenz(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	0.17	-	0.48	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
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
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 ^D	<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 ^D	<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-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	<0.20	<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																			
COB-B-SW	07/27/15	DRY - NO SAMPLE																			
COB-4-SW	12/22/14	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	<0.010	<0.010
	07/27/15	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.014	<0.010	<0.010	<0.050	<0.050	<0.20	<0.010	0.010	0.012
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
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
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	<u>0.036</u>
	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
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	<u>0.030</u>
	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

NOTES:

D - 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

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 A-3
 SURFACE WATER ANALYTICAL RESULTS - PCBs
 LTMM SURFACE WATER QUALITY MONITORING PROGRAM - JULY 2015

Sample Location	Sample Date	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1248	Aroclor 1242	Aroclor 1254	Aroclor 1260	Calculated Total PCB
Units		ug/L							
NSE Tier 1 EQS Fresh Water ¹		-	-	-	-	-	-	-	-
CCME FWAL ²		-	-	-	-	-	-	-	-
Upstream Calculated 95% UCL		-	-	-	-	-	-	-	-
Pre-Construction/Baseline Calculated 95% UCL		-	-	-	-	-	-	-	-
CB-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
NRC-1-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
SRC-1-SW	12/22/14 ^D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15 ^D	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
COB-A-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	DRY - NO SAMPLE							
COB-B-SW	07/27/15	DRY - NO SAMPLE							
COB-4-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
COB-6-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
WB-1-SW	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
NSE Tier 1 EQS Marine Water ¹		-	-	-	-	-	-	-	-
CCME MAL ²		-	-	-	-	-	-	-	-
Battery Point/Narrows Calculated 95% UCL		-	-	-	-	-	-	-	-
BP-1-SW	07/23/13	NM	NM	NM	NM	NM	NM	NM	<0.050
	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
NARROWS	12/22/14	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	07/27/15	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

NOTES:

D - 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

Concentration exceeds Tier I EQS for surface water (freshwater)

Concentration exceeds Tier I EQS for surface water (marine)

Concentration exceeds CCME FWAL

Concentration exceeds CCME MAL

Concentration exceeds Upstream Calculated 95% Upper Concentration Limit

Concentration exceeds Battery Point/Narrows Calculated 95% Upper Concentration Limit

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 A-4
 SURFACE WATER ANALYTICAL RESULTS - GENERAL CHEMISTRY AND TOTAL METALS
 LTMM SURFACE WATER QUALITY MONITORING PROGRAM - JULY 2015

Sample Location	Sample Date	Units	Na	K	Ca	Mg	ALK	SO4	Cl	SiO2	OPO4	P	NO3	NO2	NO2-NO3	NH3	Colour	TOC	TURB	COND	pH	HARD	BICARB ALK	CARB ALK	TDS	Anion Sum	Ion Bal.	Langeller Index (@20C)	Langeller Index (@4C)	Sat. pH (@20C)	Sat. pH (@4C)
			µg/L	µg/L	µg/L	µg/L	mg/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
NSE Tier 1 EQS Fresh Water ¹			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCME FWAL ²			-	-	-	-	-	-	120	-	-	-	12	0.6	-	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
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
SRC-1-SW	07/23/13		39700	2290	51700	7230	110	<u>40</u>	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 ^D		34000	2700	46000	4800	87	<u>53</u>	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	<u>54</u>	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 ^D		40000	1900	42000	4700	95	<u>46</u>	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
COB-A-SW	07/23/13		94700	27000	336000	34900	150	<u>740</u>	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	<u>160</u>	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 COLLECTED																												
COB-B-SW	07/27/15		DRY - NO SAMPLE COLLECTED																												
COB-4-SW	12/22/14		20000	1600	34000	3600	53	<u>47</u>	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	<u>100</u>	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
COB-6-SW	07/23/13		69200	5110	98900	9820	81	<u>170</u>	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	<u>56</u>	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	<u>91</u>	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	5.50	4.46	0.750	0.501	7.71	7.96
WB-1-SW	07/23/13		5750000	210000	323000	667000	83	<u>1500</u>	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
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
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

NOTES:
 D - 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 value for NH3 is based on a pH 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 - Guideline value for cadmium is based on hardness

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

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

TABLE A-4
 SURFACE WATER ANALYTICAL RESULTS - GENERAL
 LTMM SURFACE WATER QUALITY MONITORING PROC

Sample Location	Sample Date	Al	Sb	As	Ba	Be	Bi	B	Cd	Cr	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Sr	Ag	Si	Ti	Sn	Te	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	
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	Variable ⁶	1 ⁴	-	-	300	-	-	0.026	73	-	1	0.1	-	0.8	-	-	15	-	30
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
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
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	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 ^D	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 ^D	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
COB-A-SW	07/23/13	17.2	<1.0	<1	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 COLLECTED																									
COB-B-SW	07/27/15	DRY - NO SAMPLE COLLECTED																									
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
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
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
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	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
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

NOTES:
 D - 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 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 - Guideline value for cadmium is based on hardness

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
 Italic 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 B
LABORATORY CERTIFICATES

Your P.O. #: 4104251070
Your Project #: SW PROGRAM
Your C.O.C. #: 498021

Attention:Nadine Wambolt

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

Report Date: 2015/08/06
Report #: R3619680
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5E7991

Received: 2015/07/27, 16:50

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Carbonate, Bicarbonate and Hydroxide (1)	9	N/A	2015/08/05	N/A	SM 22 4500-CO2 D
Alkalinity (1)	9	N/A	2015/08/04	ATL SOP 00013	EPA 310.2 R1974 m
Chloride (1)	9	N/A	2015/08/04	ATL SOP 00014	SM 22 4500-Cl- E m
Colour (1)	9	N/A	2015/08/04	ATL SOP 00020	SM 22 2120C m
Conductance - water (1)	9	N/A	2015/08/04	ATL SOP 00004	SM 22 2510B m
TEH in Water (PIRI) (1)	4	2015/07/30	2015/07/31	ATL SOP 00113	Atl. RBCA v3 m
TEH in Water (PIRI) (1)	6	2015/07/31	2015/07/31	ATL SOP 00113	Atl. RBCA v3 m
Hardness (calculated as CaCO3) (1)	5	N/A	2015/08/02	ATL SOP 00048	SM 22 2340 B
Hardness (calculated as CaCO3) (1)	4	N/A	2015/08/05	ATL SOP 00048	SM 22 2340 B
Mercury - Total (CVAA,LL) (1)	9	2015/07/31	2015/07/31	ATL SOP 00026	EPA 245.1 R3 m
Metals Water Total MS (1)	5	2015/07/31	2015/08/01	ATL SOP 00058	EPA 6020A R1 m
Metals Water Total MS (1)	4	2015/07/31	2015/08/04	ATL SOP 00058	EPA 6020A R1 m
Ion Balance (% Difference) (1)	9	N/A	2015/08/05		Auto Calc.
Anion and Cation Sum (1)	9	N/A	2015/08/05		Auto Calc.
Nitrogen Ammonia - water (1)	9	N/A	2015/07/30	ATL SOP 00015	EPA 350.1 R2 m
Nitrogen - Nitrate + Nitrite (1)	9	N/A	2015/08/05	ATL SOP 00016	USGS SOPINCF0452.2 m
Nitrogen - Nitrite (1)	9	N/A	2015/08/04	ATL SOP 00017	SM 22 4500-NO2- B m
Nitrogen - Nitrate (as N) (1)	9	N/A	2015/08/05	ATL SOP 00018	ASTM D3867
PAH in Water by GC/MS (SIM) (1)	2	2015/07/31	2015/08/05	ATL SOP 00103	EPA 8270D 2007 m
PAH in Water by GC/MS (SIM) (1)	7	2015/07/31	2015/08/06	ATL SOP 00103	EPA 8270D 2007 m
PCBs in water by GC/ECD (1)	9	2015/07/30	2015/07/31	ATL SOP 00107	EPA 8082A m
PCB Aroclor sum (water) (1)	9	N/A	2015/07/31		Auto Calc.
pH (1, 2)	9	N/A	2015/08/04	ATL SOP 00003	SM 22 4500-H+ B m
Phosphorus - ortho (1)	9	N/A	2015/08/04	ATL SOP 00021	EPA 365.2 m
VPH in Water (PIRI) (1)	10	N/A	2015/08/05	ATL SOP 00118	Atl. RBCA v3 m
Sat. pH and Langelier Index (@ 20C) (1)	9	N/A	2015/08/05	ATL SOP 00049	Auto Calc.
Sat. pH and Langelier Index (@ 4C) (1)	9	N/A	2015/08/05	ATL SOP 00049	Auto Calc.
Reactive Silica (1)	9	N/A	2015/08/04	ATL SOP 00022	EPA 366.0 m
Sulphate (1)	9	N/A	2015/08/05	ATL SOP 00023	EPA 375.4 R1978 m
Total Dissolved Solids (TDS calc) (1)	9	N/A	2015/08/05		Auto Calc.

Your P.O. #: 4104251070
Your Project #: SW PROGRAM
Your C.O.C. #: 498021

Attention:Nadine Wambolt

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

Report Date: 2015/08/06
Report #: R3619680
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5E7991

Received: 2015/07/27, 16:50

Sample Matrix: Water
Samples Received: 10

Analyses	Date		Laboratory Method	Reference
	Quantity	Extracted		
Organic carbon - Total (TOC) (1, 3)	3	N/A	2015/07/31 ATL SOP 00037	SM 22 5310C m
Organic carbon - Total (TOC) (1, 3)	6	N/A	2015/08/04 ATL SOP 00037	SM 22 5310C m
ModTPH (T1) Calc. for Water (1)	10	N/A	2015/08/06 N/A	Atl. RBCA v3 m
Turbidity (1)	9	N/A	2015/08/05 ATL SOP 00011	EPA 180.1 R2 m

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.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Natalie MacAskill, Sr. Project Manager
Email: NMacAskill@maxxam.ca
Phone# (902)567-1255 Ext:17

=====

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.

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

RESULTS OF ANALYSES OF WATER

Maxxam ID		ARU014	ARU015		ARU016			ARU017		
Sampling Date		2015/07/27	2015/07/27		2015/07/27			2015/07/27		
COC Number		498021	498021		498021			498021		
	Units	COB-4-SW	COB-6-SW	RDL	CB-SW	RDL	QC Batch	SRC-1-SW	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	5.65	5.50	N/A	3.81	N/A	4123278	4.49	N/A	4123278
Bicarb. Alkalinity (calc. as CaCO ₃)	mg/L	93	91	1.0	95	1.0	4123275	95	1.0	4123275
Calculated TDS	mg/L	330	320	1.0	220	1.0	4123283	250	1.0	4123283
Carb. Alkalinity (calc. as CaCO ₃)	mg/L	<1.0	2.5	1.0	<1.0	1.0	4123275	<1.0	1.0	4123275
Cation Sum	me/L	5.20	5.03	N/A	3.69	N/A	4123278	4.10	N/A	4123278
Hardness (CaCO ₃)	mg/L	180	160	1.0	99	1.0	4123276	120	1.0	4123276
Ion Balance (% Difference)	%	4.15	4.46	N/A	1.60	N/A	4123277	4.54	N/A	4123277
Langelier Index (@ 20C)	N/A	0.0360	0.750		0.0480		4123281	-0.157		4123281
Langelier Index (@ 4C)	N/A	-0.213	0.501		-0.201		4123282	-0.407		4123282
Nitrate (N)	mg/L	0.31	0.18	0.050	<0.050	0.050	4123279	0.092	0.050	4123279
Saturation pH (@ 20C)	N/A	7.68	7.71		7.90		4123281	7.82		4123281
Saturation pH (@ 4C)	N/A	7.93	7.96		8.15		4123282	8.07		4123282
Inorganics										
Total Alkalinity (Total as CaCO ₃)	mg/L	94	93	5.0	96	10	4129962	95	5.0	4129962
Dissolved Chloride (Cl)	mg/L	58	61	1.0	55	1.0	4129965	57	1.0	4129965
Colour	TCU	11	10	5.0	9.4	5.0	4129973	16	5.0	4129973
Nitrate + Nitrite	mg/L	0.33	0.19	0.050	<0.050	0.050	4129977	0.092	0.050	4129977
Nitrite (N)	mg/L	0.013	0.015	0.010	<0.010	0.010	4129978	<0.010	0.010	4129978
Nitrogen (Ammonia Nitrogen)	mg/L	<0.050	<0.050	0.050	0.087	0.050	4127762	0.079	0.050	4127770
Total Organic Carbon (C)	mg/L	4.1	3.7	0.50	2.0	0.50	4129571	5.0	0.50	4132249
Orthophosphate (P)	mg/L	<0.010	<0.010	0.010	0.12	0.010	4129976	<0.010	0.010	4129976
pH	pH	7.72	8.46	N/A	7.95	N/A	4132609	7.66	N/A	4132609
Reactive Silica (SiO ₂)	mg/L	8.5	8.4	0.50	10	0.50	4129968	6.7	0.50	4129968
Dissolved Sulphate (SO ₄)	mg/L	100	91	10	16	2.0	4129966	47	10	4129966
Turbidity	NTU	1.8	0.98	0.10	1.1	0.10	4134421	1.6	0.10	4134421
Conductivity	uS/cm	530	520	1.0	380	1.0	4132613	430	1.0	4132613
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
N/A = Not Applicable										

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

RESULTS OF ANALYSES OF WATER

Maxxam ID		ARU018			ARU019			ARU020		
Sampling Date		2015/07/27			2015/07/27			2015/07/27		
COC Number		498021			498021			498021		
	Units	NRC-1-SW	RDL	QC Batch	NARROWS	RDL	QC Batch	WB-1-SW	RDL	QC Batch
Calculated Parameters										
Anion Sum	me/L	2.16	N/A	4123278	383	N/A	4123278	1.68	N/A	4123919
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	44	1.0	4123275	90	1.0	4123275	28	1.0	4123916
Calculated TDS	mg/L	130	1.0	4123283	23000	1.0	4123283	98	1.0	4123924
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	4123275	<1.0	1.0	4123275	<1.0	1.0	4123916
Cation Sum	me/L	2.05	N/A	4123278	409	N/A	4123278	1.68	N/A	4123919
Hardness (CaCO3)	mg/L	56	1.0	4123276	4400	1.0	4123276	39	1.0	4123917
Ion Balance (% Difference)	%	2.61	N/A	4123277	3.36	N/A	4123277	0.00	N/A	4123918
Langelier Index (@ 20C)	N/A	-0.963		4123281	0.502		4123281	-1.37		4123922
Langelier Index (@ 4C)	N/A	-1.21		4123282	0.265		4123282	-1.62		4123923
Nitrate (N)	mg/L	0.077	0.050	4123279	0.067	0.050	4123279	0.16	0.050	4123920
Saturation pH (@ 20C)	N/A	8.43		4123281	7.45		4123281	8.82		4123922
Saturation pH (@ 4C)	N/A	8.68		4123282	7.69		4123282	9.07		4123923
Inorganics										
Total Alkalinity (Total as CaCO3)	mg/L	44	5.0	4129962	91	5.0	4129962	28	5.0	4129962
Dissolved Chloride (Cl)	mg/L	29	1.0	4129965	13000	120	4129965	32	1.0	4129965
Colour	TCU	42	5.0	4129973	7.4	5.0	4129973	51	25	4129973
Nitrate + Nitrite	mg/L	0.077	0.050	4129977	0.067	0.050	4129977	0.18	0.050	4129977
Nitrite (N)	mg/L	<0.010	0.010	4129978	<0.010	0.010	4129978	0.016	0.010	4129978
Nitrogen (Ammonia Nitrogen)	mg/L	0.077	0.050	4127770	0.067	0.050	4127770	0.18	0.050	4127770
Total Organic Carbon (C)	mg/L	5.8	0.50	4132249	<5.0 (1)	5.0	4132249	6.3	0.50	4132249
Orthophosphate (P)	mg/L	<0.010	0.010	4129976	<0.010	0.010	4129976	0.023	0.010	4129976
pH	pH	7.47	N/A	4132609	7.96	N/A	4132609	7.44	N/A	4132609
Reactive Silica (SiO2)	mg/L	6.0	0.50	4129968	1.2	0.50	4129968	3.6	0.50	4129968
Dissolved Sulphate (SO4)	mg/L	22	2.0	4129966	1300	240	4129966	10	2.0	4129966
Turbidity	NTU	2.4	0.10	4134421	0.36	0.10	4134429	0.82	0.10	4134429
Conductivity	uS/cm	220	1.0	4132613	37000	1.0	4132613	170	1.0	4132613
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Elevated reporting limit due to sample matrix.										

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

RESULTS OF ANALYSES OF WATER

Maxxam ID		ARU021			ARU022		
Sampling Date		2015/07/27			2015/07/27		
COC Number		498021			498021		
	Units	BP-1-SW	RDL	QC Batch	FD-009	RDL	QC Batch
Calculated Parameters							
Anion Sum	me/L	393	N/A	4123919	4.41	N/A	4123919
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	87	1.0	4123916	94	1.0	4123916
Calculated TDS	mg/L	23000	1.0	4123924	250	1.0	4123924
Carb. Alkalinity (calc. as CaCO3)	mg/L	<1.0	1.0	4123916	<1.0	1.0	4123916
Cation Sum	me/L	401	N/A	4123919	4.26	N/A	4123919
Hardness (CaCO3)	mg/L	4300	1.0	4123917	120	1.0	4123917
Ion Balance (% Difference)	%	0.970	N/A	4123918	1.73	N/A	4123918
Langelier Index (@ 20C)	N/A	0.369		4123922	-0.0240		4123922
Langelier Index (@ 4C)	N/A	0.131		4123923	-0.273		4123923
Nitrate (N)	mg/L	0.11	0.050	4123920	0.092	0.050	4123920
Saturation pH (@ 20C)	N/A	7.46		4123922	7.81		4123922
Saturation pH (@ 4C)	N/A	7.70		4123923	8.06		4123923
Inorganics							
Total Alkalinity (Total as CaCO3)	mg/L	88	5.0	4129962	95	5.0	4129962
Dissolved Chloride (Cl)	mg/L	13000	120	4129965	55	1.0	4129965
Colour	TCU	6.8	5.0	4129973	17	5.0	4129973
Nitrate + Nitrite	mg/L	0.12	0.050	4129977	0.092	0.050	4129977
Nitrite (N)	mg/L	0.011	0.010	4129978	<0.010	0.010	4129978
Nitrogen (Ammonia Nitrogen)	mg/L	0.050	0.050	4127770	0.084	0.050	4127770
Total Organic Carbon (C)	mg/L	<5.0 (1)	5.0	4132249	5.0	0.50	4132249
Orthophosphate (P)	mg/L	0.018	0.010	4129976	<0.010	0.010	4129976
pH	pH	7.83	N/A	4132609	7.79	N/A	4132609
Reactive Silica (SiO2)	mg/L	1.1	0.50	4129968	6.6	0.50	4129968
Dissolved Sulphate (SO4)	mg/L	1500	100	4129966	46	10	4129966
Turbidity	NTU	0.60	0.10	4134415	1.5	0.10	4134429
Conductivity	uS/cm	37000	1.0	4132613	430	1.0	4132613
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable (1) Elevated reporting limit due to sample matrix.							

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

MERCURY BY COLD VAPOUR AA (WATER)

Maxxam ID		ARU014	ARU015	ARU016	ARU017	ARU018	ARU019	ARU020		
Sampling Date		2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27		
COC Number		498021	498021	498021	498021	498021	498021	498021		
	Units	COB-4-SW	COB-6-SW	CB-SW	SRC-1-SW	NRC-1-SW	NARROWS	WB-1-SW	RDL	QC Batch
Metals										
Total Mercury (Hg)	ug/L	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	0.013	4130003
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

Maxxam ID		ARU021	ARU022		
Sampling Date		2015/07/27	2015/07/27		
COC Number		498021	498021		
	Units	BP-1-SW	FD-009	RDL	QC Batch
Metals					
Total Mercury (Hg)	ug/L	<0.013	<0.013	0.013	4130003
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		ARU014	ARU015	ARU016	ARU017	ARU018		ARU019		
Sampling Date		2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27		2015/07/27		
COC Number		498021	498021	498021	498021	498021		498021		
	Units	COB-4-SW	COB-6-SW	CB-SW	SRC-1-SW	NRC-1-SW	RDL	NARROWS	RDL	QC Batch

Metals										
Total Aluminum (Al)	ug/L	51	39	28	51	45	5.0	140	50	4128128
Total Antimony (Sb)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<10	10	4128128
Total Arsenic (As)	ug/L	<1.0	<1.0	<1.0	1.0	<1.0	1.0	<10	10	4128128
Total Barium (Ba)	ug/L	32	29	52	16	11	1.0	21	10	4128128
Total Beryllium (Be)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<10	10	4128128
Total Bismuth (Bi)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<20	20	4128128
Total Boron (B)	ug/L	60	52	<50	63	<50	50	3100	500	4128128
Total Cadmium (Cd)	ug/L	<0.010	<0.010	<0.010	0.013	0.019	0.010	<0.10	0.10	4128128
Total Calcium (Ca)	ug/L	60000	57000	33000	41000	19000	100	300000	1000	4128128
Total Chromium (Cr)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<10	10	4128128
Total Cobalt (Co)	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	<4.0	4.0	4128128
Total Copper (Cu)	ug/L	<2.0	2.2	<2.0	24	<2.0	2.0	<20	20	4128128
Total Iron (Fe)	ug/L	460	160	260	210	1300	50	<500	500	4128128
Total Lead (Pb)	ug/L	<0.50	<0.50	<0.50	1.1	<0.50	0.50	<5.0	5.0	4128128
Total Magnesium (Mg)	ug/L	6300	5000	4300	4300	2100	100	900000	1000	4128128
Total Manganese (Mn)	ug/L	110	23	61	260	75	2.0	100	20	4128128
Total Molybdenum (Mo)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<20	20	4128128
Total Nickel (Ni)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<20	20	4128128
Total Phosphorus (P)	ug/L	<100	<100	210	<100	<100	100	<1000	1000	4128128
Total Potassium (K)	ug/L	2900	2600	1800	1800	480	100	270000	1000	4128128
Total Selenium (Se)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<10	10	4128128
Total Silver (Ag)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<1.0	1.0	4128128
Total Sodium (Na)	ug/L	37000	39000	38000	38000	20000	100	7200000	1000	4128128
Total Strontium (Sr)	ug/L	250	300	320	150	54	2.0	5400	20	4128128
Total Thallium (Tl)	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<1.0	1.0	4128128
Total Tin (Sn)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<20	20	4128128
Total Titanium (Ti)	ug/L	2.1	<2.0	<2.0	2.4	<2.0	2.0	<20	20	4128128
Total Uranium (U)	ug/L	0.35	0.34	<0.10	0.29	<0.10	0.10	2.2	1.0	4128128
Total Vanadium (V)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<20	20	4128128
Total Zinc (Zn)	ug/L	10	7.4	9.0	9.5	11	5.0	<50	50	4128128

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

ELEMENTS BY ICP/MS (WATER)

Maxxam ID		ARU020		ARU021		ARU022		
Sampling Date		2015/07/27		2015/07/27		2015/07/27		
COC Number		498021		498021		498021		
	Units	WB-1-SW	RDL	BP-1-SW	RDL	FD-009	RDL	QC Batch
Metals								
Total Aluminum (Al)	ug/L	89	5.0	86	50	51	5.0	4128128
Total Antimony (Sb)	ug/L	<1.0	1.0	<10	10	<1.0	1.0	4128128
Total Arsenic (As)	ug/L	<1.0	1.0	<10	10	1.0	1.0	4128128
Total Barium (Ba)	ug/L	18	1.0	19	10	17	1.0	4128128
Total Beryllium (Be)	ug/L	<1.0	1.0	<10	10	<1.0	1.0	4128128
Total Bismuth (Bi)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Boron (B)	ug/L	<50	50	2900	500	64	50	4128128
Total Cadmium (Cd)	ug/L	0.012	0.010	<0.10	0.10	0.015	0.010	4128128
Total Calcium (Ca)	ug/L	12000	100	300000	1000	42000	100	4128128
Total Chromium (Cr)	ug/L	<1.0	1.0	<10	10	1.5	1.0	4128128
Total Cobalt (Co)	ug/L	<0.40	0.40	<4.0	4.0	<0.40	0.40	4128128
Total Copper (Cu)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Iron (Fe)	ug/L	480	50	<500	500	190	50	4128128
Total Lead (Pb)	ug/L	<0.50	0.50	<5.0	5.0	<0.50	0.50	4128128
Total Magnesium (Mg)	ug/L	2200	100	870000	1000	4700	100	4128128
Total Manganese (Mn)	ug/L	41	2.0	59	20	260	2.0	4128128
Total Molybdenum (Mo)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Nickel (Ni)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Phosphorus (P)	ug/L	<100	100	<1000	1000	<100	100	4128128
Total Potassium (K)	ug/L	860	100	260000	1000	1900	100	4128128
Total Selenium (Se)	ug/L	<1.0	1.0	<10	10	<1.0	1.0	4128128
Total Silver (Ag)	ug/L	<0.10	0.10	<1.0	1.0	<0.10	0.10	4128128
Total Sodium (Na)	ug/L	19000	100	7100000	1000	40000	100	4128128
Total Strontium (Sr)	ug/L	100	2.0	5300	20	150	2.0	4128128
Total Thallium (Tl)	ug/L	<0.10	0.10	<1.0	1.0	<0.10	0.10	4128128
Total Tin (Sn)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Titanium (Ti)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Uranium (U)	ug/L	<0.10	0.10	2.1	1.0	0.32	0.10	4128128
Total Vanadium (V)	ug/L	<2.0	2.0	<20	20	<2.0	2.0	4128128
Total Zinc (Zn)	ug/L	7.9	5.0	<50	50	8.4	5.0	4128128
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

Maxxam Job #: B5E7991
Report Date: 2015/08/06

Dillon Consulting Limited
Client Project #: SW PROGRAM
Your P.O. #: 4104251070

SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		ARU014	ARU015	ARU016	ARU017	ARU018	ARU019	ARU020		
Sampling Date		2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27		
COC Number		498021	498021	498021	498021	498021	498021	498021		
	Units	COB-4-SW	COB-6-SW	CB-SW	SRC-1-SW	NRC-1-SW	NARROWS	WB-1-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	4132202
2-Methylnaphthalene	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4132202
Acenaphthene	ug/L	0.011	<0.010	0.066	<0.010	0.014	0.035	<0.010	0.010	4132202
Acenaphthylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	0.037	<0.010	0.010	4132202
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(a)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Chrysene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Fluoranthene	ug/L	0.014	<0.010	0.017	<0.010	<0.010	0.016	<0.010	0.010	4132202
Fluorene	ug/L	<0.010	<0.010	0.039	<0.010	<0.010	0.033	<0.010	0.010	4132202
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Naphthalene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	4132202
Perylene	ug/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	4132202
Phenanthrene	ug/L	0.010	<0.010	0.017	<0.010	0.011	0.026	<0.010	0.010	4132202
Pyrene	ug/L	0.012	<0.010	0.016	<0.010	<0.010	0.014	<0.010	0.010	4132202
Surrogate Recovery (%)										
D10-Anthracene	%	69	66	63	67	68	64	61		4132202
D14-Terphenyl	%	78	71	77	73	75	76	70		4132202
D8-Acenaphthylene	%	67	65	68	68	70	68	69		4132202
RDL = Reportable Detection Limit QC Batch = Quality Control Batch										

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SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

Maxxam ID		ARU021	ARU022		
Sampling Date		2015/07/27	2015/07/27		
COC Number		498021	498021		
	Units	BP-1-SW	FD-009	RDL	QC Batch
Polyaromatic Hydrocarbons					
1-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	4132202
2-Methylnaphthalene	ug/L	<0.050	<0.050	0.050	4132202
Acenaphthene	ug/L	0.014	<0.010	0.010	4132202
Acenaphthylene	ug/L	0.018	<0.010	0.010	4132202
Anthracene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(a)anthracene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(a)pyrene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(b)fluoranthene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(g,h,i)perylene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(j)fluoranthene	ug/L	<0.010	<0.010	0.010	4132202
Benzo(k)fluoranthene	ug/L	<0.010	<0.010	0.010	4132202
Chrysene	ug/L	<0.010	<0.010	0.010	4132202
Dibenz(a,h)anthracene	ug/L	<0.010	<0.010	0.010	4132202
Fluoranthene	ug/L	<0.010	<0.010	0.010	4132202
Fluorene	ug/L	0.015	<0.010	0.010	4132202
Indeno(1,2,3-cd)pyrene	ug/L	<0.010	<0.010	0.010	4132202
Naphthalene	ug/L	<0.20	<0.20	0.20	4132202
Perylene	ug/L	<0.010	<0.010	0.010	4132202
Phenanthrene	ug/L	0.015	<0.010	0.010	4132202
Pyrene	ug/L	<0.010	<0.010	0.010	4132202
Surrogate Recovery (%)					
D10-Anthracene	%	69	68		4132202
D14-Terphenyl	%	71	76		4132202
D8-Acenaphthylene	%	71	67		4132202
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		ARU014	ARU015	ARU016	ARU017		ARU018		
Sampling Date		2015/07/27	2015/07/27	2015/07/27	2015/07/27		2015/07/27		
COC Number		498021	498021	498021	498021		498021		
	Units	COB-4-SW	COB-6-SW	CB-SW	SRC-1-SW	QC Batch	NRC-1-SW	RDL	QC Batch
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	4132618	<0.0010	0.0010	4132618
Toluene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	4132618	<0.0010	0.0010	4132618
Ethylbenzene	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	4132618	<0.0010	0.0010	4132618
Total Xylenes	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	4132618	<0.0020	0.0020	4132618
C6 - C10 (less BTEX)	mg/L	<0.010	<0.010	<0.010	<0.010	4132618	<0.010	0.010	4132618
>C10-C16 Hydrocarbons	mg/L	<0.050	<0.050	<0.050	<0.050	4127272	<0.050	0.050	4129144
>C16-C21 Hydrocarbons	mg/L	<0.050	<0.050	<0.050	<0.050	4127272	<0.050	0.050	4129144
>C21-<C32 Hydrocarbons	mg/L	<0.10	<0.10	<0.10	<0.10	4127272	<0.10	0.10	4129144
Modified TPH (Tier1)	mg/L	<0.10	<0.10	<0.10	<0.10	4123272	<0.10	0.10	4123272
Reached Baseline at C32	mg/L	NA	NA	NA	NA	4127272	NA	N/A	4129144
Hydrocarbon Resemblance	mg/L	NA	NA	NA	NA	4127272	NA	N/A	4129144
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	73	79	74	79	4127272	107		4129144
n-Dotriacontane - Extractable	%	123	126	126	128	4127272	108		4129144
Isobutylbenzene - Volatile	%	99	97	97	98	4132618	97		4132618
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable									

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ATLANTIC RBCA HYDROCARBONS (WATER)

Maxxam ID		ARU019	ARU020		ARU021	ARU022	ARU035		
Sampling Date		2015/07/27	2015/07/27		2015/07/27	2015/07/27	2015/07/27		
COC Number		498021	498021		498021	498021			
	Units	NARROWS	WB-1-SW	QC Batch	BP-1-SW	FD-009	TB-010	RDL	QC Batch
Petroleum Hydrocarbons									
Benzene	mg/L	<0.0010	<0.0010	4132618	<0.0010	<0.0010	<0.0010	0.0010	4132618
Toluene	mg/L	<0.0010	<0.0010	4132618	<0.0010	<0.0010	<0.0010	0.0010	4132618
Ethylbenzene	mg/L	<0.0010	<0.0010	4132618	<0.0010	<0.0010	<0.0010	0.0010	4132618
Total Xylenes	mg/L	<0.0020	<0.0020	4132618	<0.0020	<0.0020	<0.0020	0.0020	4132618
C6 - C10 (less BTEX)	mg/L	<0.010	<0.010	4132618	<0.010	<0.010	<0.010	0.010	4132618
>C10-C16 Hydrocarbons	mg/L	<0.050	<0.050	4129144	<0.050	<0.050	<0.050	0.050	4129144
>C16-C21 Hydrocarbons	mg/L	<0.050	<0.050	4129144	<0.050	<0.050	<0.050	0.050	4129144
>C21-<C32 Hydrocarbons	mg/L	<0.10	<0.10	4129144	<0.10	<0.10	<0.10	0.10	4129144
Modified TPH (Tier1)	mg/L	<0.10	<0.10	4123272	<0.10	<0.10	<0.10	0.10	4123925
Reached Baseline at C32	mg/L	NA	NA	4129144	NA	NA	NA	N/A	4129144
Hydrocarbon Resemblance	mg/L	NA	NA	4129144	NA	NA	NA	N/A	4129144
Surrogate Recovery (%)									
Isobutylbenzene - Extractable	%	107	108	4129144	107	103	98		4129144
n-Dotriacontane - Extractable	%	111	113	4129144	112	108	107		4129144
Isobutylbenzene - Volatile	%	93	96	4132618	92	97	97		4132618
RDL = Reportable Detection Limit QC Batch = Quality Control Batch N/A = Not Applicable									

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POLYCHLORINATED BIPHENYLS BY GC-ECD (WATER)

Maxxam ID		ARU014	ARU015	ARU016	ARU017	ARU018	ARU019	ARU020		
Sampling Date		2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27	2015/07/27		
COC Number		498021	498021	498021	498021	498021	498021	498021		
	Units	COB-4-SW	COB-6-SW	CB-SW	SRC-1-SW	NRC-1-SW	NARROWS	WB-1-SW	RDL	QC Batch
PCBs										
Aroclor 1016	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1221	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1232	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1248	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1242	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1254	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Aroclor 1260	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4127263
Calculated Total PCB	ug/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	4123921
Surrogate Recovery (%)										
Decachlorobiphenyl	%	71	80	78	63	63	74	58		4127263
RDL = Reportable Detection Limit QC Batch = Quality Control Batch										

Maxxam ID		ARU021	ARU022		
Sampling Date		2015/07/27	2015/07/27		
COC Number		498021	498021		
	Units	BP-1-SW	FD-009	RDL	QC Batch
PCBs					
Aroclor 1016	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1221	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1232	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1248	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1242	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1254	ug/L	<0.050	<0.050	0.050	4127263
Aroclor 1260	ug/L	<0.050	<0.050	0.050	4127263
Calculated Total PCB	ug/L	<0.050	<0.050	0.050	4123921
Surrogate Recovery (%)					
Decachlorobiphenyl	%	71	82		4127263
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

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GENERAL COMMENTS

Sample ARU019-01 : Elevated reporting limits for trace metals due to sample matrix.

Sample ARU021-01 : Elevated reporting limits for trace metals due to sample matrix.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	Units	QC Limits	
4127263	LGE	Matrix Spike [ARU015-07]	Decachlorobiphenyl	2015/07/31		89	%	30 - 130	
			Aroclor 1254	2015/07/31		125	%	30 - 130	
4127263	LGE	Spiked Blank	Decachlorobiphenyl	2015/07/31		63	%	30 - 130	
			Aroclor 1254	2015/07/31		110	%	30 - 130	
4127263	LGE	Method Blank	Decachlorobiphenyl	2015/07/31		51	%	30 - 130	
			Aroclor 1016	2015/07/31	<0.050		ug/L		
			Aroclor 1221	2015/07/31	<0.050		ug/L		
			Aroclor 1232	2015/07/31	<0.050		ug/L		
			Aroclor 1248	2015/07/31	<0.050		ug/L		
			Aroclor 1242	2015/07/31	<0.050		ug/L		
			Aroclor 1254	2015/07/31	<0.050		ug/L		
			Aroclor 1260	2015/07/31	<0.050		ug/L		
4127263	LGE	RPD [ARU014-07]	Aroclor 1016	2015/07/31	NC		%	40	
			Aroclor 1221	2015/07/31	NC		%	40	
			Aroclor 1232	2015/07/31	NC		%	40	
			Aroclor 1248	2015/07/31	NC		%	40	
			Aroclor 1242	2015/07/31	NC		%	40	
			Aroclor 1254	2015/07/31	NC		%	40	
			Aroclor 1260	2015/07/31	NC		%	40	
4127272	AJS	Matrix Spike	Isobutylbenzene - Extractable	2015/07/31		84	%	30 - 130	
			n-Dotriacontane - Extractable	2015/07/31		107	%	30 - 130	
			>C10-C16 Hydrocarbons	2015/07/31		93	%	70 - 130	
			>C16-C21 Hydrocarbons	2015/07/31		103	%	70 - 130	
			>C21-<C32 Hydrocarbons	2015/07/31		104	%	70 - 130	
4127272	AJS	Spiked Blank	Isobutylbenzene - Extractable	2015/07/31		80	%	30 - 130	
			n-Dotriacontane - Extractable	2015/07/31		105	%	30 - 130	
			>C10-C16 Hydrocarbons	2015/07/31		89	%	70 - 130	
			>C16-C21 Hydrocarbons	2015/07/31		97	%	70 - 130	
			>C21-<C32 Hydrocarbons	2015/07/31		100	%	70 - 130	
4127272	AJS	Method Blank	Isobutylbenzene - Extractable	2015/07/31		72	%	30 - 130	
			n-Dotriacontane - Extractable	2015/07/31		107	%	30 - 130	
			>C10-C16 Hydrocarbons	2015/07/31	<0.050		mg/L		
			>C16-C21 Hydrocarbons	2015/07/31	<0.050		mg/L		
			>C21-<C32 Hydrocarbons	2015/07/31	<0.10		mg/L		
4127272	AJS	RPD	>C10-C16 Hydrocarbons	2015/07/31	NC		%	40	
			>C16-C21 Hydrocarbons	2015/07/31	NC		%	40	
			>C21-<C32 Hydrocarbons	2015/07/31	NC		%	40	
4127762	ARS	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2015/07/30		94	%	80 - 120	
4127762	ARS	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2015/07/30		95	%	80 - 120	
4127762	ARS	Method Blank	Nitrogen (Ammonia Nitrogen)	2015/07/30	<0.050		mg/L		
4127762	ARS	RPD	Nitrogen (Ammonia Nitrogen)	2015/07/30	NC		%	20	
4127770	ARS	Matrix Spike	Nitrogen (Ammonia Nitrogen)	2015/07/30		93	%	80 - 120	
4127770	ARS	Spiked Blank	Nitrogen (Ammonia Nitrogen)	2015/07/30		96	%	80 - 120	
4127770	ARS	Method Blank	Nitrogen (Ammonia Nitrogen)	2015/07/30	<0.050		mg/L		
4127770	ARS	RPD	Nitrogen (Ammonia Nitrogen)	2015/07/30	NC		%	20	
4128128	BAN	Matrix Spike	Total Aluminum (Al)	2015/08/01		100	%	80 - 120	
			Total Antimony (Sb)	2015/08/01		107	%	80 - 120	
			Total Arsenic (As)	2015/08/01		104	%	80 - 120	
			Total Barium (Ba)	2015/08/01		100	%	80 - 120	
			Total Beryllium (Be)	2015/08/01		104	%	80 - 120	
			Total Bismuth (Bi)	2015/08/01		102	%	80 - 120	
			Total Boron (B)	2015/08/01		102	%	80 - 120	
			Total Cadmium (Cd)	2015/08/01		106	%	80 - 120	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC			Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
Batch	Init	QC Type						
			Total Calcium (Ca)	2015/08/01		101	%	80 - 120
			Total Chromium (Cr)	2015/08/01		102	%	80 - 120
			Total Cobalt (Co)	2015/08/01		101	%	80 - 120
			Total Copper (Cu)	2015/08/01		100	%	80 - 120
			Total Iron (Fe)	2015/08/01		103	%	80 - 120
			Total Lead (Pb)	2015/08/01		102	%	80 - 120
			Total Magnesium (Mg)	2015/08/01		104	%	80 - 120
			Total Manganese (Mn)	2015/08/01		104	%	80 - 120
			Total Molybdenum (Mo)	2015/08/01		105	%	80 - 120
			Total Nickel (Ni)	2015/08/01		102	%	80 - 120
			Total Phosphorus (P)	2015/08/01		105	%	80 - 120
			Total Potassium (K)	2015/08/01		104	%	80 - 120
			Total Selenium (Se)	2015/08/01		100	%	80 - 120
			Total Silver (Ag)	2015/08/01		106	%	80 - 120
			Total Sodium (Na)	2015/08/01		NC	%	80 - 120
			Total Strontium (Sr)	2015/08/01		106	%	80 - 120
			Total Thallium (Tl)	2015/08/01		100	%	80 - 120
			Total Tin (Sn)	2015/08/01		106	%	80 - 120
			Total Titanium (Ti)	2015/08/01		106	%	80 - 120
			Total Uranium (U)	2015/08/01		108	%	80 - 120
			Total Vanadium (V)	2015/08/01		106	%	80 - 120
			Total Zinc (Zn)	2015/08/01		100	%	80 - 120
4128128	BAN	Spiked Blank	Total Aluminum (Al)	2015/08/01		100	%	80 - 120
			Total Antimony (Sb)	2015/08/01		101	%	80 - 120
			Total Arsenic (As)	2015/08/01		100	%	80 - 120
			Total Barium (Ba)	2015/08/01		98	%	80 - 120
			Total Beryllium (Be)	2015/08/01		102	%	80 - 120
			Total Bismuth (Bi)	2015/08/01		102	%	80 - 120
			Total Boron (B)	2015/08/01		100	%	80 - 120
			Total Cadmium (Cd)	2015/08/01		103	%	80 - 120
			Total Calcium (Ca)	2015/08/01		101	%	80 - 120
			Total Chromium (Cr)	2015/08/01		101	%	80 - 120
			Total Cobalt (Co)	2015/08/01		102	%	80 - 120
			Total Copper (Cu)	2015/08/01		101	%	80 - 120
			Total Iron (Fe)	2015/08/01		103	%	80 - 120
			Total Lead (Pb)	2015/08/01		102	%	80 - 120
			Total Magnesium (Mg)	2015/08/01		103	%	80 - 120
			Total Manganese (Mn)	2015/08/01		103	%	80 - 120
			Total Molybdenum (Mo)	2015/08/01		100	%	80 - 120
			Total Nickel (Ni)	2015/08/01		104	%	80 - 120
			Total Phosphorus (P)	2015/08/01		104	%	80 - 120
			Total Potassium (K)	2015/08/01		106	%	80 - 120
			Total Selenium (Se)	2015/08/01		98	%	80 - 120
			Total Silver (Ag)	2015/08/01		106	%	80 - 120
			Total Sodium (Na)	2015/08/01		102	%	80 - 120
			Total Strontium (Sr)	2015/08/01		104	%	80 - 120
			Total Thallium (Tl)	2015/08/01		101	%	80 - 120
			Total Tin (Sn)	2015/08/01		102	%	80 - 120
			Total Titanium (Ti)	2015/08/01		105	%	80 - 120
			Total Uranium (U)	2015/08/01		107	%	80 - 120
			Total Vanadium (V)	2015/08/01		103	%	80 - 120
			Total Zinc (Zn)	2015/08/01		101	%	80 - 120
4128128	BAN	Method Blank	Total Aluminum (Al)	2015/08/01	<5.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC			Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
Batch	Init	QC Type						
			Total Antimony (Sb)	2015/08/01	<1.0		ug/L	
			Total Arsenic (As)	2015/08/01	<1.0		ug/L	
			Total Barium (Ba)	2015/08/01	<1.0		ug/L	
			Total Beryllium (Be)	2015/08/01	<1.0		ug/L	
			Total Bismuth (Bi)	2015/08/01	<2.0		ug/L	
			Total Boron (B)	2015/08/01	<50		ug/L	
			Total Cadmium (Cd)	2015/08/01	<0.010		ug/L	
			Total Calcium (Ca)	2015/08/01	<100		ug/L	
			Total Chromium (Cr)	2015/08/01	<1.0		ug/L	
			Total Cobalt (Co)	2015/08/01	<0.40		ug/L	
			Total Copper (Cu)	2015/08/01	<2.0		ug/L	
			Total Iron (Fe)	2015/08/01	<50		ug/L	
			Total Lead (Pb)	2015/08/01	<0.50		ug/L	
			Total Magnesium (Mg)	2015/08/01	<100		ug/L	
			Total Manganese (Mn)	2015/08/01	<2.0		ug/L	
			Total Molybdenum (Mo)	2015/08/01	<2.0		ug/L	
			Total Nickel (Ni)	2015/08/01	<2.0		ug/L	
			Total Phosphorus (P)	2015/08/01	<100		ug/L	
			Total Potassium (K)	2015/08/01	<100		ug/L	
			Total Selenium (Se)	2015/08/01	<1.0		ug/L	
			Total Silver (Ag)	2015/08/01	<0.10		ug/L	
			Total Sodium (Na)	2015/08/01	<100		ug/L	
			Total Strontium (Sr)	2015/08/01	<2.0		ug/L	
			Total Thallium (Tl)	2015/08/01	<0.10		ug/L	
			Total Tin (Sn)	2015/08/01	<2.0		ug/L	
			Total Titanium (Ti)	2015/08/01	<2.0		ug/L	
			Total Uranium (U)	2015/08/01	<0.10		ug/L	
			Total Vanadium (V)	2015/08/01	<2.0		ug/L	
			Total Zinc (Zn)	2015/08/01	6.3,		ug/L	
					RDL=5.0			
4128128	BAN	RPD	Total Aluminum (Al)	2015/08/01	NC		%	20
			Total Antimony (Sb)	2015/08/01	NC		%	20
			Total Arsenic (As)	2015/08/01	0.37		%	20
			Total Barium (Ba)	2015/08/01	0.30		%	20
			Total Beryllium (Be)	2015/08/01	NC		%	20
			Total Bismuth (Bi)	2015/08/01	NC		%	20
			Total Boron (B)	2015/08/01	NC		%	20
			Total Cadmium (Cd)	2015/08/01	NC		%	20
			Total Calcium (Ca)	2015/08/01	0.89		%	20
			Total Chromium (Cr)	2015/08/01	NC		%	20
			Total Cobalt (Co)	2015/08/01	NC		%	20
			Total Copper (Cu)	2015/08/01	0.092		%	20
			Total Iron (Fe)	2015/08/01	NC		%	20
			Total Lead (Pb)	2015/08/01	NC		%	20
			Total Magnesium (Mg)	2015/08/01	0.58		%	20
			Total Manganese (Mn)	2015/08/01	NC		%	20
			Total Molybdenum (Mo)	2015/08/01	NC		%	20
			Total Nickel (Ni)	2015/08/01	NC		%	20
			Total Phosphorus (P)	2015/08/01	NC		%	20
			Total Potassium (K)	2015/08/01	1.4		%	20
			Total Selenium (Se)	2015/08/01	NC		%	20
			Total Silver (Ag)	2015/08/01	NC		%	20
			Total Sodium (Na)	2015/08/01	0.62		%	20

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			Total Strontium (Sr)	2015/08/01	1.2		%	20
			Total Thallium (Tl)	2015/08/01	NC		%	20
			Total Tin (Sn)	2015/08/01	NC		%	20
			Total Titanium (Ti)	2015/08/01	NC		%	20
			Total Uranium (U)	2015/08/01	0.70		%	20
			Total Vanadium (V)	2015/08/01	NC		%	20
			Total Zinc (Zn)	2015/08/01	3.1		%	20
4129144	KCR	Matrix Spike	Isobutylbenzene - Extractable	2015/07/31		105	%	30 - 130
			n-Dotriacontane - Extractable	2015/07/31		112	%	30 - 130
			>C10-C16 Hydrocarbons	2015/07/31		85	%	70 - 130
			>C16-C21 Hydrocarbons	2015/07/31		96	%	70 - 130
			>C21-<C32 Hydrocarbons	2015/07/31		97	%	70 - 130
4129144	KCR	Spiked Blank	Isobutylbenzene - Extractable	2015/08/04		81	%	30 - 130
			n-Dotriacontane - Extractable	2015/08/04		117	%	30 - 130
			>C10-C16 Hydrocarbons	2015/08/04		93	%	70 - 130
			>C16-C21 Hydrocarbons	2015/08/04		106	%	70 - 130
			>C21-<C32 Hydrocarbons	2015/08/04		111	%	70 - 130
4129144	KCR	Method Blank	Isobutylbenzene - Extractable	2015/07/31		93	%	30 - 130
			n-Dotriacontane - Extractable	2015/07/31		105	%	30 - 130
			>C10-C16 Hydrocarbons	2015/07/31	<0.050		mg/L	
			>C16-C21 Hydrocarbons	2015/07/31	<0.050		mg/L	
			>C21-<C32 Hydrocarbons	2015/07/31	<0.10		mg/L	
4129144	KCR	RPD	>C10-C16 Hydrocarbons	2015/07/31	NC (1)		%	40
			>C16-C21 Hydrocarbons	2015/07/31	NC (1)		%	40
			>C21-<C32 Hydrocarbons	2015/07/31	NC (1)		%	40
4129571	MCY	Matrix Spike [ARU016-04]	Total Organic Carbon (C)	2015/07/31		103	%	80 - 120
4129571	MCY	Spiked Blank	Total Organic Carbon (C)	2015/07/31		102	%	80 - 120
4129571	MCY	Method Blank	Total Organic Carbon (C)	2015/07/31	<0.50		mg/L	
4129571	MCY	RPD [ARU015-04]	Total Organic Carbon (C)	2015/07/31	0.027		%	20
4129962	ARS	Matrix Spike [ARU021-01]	Total Alkalinity (Total as CaCO3)	2015/08/04		NC	%	80 - 120
4129962	ARS	Spiked Blank	Total Alkalinity (Total as CaCO3)	2015/08/04		103	%	80 - 120
4129962	ARS	Method Blank	Total Alkalinity (Total as CaCO3)	2015/08/04	<5.0		mg/L	
4129962	ARS	RPD [ARU021-01]	Total Alkalinity (Total as CaCO3)	2015/08/04	0.63		%	25
4129965	MCN	Matrix Spike [ARU021-01]	Dissolved Chloride (Cl)	2015/08/04		NC	%	80 - 120
4129965	MCN	QC Standard	Dissolved Chloride (Cl)	2015/08/04		110	%	80 - 120
4129965	MCN	Spiked Blank	Dissolved Chloride (Cl)	2015/08/04		104	%	80 - 120
4129965	MCN	Method Blank	Dissolved Chloride (Cl)	2015/08/04	1.0, RDL=1.0		mg/L	
4129965	MCN	RPD [ARU021-01]	Dissolved Chloride (Cl)	2015/08/04	0.79		%	25
4129966	NRG	Matrix Spike [ARU021-01]	Dissolved Sulphate (SO4)	2015/08/05		NC	%	80 - 120
4129966	NRG	Spiked Blank	Dissolved Sulphate (SO4)	2015/08/05		115	%	80 - 120
4129966	NRG	Method Blank	Dissolved Sulphate (SO4)	2015/08/05	<2.0		mg/L	
4129966	NRG	RPD [ARU021-01]	Dissolved Sulphate (SO4)	2015/08/05	1.9		%	25
4129968	MCN	Matrix Spike [ARU021-01]	Reactive Silica (SiO2)	2015/08/04		94	%	80 - 120
4129968	MCN	Spiked Blank	Reactive Silica (SiO2)	2015/08/04		99	%	80 - 120
4129968	MCN	Method Blank	Reactive Silica (SiO2)	2015/08/04	<0.50		mg/L	
4129968	MCN	RPD [ARU021-01]	Reactive Silica (SiO2)	2015/08/04	NC		%	25
4129973	MCN	Spiked Blank	Colour	2015/08/04		99	%	80 - 120
4129973	MCN	Method Blank	Colour	2015/08/04	<5.0		TCU	
4129973	MCN	RPD [ARU021-01]	Colour	2015/08/04	NC		%	20
4129976	MCN	Matrix Spike [ARU021-01]	Orthophosphate (P)	2015/08/04		96	%	80 - 120
4129976	MCN	Spiked Blank	Orthophosphate (P)	2015/08/04		99	%	80 - 120
4129976	MCN	Method Blank	Orthophosphate (P)	2015/08/04	<0.010		mg/L	

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4129976	MCN	RPD [ARU021-01]	Orthophosphate (P)	2015/08/04	NC		%	25
4129977	MCN	Matrix Spike [ARU021-01]	Nitrate + Nitrite	2015/08/05		95	%	80 - 120
4129977	MCN	Spiked Blank	Nitrate + Nitrite	2015/08/05		96	%	80 - 120
4129977	MCN	Method Blank	Nitrate + Nitrite	2015/08/05	<0.050		mg/L	
4129977	MCN	RPD [ARU021-01]	Nitrate + Nitrite	2015/08/05	NC		%	25
4129978	MCN	Matrix Spike [ARU021-01]	Nitrite (N)	2015/08/04		102	%	80 - 120
4129978	MCN	Spiked Blank	Nitrite (N)	2015/08/04		99	%	80 - 120
4129978	MCN	Method Blank	Nitrite (N)	2015/08/04	<0.010		mg/L	
4129978	MCN	RPD [ARU021-01]	Nitrite (N)	2015/08/04	NC		%	25
4130003	VWA	Matrix Spike	Total Mercury (Hg)	2015/07/31		88	%	80 - 120
4130003	VWA	QC Standard	Total Mercury (Hg)	2015/07/31		98	%	N/A
4130003	VWA	Spiked Blank	Total Mercury (Hg)	2015/07/31		102	%	80 - 120
4130003	VWA	Method Blank	Total Mercury (Hg)	2015/07/31	<0.013		ug/L	
4130003	VWA	RPD	Total Mercury (Hg)	2015/07/31	NC		%	20
4132202	GTH	Matrix Spike	D10-Anthracene	2015/08/05		41 (2)	%	30 - 130
			D14-Terphenyl	2015/08/05		54	%	30 - 130
			D8-Acenaphthylene	2015/08/05		39 (2)	%	30 - 130
			1-Methylnaphthalene	2015/08/05		87	%	30 - 130
			2-Methylnaphthalene	2015/08/05		69	%	30 - 130
			Acenaphthene	2015/08/05		70	%	30 - 130
			Acenaphthylene	2015/08/05		65	%	30 - 130
			Anthracene	2015/08/05		65	%	30 - 130
			Benzo(a)anthracene	2015/08/05		75	%	30 - 130
			Benzo(a)pyrene	2015/08/05		65	%	30 - 130
			Benzo(b)fluoranthene	2015/08/05		63	%	30 - 130
			Benzo(g,h,i)perylene	2015/08/05		63	%	30 - 130
			Benzo(j)fluoranthene	2015/08/05		63	%	30 - 130
			Benzo(k)fluoranthene	2015/08/05		65	%	30 - 130
			Chrysene	2015/08/05		75	%	30 - 130
			Dibenz(a,h)anthracene	2015/08/05		64	%	30 - 130
			Fluoranthene	2015/08/05		74	%	30 - 130
			Fluorene	2015/08/05		71	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/08/05		64	%	30 - 130
			Naphthalene	2015/08/05		68	%	30 - 130
			Perylene	2015/08/05		65	%	30 - 130
			Phenanthrene	2015/08/05		68	%	30 - 130
			Pyrene	2015/08/05		72	%	30 - 130
4132202	GTH	Spiked Blank	D10-Anthracene	2015/08/05		102	%	30 - 130
			D14-Terphenyl	2015/08/05		120	%	30 - 130
			D8-Acenaphthylene	2015/08/05		105	%	30 - 130
			1-Methylnaphthalene	2015/08/05		108	%	30 - 130
			2-Methylnaphthalene	2015/08/05		108	%	30 - 130
			Acenaphthene	2015/08/05		121	%	30 - 130
			Acenaphthylene	2015/08/05		119	%	30 - 130
			Anthracene	2015/08/05		118	%	30 - 130
			Benzo(a)anthracene	2015/08/05		128	%	30 - 130
			Benzo(a)pyrene	2015/08/05		114	%	30 - 130
			Benzo(b)fluoranthene	2015/08/05		110	%	30 - 130
			Benzo(g,h,i)perylene	2015/08/05		117	%	30 - 130
			Benzo(j)fluoranthene	2015/08/05		114	%	30 - 130
			Benzo(k)fluoranthene	2015/08/05		117	%	30 - 130
			Chrysene	2015/08/05		127	%	30 - 130
			Dibenz(a,h)anthracene	2015/08/05		119	%	30 - 130

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4132202	GTH	Method Blank	Fluoranthene	2015/08/05		128	%	30 - 130
			Fluorene	2015/08/05		123	%	30 - 130
			Indeno(1,2,3-cd)pyrene	2015/08/05		116	%	30 - 130
			Naphthalene	2015/08/05		117	%	30 - 130
			Perylene	2015/08/05		117	%	30 - 130
			Phenanthrene	2015/08/05		124	%	30 - 130
			Pyrene	2015/08/05		126	%	30 - 130
			D10-Anthracene	2015/08/05		102	%	30 - 130
			D14-Terphenyl	2015/08/05		114	%	30 - 130
			D8-Acenaphthylene	2015/08/05		102	%	30 - 130
			1-Methylnaphthalene	2015/08/05	<0.050		ug/L	
			2-Methylnaphthalene	2015/08/05	<0.050		ug/L	
			Acenaphthene	2015/08/05	<0.010		ug/L	
			Acenaphthylene	2015/08/05	<0.010		ug/L	
			Anthracene	2015/08/05	<0.010		ug/L	
			Benzo(a)anthracene	2015/08/05	<0.010		ug/L	
			Benzo(a)pyrene	2015/08/05	<0.010		ug/L	
			Benzo(b)fluoranthene	2015/08/05	<0.010		ug/L	
			Benzo(g,h,i)perylene	2015/08/05	<0.010		ug/L	
			Benzo(j)fluoranthene	2015/08/05	<0.010		ug/L	
			Benzo(k)fluoranthene	2015/08/05	<0.010		ug/L	
			Chrysene	2015/08/05	<0.010		ug/L	
			Dibenz(a,h)anthracene	2015/08/05	<0.010		ug/L	
			Fluoranthene	2015/08/05	<0.010		ug/L	
			Fluorene	2015/08/05	<0.010		ug/L	
			Indeno(1,2,3-cd)pyrene	2015/08/05	<0.010		ug/L	
			Naphthalene	2015/08/05	<0.20		ug/L	
Perylene	2015/08/05	<0.010		ug/L				
Phenanthrene	2015/08/05	<0.010		ug/L				
Pyrene	2015/08/05	<0.010		ug/L				
4132202	GTH	RPD	1-Methylnaphthalene	2015/08/05	NC		%	40
			2-Methylnaphthalene	2015/08/05	NC		%	40
			Acenaphthene	2015/08/05	NC		%	40
			Acenaphthylene	2015/08/05	NC		%	40
			Anthracene	2015/08/05	NC		%	40
			Benzo(a)anthracene	2015/08/05	NC		%	40
			Benzo(a)pyrene	2015/08/05	NC		%	40
			Benzo(b)fluoranthene	2015/08/05	NC		%	40
			Benzo(g,h,i)perylene	2015/08/05	NC		%	40
			Benzo(j)fluoranthene	2015/08/05	NC		%	40
			Benzo(k)fluoranthene	2015/08/05	NC		%	40
			Chrysene	2015/08/05	NC		%	40
			Dibenz(a,h)anthracene	2015/08/05	NC		%	40
			Fluoranthene	2015/08/05	NC		%	40
			Fluorene	2015/08/05	NC		%	40
			Indeno(1,2,3-cd)pyrene	2015/08/05	NC		%	40
			Naphthalene	2015/08/05	NC		%	40
			Perylene	2015/08/05	NC		%	40
			Phenanthrene	2015/08/05	NC		%	40
			Pyrene	2015/08/05	NC		%	40
4132249	MCY	Matrix Spike [ARU020-04]	Total Organic Carbon (C)	2015/08/04		NC	%	80 - 120
4132249	MCY	Spiked Blank	Total Organic Carbon (C)	2015/08/04		98	%	80 - 120
4132249	MCY	Method Blank	Total Organic Carbon (C)	2015/08/04	<0.50		mg/L	

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4132249	MCY	RPD [ARU020-04]	Total Organic Carbon (C)	2015/08/04	1.2		%	20
4132609	KSR	QC Standard	pH	2015/08/04		99	%	97 - 103
4132609	KSR	RPD	pH	2015/08/04	0.14		%	N/A
4132613	KSR	Spiked Blank	Conductivity	2015/08/04		100	%	80 - 120
4132613	KSR	Method Blank	Conductivity	2015/08/04	1.0, RDL=1.0		uS/cm	
4132613	KSR	RPD	Conductivity	2015/08/04	0.34		%	25
4132618	MS3	Matrix Spike [ARU015-09]	Isobutylbenzene - Volatile	2015/08/05		98	%	70 - 130
			Benzene	2015/08/05		107	%	70 - 130
			Toluene	2015/08/05		107	%	70 - 130
			Ethylbenzene	2015/08/05		104	%	70 - 130
			Total Xylenes	2015/08/05		107	%	70 - 130
4132618	MS3	Spiked Blank	Isobutylbenzene - Volatile	2015/08/05		101	%	70 - 130
			Benzene	2015/08/05		100	%	70 - 130
			Toluene	2015/08/05		102	%	70 - 130
			Ethylbenzene	2015/08/05		103	%	70 - 130
			Total Xylenes	2015/08/05		102	%	70 - 130
4132618	MS3	Method Blank	Isobutylbenzene - Volatile	2015/08/05		100	%	70 - 130
			Benzene	2015/08/05	<0.0010		mg/L	
			Toluene	2015/08/05	<0.0010		mg/L	
			Ethylbenzene	2015/08/05	<0.0010		mg/L	
			Total Xylenes	2015/08/05	<0.0020		mg/L	
			C6 - C10 (less BTEX)	2015/08/05	<0.010		mg/L	
4132618	MS3	RPD [ARU014-09]	Benzene	2015/08/05	NC		%	40
			Toluene	2015/08/05	NC		%	40
			Ethylbenzene	2015/08/05	NC		%	40
			Total Xylenes	2015/08/05	NC		%	40
			C6 - C10 (less BTEX)	2015/08/05	NC		%	40
4134415	TMO	QC Standard	Turbidity	2015/08/05		106	%	80 - 120
4134415	TMO	Method Blank	Turbidity	2015/08/05	<0.10		NTU	
4134415	TMO	RPD [ARU021-01]	Turbidity	2015/08/05	8.7		%	25
4134421	TMO	QC Standard	Turbidity	2015/08/05		103	%	80 - 120
4134421	TMO	Method Blank	Turbidity	2015/08/05	<0.10		NTU	
4134421	TMO	RPD	Turbidity	2015/08/05	NC		%	25
4134429	TMO	QC Standard	Turbidity	2015/08/05		108	%	80 - 120
4134429	TMO	Method Blank	Turbidity	2015/08/05	<0.10		NTU	

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Batch	Init	QC Type						
4134429	TMO	RPD	Turbidity	2015/08/05	4.3		%	25
<p>N/A = Not Applicable</p> <p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.</p> <p>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.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).</p> <p>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 (one or both samples < 5x RDL).</p> <p>(1) Elevated TEH RDL(s) due to limited sample.</p> <p>(2) PAH surrogate(s) not within acceptance limits. Insufficient sample to repeat.</p>								

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VALIDATION SIGNATURE PAGE

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



Kevin MacDonald, Inorganics Supervisor



Rose 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.