Annex IV

Surface Water Quality Studies

Contents

WESA
A Better Environment For Business

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February 25, 2011
Project No. SB8931-14

Mr. Edmond Laratta
Xeneca Power Development Inc.
5160 Yonge Street, Suite 520
North York (GTA), Ontario
M2N 6L9

Attn: Edmond Laratta, Manager, Environmental Affairs
Email address: elaratta@xeneca.com

Re: Surface Water Quality Monitoring Program
Vermillion (Wabageshik Rapid), Ontario

Dear Mr. Laratta:

This letter report summarizes the surface water monitoring program completed on May 30 and August 4, 2010 at Vermillion (Wabageshik Rapid). It includes visual observations of each sampling event, sampling results, and conclusions.

BACKGROUND

WESA Inc. (WESA) was retained by Xeneca Power Development Inc (Xeneca) to prepare, manage data and report on the surface water sampling events completed on May 30 and August 4, 2010. As requested by Xeneca the onsite monitoring was conducted by Natural Resource Solutions Inc. (NRSI) in conjunction with their spring and summer sampling events. Onsite monitoring included sampling collection, water quality parameter collection and general field observations.

METHODOLOGY

A total of two sampling events (late spring and late summer) were conducted at two different locations (SW1 and SW3) at the Vermillion (Wabageshik Rapid) site. During the sampling events, general observations and characteristics of each sampling location was assessed and recorded (i.e. water level, current, colour and odour). The surface water monitoring and sampling at the site is summarized in Table 1 below.

Field parameters (pH, conductivity, temperature, and dissolved oxygen) were measured and recorded at each sampling location using a YSI 556 multi-probe meter. Ferrous iron was measured and recorded at each sampling location using a Ferrous Iron HACH kit. All instruments were calibrated prior to use in the field. The coordinates for each sample location were recorded using a hand held GPS instrument.

NRSI collected surface water samples using clean laboratory-supplied bottles and submitted all samples to Testmark Laboratories (Testmark) of Garson, Ontario for analysis. A total of 61 chemical parameters were analyzed for each sample. All samples were maintained at < 4°C from the time of sampling until delivery to Testmark. Full 'chain of custody' documentation accompanied the samples from each site to Testmark and is enclosed with this document.

All field parameters and analytical laboratory results can be found in Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry enclosed with this document.

RESULTS

The GPS coordinates and general observations made by NRSI during each sampling event can be found in Table 1 below. In all cases the water levels were relatively low, the water current was relatively slow to moderate, the water colour was clear, and there were no odours associated with the samples.

Table 1: Vermillion (Wabageshik Rapid) Surface Water Locations and General Observations:

Surface Water Locations	UTM coordinates (Zone 17T)	General Observations			
		Water Level	Water Current	Water Colour	Water Odour
Summer – August 4, 2010					
SW1	E452497 N5124340	low	slow	clear	none
SW3	E451731 N5124810	low	moderate	clear	none

Surface water results can be found in Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry in comparison to the Ontario Provincial Water Quality Objectives (PWQO, 1994). Of the 25 parameters that have associated PWQO values, a total of 2 parameters had exceedances. A total of 29 parameters, including alkalinity, sulphide, nitrate, phosphate, and several metal parameters had concentrations below their method detection limits. The PWQO exceedances are listed below in Table 3 below. Laboratory certificates of analysis for surface water samples collected in 2010 are enclosed with this document.

Table 3: Vermillion (Wabageshik Rapid) PWQO Surface Water Exceedances:

Surface Water Locations	Parameters Exceeding PWQO
Spring – May 30, 2010	
SW1	Nickel
SW3	Nickel
Summer – August 4, 2010	
SW1	Copper, Nickel
SW3	Copper, Nickel

The parameters that exceeded the PWQO for samples collected during the spring sampling event (May 30, 2010) include nickel (31.1 µg/L) for SW1 and nickel (35.1 µg/L) for SW3. The parameters that exceeded their respective PWQOs for samples collected during the August sampling event include copper (7.6 µg/L) and nickel (40.9 µg/L) for SW1, and copper (7.8 µg/L) and nickel (45.2 µg/L) for SW3. The source of the elevated metal concentrations is unknown. For reference, the PWQOs for nickel and copper are 75µg/L, and 5 µg/L respectively.

CONCLUSION

A total of two surface water samples, SW1 and SW3, were collected in May and August of 2010 and analyzed for 61 parameters at the Vermillion (Wabageshik Rapid) site. Several parameter concentrations were below the method detection limit of the laboratory. For the May event, nickel exceeded its PWQO for SW1 and SW3. For the August event, copper and nickel exceeded their PWQOs for SW1 and SW3.

The observations and results obtained by NRSI are representative of the conditions during the site visits made on May 30 and August 4, 2010 at Vermillion (Wabageshik Rapid) site. ` The statements made in this report are based solely on the information obtained to date as part of the above referenced assessment. The information presented herein is based on observations and laboratory testing of samples collected at specific locations. Any inferences between specific sample locations should be made with caution. WESA has used professional judgement in analyzing this information and formulating its conclusions. No other warranty, expressed or implied, as to the accuracy of the information or recommendations is included or intended in this report.

If you have any questions, or require further assistance, please feel free to contact the undersigned at your convenience.

Yours sincerely,

Julia LaRonde
Occupational Hygiene /
Environmental Technologist

Reviewed by:

Darryl Roberts, Ph.D
Project Manager

Encl.

- Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry
- Lab Chain of Custody No. 104445 dated May 30, 2010
- Lab Report Reference No. WO104445 dated June 04, 2010
- Lab Chain of Custody No. 109138 dated August 04, 2010
- Lab Report Reference No. WO109138 dated August 13, 2010
- Lab Report Reference No. REG109138 dated August 13, 2010

Ref: SB8931-14 Feb 25-2011 Wabageshik Rapid LetRept.doc

Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry
SB8931-00-14

Sample Location		Total Alkalinity mg/L	Bicarbonate Alkalinity mg/L	Carbonate Alkalinity mg/L	pH	Total Phos. mg/L	TDS mg/L	TSS mg/L	Sulfide mg/L	TKN mg/L	Chloride mg/L	NO3 mg/L	NO2 mg/L	Phosphate mg/L	Sulphate mg/L	Ferric Iron mg/L	Ferrous Iron mg/L	Al µg/L	Sb µg/L	As mg/L
	PWQO	>25% ⇩	nv	nv	6.5-8.5	0.03	nv	nv	nv	nv	nv	nv	nv	nv	nv	nv	nv	75	20	100
	MDL	1	1	1		0.002	25	0.4	0.021	1	0.2	0.1	0.03	1	1	1	1	1	0.5	1
	Sample Date																			
SW1	30-May-10	36.1	36	<1	7.48	0.0110	160	0.82	<0.021	<1	14.4	<0.1	<0.03	<1	47.3	<1	<1	49.0	<0.5	<1
	4-Aug-10	33.1	32.8	<1	7.86	0.0058	190	1.4	<0.021	<0.1	15.7	<0.1	<0.03	<1	49.2	<1	<1	58.2	<0.5	2
SW3	30-May-10	34.4	34.3	<1	7.40	0.0110	190	0.80	<0.021	<1	14	<0.1	<0.03	<1	46.4	<1	<1	58.8	<0.5	<1
	4-Aug-10	32.8	32.6	<1	7.72	0.0078	190	1.1	<0.021	<0.1	15	<0.1	<0.03	<1	53.2	<1	<1	38.3	<0.5	2

Notes:

PWQO	Provincial
MDL	Method
nv	No value
	Exceeds
<	Concentration less than the MDL
*	Elevated Reporting Limits due to Limited Sample Volume
--	Sample not analyzed

Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry
SB8931-00-14

Sample Location		Ba µg/L	Be µg/L	Bi µg/L	B µg/L	Cd µg/L	Ca µg/L	Ce µg/L	Cs µg/L	Cr µg/L	Co µg/L	Cu µg/L	Eu µg/L	Ga µg/L	Fe µg/L	La µg/L	Pb µg/L	Li µg/L	Mg µg/L	Mn µg/L	Hg µg/L	Mo µg/L	Ni µg/L	Nb µg/L	K µg/L	Rb µg/L
	PWQO	nv	11	nv	200	0.2	nv	nv	nv	1	0.9	5	nv	nv	300	nv	1	nv	nv	nv	0.2	40	25	nv	nv	nv
	MDL	1	0.5	1	2	0.1	50	1	1	0.8	0.1	1	1	1	20	1	1	5	4	1	0.1	1	1	1	100	1
	Sample Date																									
SW1	30-May-10	12.3	<0.5	<1	6.6	<0.1	21,000	<1	<1	0.8	0.21	3.7	<1	<1	100	<1	<1	<5	5,070	24.0	<0.1	<1	31.1	<1	2,520	2.9
	4-Aug-10	21.8	<0.5	<1	17.0	<0.1	31,100	<1	<1	<0.8	0.53	7.6	<1	<1	93	<1	<1	<5	8,980	57.7	<0.1	<1	40.9	<1	830	6.1
SW3	30-May-10	10.2	<0.5	<1	4.5	<0.1	22,100	<1	<1	0.91	0.37	4.4	<1	<1	120	<1	<1	<5	4,770	28.5	<0.1	<1	35.1	<1	2,410	3.1
	4-Aug-10	22.4	<0.5	<1	18.0	<0.1	30,400	<1	<1	<0.8	0.58	7.8	<1	<1	79	<1	<1	<5	8,950	71.2	<0.1	<1	45.2	<1	650	5.6

Notes:

PWQO	Provincial Water Quality
MDL	Method Detection Limit
nv	No value listed in
	Exceeds PWQO criteria
<	Concentration less than the MDL
*	Elevated Reporting Limits due to Limited Sample Volume
--	Sample not analyzed

Table 2: Vermillion (Wabageshik Rapid) Surface Water Chemistry
SB8931-00-14

																			Field Measurements				
		Sc µg/L	Se µg/L	Sl µg/L	Ag µg/L	Na µg/L	Sr µg/L	Sulfur µg/L	Tl µg/L	Th µg/L	Sn µg/L	Ti µg/L	W µg/L	U µg/L	V µg/L	Y µg/L	Zn µg/L	Zr µg/L	pH	Temp. °C	Cond. uS/cm	DO %	Ferrous Iron mg/L
	PWQO	nv	100	nv	0.1	nv	nv	nv	0.3	nv	nv	nv	30	5	6	nv	30	4	6.5-8.5				
	MDL	1	1	2	0.1	100	1	800	0.1	1	1	1	1	1	1	1	1	1					
Sample Location	Sample Date																						
SW1	30-May-10	<1	<1	1,300	<0.1	10,500	50.0	18,200	<0.1	<1	<1	2.8	<1	<1	<1	<1	2.0	<1	--	--	--	--	0.03
	4-Aug-10	<1	<1	873	<0.1	13,800	121.0	21,800	<0.1	<1	<1	1.2	<1	<1	1.0	<1	25.7	<1	8.43	24.5	282	98.5	0.03
SW3	30-May-10	<1	<1	1,370	<0.1	10,900	51.6	16,700	<0.1	<1	<1	2.6	<1	<1	<1	<1	5.2	<1	--	--	--	--	<0.02
	4-Aug-10	<1	1.9	868	<0.1	13,500	108.0	21,600	<0.1	<1	<1	<1	<1	<1	<1	<1	11.7	<1	8.78	25.2	250	95.0	<0.02

Notes:
PWQO Provincial Water Quality
MDL Method Detection Limit
nv No value listed in
Exceeds PWQO criteria
< Concentration less than the MDL
* Elevated Reporting Limits due to Limited Sample Volume
-- Sample not analyzed

TESTMARK Laboratories Ltd.
Committed to Quality and Service

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Garson, ON CANADA P3L 1E1
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Contact: Shawna Davy
Phone: (705) 525-6075 Fax: (705) 525-6072

Testmark Quote: 2965
Client P.O. #: INORG
Client Project #: SB8931-14
DWS/SDWS #:
Email Address: sdavy@wesa.ca

O.Reg 318/319 Only:
Public Health Unit:_ Phone:_____ Fax:_____

REPORTING FORMAT
☐ Fax ☑ Email ☐ Mail

QC DATA REPORTED
☑ Yes ☐ No

SAMPLE DISPOSAL
☐ Hold ☑ Dispose ☐ Return

TURN AROUND TIME (TAT)*
☐ 1 Day ☐ 2 Days
☐ 3 Days ☒ Standard
SPECIFIC DATE: Mon 7
*RUSH analysis may involve additional charges

SAMPLING

DATE	TIME	TYPE	MATRIX	SAMPLE DESCRIPTION (This Will Appear On The Report)	NUMBER OF CONTAINERS	TSS	TDS	pH	pOH	Alk	ICPMS-T	Fe+3	Sulphide	TKN	TP	Bicarbonate	Carbonate	Anions[Cl, NO2, NO3, PO4, SO4]	Field Fe+2	RESIDUAL CHLORINE (IF APPLICABLE)	CONTAINERS RECEIVED	TEMP	LAB ID	BOTTLE TYPE
30 May 2010	18:15	G	SW	SW - 1	5	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.03		S	7	286474	2P,3M
		G	SW	~~SW - 2~~																				
30 May 2010	16:45	G	SW	SW - 3	5	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.00		S	7	286475	↓

LABORATORY USE ONLY
WORK ORDER NUMBER: 164445
INORG

LEGEND
TYPE: G=Grab, C=Composite **O.REG. 170 / O.REG. 318/319 / O.REG. 243:** R=Raw, E=Entry / Treated, D=Distribution, P=Plumbing
Matrix: A=Air, B=Biota, F=Fish, GW=Groundwater, O=Oil, P=Paint, S=Soil, SD=Sediment, SL=Sludge, SW=Water, W=Water, DW=Drinking Water

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REGULATION
☐ O.Reg. 153: Record of Site Condition Table (☐1 ☐2 ☐3 ☐4 ☐5 ☐6) Column
☐ O.Reg.170 ☐ O.Reg 318/319 ☐ O.Reg. 243 ☐ ODWS ☐ PWQO ☐ MISA
☐ O.Reg. 558 ☐ C of A ☐ Other:_____ ☐ None

COMMENTS:
CONFIRMATION REPORT SENT

Sampled By (Signature)	Date 30 May 10	Time 1830	Shipped By Hand	Shipping Reference 13148	
Received By (Signature)	Date	Time	Relinquished to Testmark By (Signature)	Date	Time
Received By (Signature)	Date	Time	Received at Testmark By	Date RECEIVED MAY 31 2010	Time 9:30

V2008-2

TESTMARK Laboratories Ltd.

Committed to Quality and Service

Analytical Report

Client: Shawna Davy
Company: WESA
Address: 273 Elm Street
Sudbury, ON, P3C 1V5
Phone: (705) 525-6075
Fax: (705) 525-6077
Email: sdavy@wesa.ca
Notes: Please see sample notes:

Work Order Number: **104445**
Date Order Received: 05/31/10
Regulation: Information not provided
PO #:
Project #: SB8931-14

Analyses were performed on the following samples submitted with your order.
The results relate only to the items tested.

Sample Name	Lab #	Matrix	Type	Comments	Date Collected	Time Collected
SW-1	286474	Water	Grab		05/30/10	18:15
SW-3	286475	Water	Grab		05/30/10	16:45

The following instrumentation and reference methods were used for your sample(s)

Method Name	Description	Reference
ALKA	Determination of Alkalinity **Instrument group:** Metrohm Analyzer	Based on APHA-2320
Anions Water	Determination of Anions by Ion Chromatography **Instrument group:** Dionex IC	Based on SW846-9056
Carbonate	Determination of Carbonate and Bi-Carbonate **Instrument group:** Calculation	Based on APHA-2330
FE2FE3 Water	Determination of Fe2+ and Fe3+ **Instrument group:** UV/Vis Spectrophotometer	Based on APHA 3500
ICPMS Tot. Water	Determination of Total Metals in Water by ICP/MS with Digestion **Instrument group:** Perkin Elmer ICPMS	Based on SW846-6020
pHWATER	Determination of water pH by ion selective electrode **Instrument group:** Metrohm Analyzer	Based on APHA-4500
pOH	Calculation of pOH in water **Instrument group:** Calculation	Based on APHA-4500
Sulphide Water	Determination of Sulphide in Water **Instrument group:** UV/Vis Spectrophotometer	Based on APHA-4500
TDS	Determination of Total Dissolved Solids in water by gravimetry **Instrument group:** Mettler Toledo Balance	Based on APHA-2540
TKN Water Dig.	Determination of Total Kjeldahl Nitrogen in Waters with Block Digestion **Instrument group:** UV/Vis Spectrophotometer	Based on APHA 4500-N
TP Water	Determination of Total Phosphorus in Water **Instrument group:** UV/Vis Spectrophotometer	Based on APHA-4500
TSS - 500	Determination of Total Suspended Solids in water by gravimetry **Instrument group:** Mettler Toledo Balance	Based on APHA-2540

Sample Notes: The results for Fe2+ analysis were obtained from the field notes provided by the client. 05/31/10 SG

This report has been approved by:

Brad Halvorson, B. Sc.
Inorganic Section Head

Sample Data:

Sample Name: SW-1 **Date: 05/30/10** **Matrix: Water** **Lab #: 286474**

ALKA				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1	36.1	mg/L	20100602.R1A

Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.2	14.4	mg/L	20100602.R5G
Nitrate (as N)	0.1	<0.1	mg/L	20100602.R5G
Nitrite (as N)	0.03	<0.03	mg/L	20100602.R5G
Phosphate	1	<1	mg/L	20100602.R5G
Sulfate	1	47.3	mg/L	20100602.R5G

Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bi-Carbonate	1	36	mg/L	20100603.R94A
Carbonate	1	<1	mg/L	20100603.R94A

FE2FE3 Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Iron (II)	1	<1	mg/L	20100601.R87A
Iron (III)	1	<1	mg/L	20100601.R87A

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Aluminum	1	49	ug/L	20100602.R13na3
Total Aluminum (Dup)	1	50.5	ug/L	20100602.R13na3
Total Antimony	0.5	<0.5	ug/L	20100602.R13na3
Total Antimony (Dup)	0.5	<0.5	ug/L	20100602.R13na3
Total Arsenic	1	<1	ug/L	20100602.R13na3
Total Arsenic (Dup)	1	<1	ug/L	20100602.R13na3
Total Barium	1	12.3	ug/L	20100602.R13na3
Total Barium (Dup)	1	12.2	ug/L	20100602.R13na3
Total Berylium	0.5	<0.5	ug/L	20100602.R13na3
Total Berylium (Dup)	0.5	<0.5	ug/L	20100602.R13na3
Total Bismuth	1	<1	ug/L	20100602.R13na3
Total Bismuth (Dup)	1	<1	ug/L	20100602.R13na3
Total Boron	2	6.6	ug/L	20100602.R13na3
Total Boron (Dup)	2	6.4	ug/L	20100602.R13na3
Total Cadmium	0.1	<0.1	ug/L	20100602.R13na3
Total Cadmium (Dup)	0.1	<0.1	ug/L	20100602.R13na3
Total Calcium	50	21000	ug/L	20100602.R13na3
Total Calcium (Dup)	50	19000	ug/L	20100602.R13na3
Total Cerium	1	<1	ug/L	20100602.R13na3
Total Cerium (Dup)	1	<1	ug/L	20100602.R13na3
Total Cesium	1	<1	ug/L	20100602.R13na3
Total Cesium (Dup)	1	<1	ug/L	20100602.R13na3
Total Chromium	0.8	0.8	ug/L	20100602.R13na3
Total Chromium (Dup)	0.8	<0.8	ug/L	20100602.R13na3

Sample Name: SW-1 **Date: 05/30/10** **Matrix: Water** **Lab #: 286474**

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Cobalt	0.1	0.21	ug/L	20100602.R13na3
Total Cobalt (Dup)	0.1	0.22	ug/L	20100602.R13na3
Total Copper	1	3.7	ug/L	20100602.R13na3
Total Copper (Dup)	1	3.9	ug/L	20100602.R13na3
Total Europium	1	<1	ug/L	20100602.R13na3
Total Europium (Dup)	1	<1	ug/L	20100602.R13na3
Total Gallium	1	<1	ug/L	20100602.R13na3
Total Gallium (Dup)	1	<1	ug/L	20100602.R13na3
Total Iron	20	100	ug/L	20100602.R13na3
Total Iron (Dup)	20	97	ug/L	20100602.R13na3
Total Lanthanum	1	<1	ug/L	20100602.R13na3
Total Lanthanum (Dup)	1	<1	ug/L	20100602.R13na3
Total Lead	1	<1	ug/L	20100602.R13na3
Total Lead (Dup)	1	<1	ug/L	20100602.R13na3
Total Lithium	5	<5	ug/L	20100602.R13na3
Total Lithium (Dup)	5	<5	ug/L	20100602.R13na3
Total Magnesium	4	5070	ug/L	20100602.R13na3
Total Magnesium (Dup)	4	5060	ug/L	20100602.R13na3
Total Manganese	1	24	ug/L	20100602.R13na3
Total Manganese (Dup)	1	23.4	ug/L	20100602.R13na3
Total Mercury	0.1	<0.1	ug/L	20100602.R13na3
Total Mercury (Dup)	0.1	<0.1	ug/L	20100602.R13na3
Total Molybdenum	1	<1	ug/L	20100602.R13na3
Total Molybdenum (Dup)	1	<1	ug/L	20100602.R13na3
Total Nickel	1	31.1	ug/L	20100602.R13na3
Total Nickel (Dup)	1	31.7	ug/L	20100602.R13na3
Total Niobium	1	<1	ug/L	20100602.R13na3
Total Niobium (Dup)	1	<1	ug/L	20100602.R13na3
Total Potassium	100	2520	ug/L	20100602.R13na3
Total Potassium (Dup)	100	2400	ug/L	20100602.R13na3
Total Rubidium	1	2.9	ug/L	20100602.R13na3
Total Rubidium (Dup)	1	3.1	ug/L	20100602.R13na3
Total Scandium	1	<1	ug/L	20100602.R13na3
Total Scandium (Dup)	1	<1	ug/L	20100602.R13na3
Total Selenium	1	<1	ug/L	20100602.R13na3
Total Selenium (Dup)	1	<1	ug/L	20100602.R13na3
Total Silicon	2	1300	ug/L	20100602.R13na3
Total Silicon (Dup)	2	1440	ug/L	20100602.R13na3
Total Silver	0.1	<0.1	ug/L	20100602.R13na3
Total Silver (Dup)	0.1	<0.1	ug/L	20100602.R13na3
Total Sodium	100	10500	ug/L	20100602.R13na3
Total Sodium (Dup)	100	10600	ug/L	20100602.R13na3
Total Strontium	1	50	ug/L	20100602.R13na3
Total Strontium (Dup)	1	49.1	ug/L	20100602.R13na3
Total Sulfur	800	18200	ug/L	20100602.R13na3
Total Sulfur (Dup)	800	18100	ug/L	20100602.R13na3

Sample Name: SW-1 **Date: 05/30/10** **Matrix: Water** **Lab #: 286474**

ICPMS Tot. Water

Parameter	MDL	Result	Units	QAQCID
Total Thallium	0.1	<0.1	ug/L	20100602.R13na3
Total Thallium (Dup)	0.1	<0.1	ug/L	20100602.R13na3
Total Thorium	1	<1	ug/L	20100602.R13na3
Total Thorium (Dup)	1	<1	ug/L	20100602.R13na3
Total Tin	1	<1	ug/L	20100602.R13na3
Total Tin (Dup)	1	<1	ug/L	20100602.R13na3
Total Titanium	1	2.8	ug/L	20100602.R13na3
Total Titanium (Dup)	1	3	ug/L	20100602.R13na3
Total Tungsten	1	<1	ug/L	20100602.R13na3
Total Tungsten (Dup)	1	<1	ug/L	20100602.R13na3
Total Uranium	1	<1	ug/L	20100602.R13na3
Total Uranium (Dup)	1	<1	ug/L	20100602.R13na3
Total Vanadium	1	<1	ug/L	20100602.R13na3
Total Vanadium (Dup)	1	<1	ug/L	20100602.R13na3
Total Yttrium	1	<1	ug/L	20100602.R13na3
Total Yttrium (Dup)	1	<1	ug/L	20100602.R13na3
Total Zinc	1	2	ug/L	20100602.R13na3
Total Zinc (Dup)	1	2.7	ug/L	20100602.R13na3
Total Zirconium	1	<1	ug/L	20100602.R13na3
Total Zirconium (Dup)	1	<1	ug/L	20100602.R13na3

pHWATER

Parameter	MDL	Result	Units	QAQCID
pH	N/A	7.48	pH	20100602.R2F

pOH

Parameter	MDL	Result	Units	QAQCID
pOH	N/A	6.52	pOH	20100603.R2E

Sulphide Water

Parameter	MDL	Result	Units	QAQCID
Sulphide (as H2S)	0.021	<0.021	mg/L	20100601.R11A

TDS

Parameter	MDL	Result	Units	QAQCID
Total Dissolved Solids	25	160	mg/L	20100602.R27E

TKN Water Dig.

Parameter	MDL	Result	Units	QAQCID
Total Kjeldahl Nitrogen	1	<1	mg/L	20100603.R58G

TP Water

Parameter	MDL	Result	Units	QAQCID
Total Phosphorus (as P)	0.002	0.011	mg/L	20100601.R23.2C

TSS - 500

Parameter	MDL	Result	Units	QAQCID
Total Suspended Solids	0.41	0.82	mg/L	20100602.R27B

Sample Name: SW-3 **Date: 05/30/10** **Matrix: Water** **Lab #: 286475**

ALKA				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1	34.4	mg/L	20100602.R1A

Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.2	14	mg/L	20100602.R5G
Chloride (Dup)	0.2	14.6	mg/L	20100602.R5G
Nitrate (as N)	0.1	<0.1	mg/L	20100602.R5G
Nitrate (as N) (Dup)	0.1	<0.1	mg/L	20100602.R5G
Nitrite (as N)	0.03	<0.03	mg/L	20100602.R5G
Nitrite (as N) (Dup)	0.03	<0.03	mg/L	20100602.R5G
Phosphate	1	<1	mg/L	20100602.R5G
Phosphate (Dup)	1	<1	mg/L	20100602.R5G
Sulfate	1	46.4	mg/L	20100602.R5G
Sulfate (Dup)	1	49.4	mg/L	20100602.R5G

Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bi-Carbonate	1	34.3	mg/L	20100603.R94A
Carbonate	1	<1	mg/L	20100603.R94A

FE2FE3 Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Iron (II)	1	<1	mg/L	20100601.R87A
Iron (III)	1	<1	mg/L	20100601.R87A

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Aluminum	1	58.8	ug/L	20100602.R13na3
Total Antimony	0.5	<0.5	ug/L	20100602.R13na3
Total Arsenic	1	<1	ug/L	20100602.R13na3
Total Barium	1	10.2	ug/L	20100602.R13na3
Total Berylium	0.5	<0.5	ug/L	20100602.R13na3
Total Bismuth	1	<1	ug/L	20100602.R13na3
Total Boron	2	4.5	ug/L	20100602.R13na3
Total Cadmium	0.1	<0.1	ug/L	20100602.R13na3
Total Calcium	50	22100	ug/L	20100602.R13na3
Total Cerium	1	<1	ug/L	20100602.R13na3
Total Cesium	1	<1	ug/L	20100602.R13na3
Total Chromium	0.8	0.91	ug/L	20100602.R13na3
Total Cobalt	0.1	0.37	ug/L	20100602.R13na3
Total Copper	1	4.4	ug/L	20100602.R13na3
Total Europium	1	<1	ug/L	20100602.R13na3
Total Gallium	1	<1	ug/L	20100602.R13na3
Total Iron	20	120	ug/L	20100602.R13na3
Total Lanthanum	1	<1	ug/L	20100602.R13na3
Total Lead	1	<1	ug/L	20100602.R13na3
Total Lithium	5	<5	ug/L	20100602.R13na3
Total Magnesium	4	4770	ug/L	20100602.R13na3

Sample Name: SW-3 **Date: 05/30/10** **Matrix: Water** **Lab #: 286475**

ICPMS Tot. Water

Parameter	MDL	Result	Units	QAQCID
Total Manganese	1	28.5	ug/L	20100602.R13na3
Total Mercury	0.1	<0.1	ug/L	20100602.R13na3
Total Molybdenum	1	<1	ug/L	20100602.R13na3
Total Nickel	1	35.1	ug/L	20100602.R13na3
Total Niobium	1	<1	ug/L	20100602.R13na3
Total Potassium	100	2410	ug/L	20100602.R13na3
Total Rubidium	1	3.1	ug/L	20100602.R13na3
Total Scandium	1	<1	ug/L	20100602.R13na3
Total Selenium	1	<1	ug/L	20100602.R13na3
Total Silicon	2	1370	ug/L	20100602.R13na3
Total Silver	0.1	<0.1	ug/L	20100602.R13na3
Total Sodium	100	10900	ug/L	20100602.R13na3
Total Strontium	1	51.6	ug/L	20100602.R13na3
Total Sulfur	800	16700	ug/L	20100602.R13na3
Total Thallium	0.1	<0.1	ug/L	20100602.R13na3
Total Thorium	1	<1	ug/L	20100602.R13na3
Total Tin	1	<1	ug/L	20100602.R13na3
Total Titanium	1	2.6	ug/L	20100602.R13na3
Total Tungsten	1	<1	ug/L	20100602.R13na3
Total Uranium	1	<1	ug/L	20100602.R13na3
Total Vanadium	1	<1	ug/L	20100602.R13na3
Total Yttrium	1	<1	ug/L	20100602.R13na3
Total Zinc	1	5.2	ug/L	20100602.R13na3
Total Zirconium	1	<1	ug/L	20100602.R13na3

pHWATER

Parameter	MDL	Result	Units	QAQCID
pH	N/A	7.40	pH	20100602.R2F

pOH

Parameter	MDL	Result	Units	QAQCID
pOH	N/A	6.6	pOH	20100603.R2E

Sulphide Water

Parameter	MDL	Result	Units	QAQCID
Sulphide (as H2S)	0.021	<0.021	mg/L	20100601.R11A

TDS

Parameter	MDL	Result	Units	QAQCID
Total Dissolved Solids	25	190	mg/L	20100602.R27E

TKN Water Dig.

Parameter	MDL	Result	Units	QAQCID
Total Kjeldahl Nitrogen	1	<1	mg/L	20100603.R58G

TP Water

Parameter	MDL	Result	Units	QAQCID
Total Phosphorus (as P)	0.002	0.011	mg/L	20100601.R23.2C
Total Phosphorus (as P) (Dup)	0.002	0.012	mg/L	20100601.R23.2C

Sample Name: SW-3 **Date: 05/30/10** **Matrix: Water** **Lab #: 286475**

TP Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**

TSS - 500				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Suspended Solids	0.4	0.8	mg/L	20100602.R27B

MDL *Method detection limit or minimum reporting limit.*
% Rec *Surrogate compounds are added to the sample in some cases and the recovery is reported as a percent recovered.*
QAQCID *This is a unique reference to the quality control data set used to generate the reported value.*
Data reported for organic analysis in soil samples are corrected for moisture content
Matrix *If the matrix is a leachate, the sample was extracted according to regulation 558.*
INT *Interferences*
TNTC *Too numerous to count*
ND *Not detected*

Quality Control Data:

ALKA

155 mg/L Control-Metroh						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1.3	mg/L	175	156	145	20100602.R1A

Anions Water

Blank (IC-2)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Chloride	0.2	mg/L	0.5	<0.2	<0.2	20100602.R5G
Nitrate (as N)	0.1	mg/L	0.5	<0.1	<0.1	20100602.R5G
Nitrite (as N)	0.03	mg/L	0.5	<0.03	<0.03	20100602.R5G
Phosphate	1	mg/L	1	<1	<1	20100602.R5G
Sulfate	1	mg/L	1	<1	<1	20100602.R5G

Control (IC-2)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Chloride	0.2	mg/L	115	95.4	85	20100602.R5G
Nitrate (as N)	0.1	mg/L	57.5	47.3	40	20100602.R5G
Nitrite (as N)	0.03	mg/L	57.5	47.6	42.5	20100602.R5G
Phosphate	1	mg/L	130	86.3	70	20100602.R5G
Sulfate	1	mg/L	115	91.4	78	20100602.R5G

ICPMS Tot. Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Aluminum	1	ug/L	1	<1	<1	20100602.R13na3
Total Antimony	1	ug/L	1	<1	<1	20100602.R13na3
Total Arsenic	1	ug/L	1	<1	<1	20100602.R13na3
Total Barium	1	ug/L	1	<1	<1	20100602.R13na3
Total Berylium	1	ug/L	1	<1	<1	20100602.R13na3
Total Bismuth	1	ug/L	1	<1	<1	20100602.R13na3
Total Boron	2	ug/L	2	<2	<2	20100602.R13na3
Total Cadmium	1	ug/L	1	<1	<1	20100602.R13na3
Total Cerium	1	ug/L	1	<1	<1	20100602.R13na3
Total Cesium	1	ug/L	1	<1	<1	20100602.R13na3
Total Chromium	1	ug/L	1	<1	<1	20100602.R13na3
Total Cobalt	1	ug/L	1	<1	<1	20100602.R13na3
Total Copper	1	ug/L	1	<1	<1	20100602.R13na3
Total Europium	1	ug/L	1	<1	<1	20100602.R13na3
Total Gallium	1	ug/L	1	<1	<1	20100602.R13na3
Total Iron	20	ug/L	20	<20	<20	20100602.R13na3
Total Lanthanum	1	ug/L	1	<1	<1	20100602.R13na3
Total Lead	1	ug/L	1	<1	<1	20100602.R13na3
Total Lithium	5	ug/L	5	<5	<5	20100602.R13na3
Total Magnesium	4	ug/L	4	<4	<4	20100602.R13na3
Total Manganese	1	ug/L	1	<1	<1	20100602.R13na3

ICPMS Tot. Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Mercury	0.1	ug/L	0.1	<0.1	<0.1	20100602.R13na3
Total Molybdenum	1	ug/L	1	<1	<1	20100602.R13na3
Total Nickel	1	ug/L	1	<1	<1	20100602.R13na3
Total Niobium	1	ug/L	1	<1	<1	20100602.R13na3
Total Rubidium	1	ug/L	1	<1	<1	20100602.R13na3
Total Selenium	1	ug/L	1	<1	<1	20100602.R13na3
Total Silver	5	ug/L	5	<5	<5	20100602.R13na3
Total Strontium	1	ug/L	1	<1	<1	20100602.R13na3
Total Thallium	1	ug/L	1	<1	<1	20100602.R13na3
Total Thorium	1	ug/L	1	<1	<1	20100602.R13na3
Total Tin	1	ug/L	1	<1	<1	20100602.R13na3
Total Tungsten	1	ug/L	1	<1	<1	20100602.R13na3
Total Uranium	1	ug/L	1	<1	<1	20100602.R13na3
Total Vanadium	1	ug/L	1	<1	<1	20100602.R13na3
Total Yttrium	1	ug/L	1	<1	<1	20100602.R13na3
Total Zinc	1	ug/L	1	<1	<1	20100602.R13na3
Total Zirconium	1	ug/L	1	<1	<1	20100602.R13na3

Positive Control (1011)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Aluminum	1	ug/L	600	502	400	20100602.R13na3
Total Arsenic	1	ug/L	120	96.9	80	20100602.R13na3
Total Barium	1	ug/L	120	102	80	20100602.R13na3
Total Berylium	1	ug/L	125	102	75	20100602.R13na3
Total Boron	2	ug/L	110	110	90	20100602.R13na3
Total Cadmium	1	ug/L	120	96.9	80	20100602.R13na3
Total Calcium	50	ug/L	1200	950	800	20100602.R13na3
Total Chromium	1	ug/L	110	98	90	20100602.R13na3
Total Cobalt	1	ug/L	120	97.6	80	20100602.R13na3
Total Copper	1	ug/L	120	102	80	20100602.R13na3
Total Iron	20	ug/L	600	509	400	20100602.R13na3
Total Lead	1	ug/L	120	99.9	80	20100602.R13na3
Total Magnesium	4	ug/L	1200	1040	800	20100602.R13na3
Total Manganese	1	ug/L	120	97.6	80	20100602.R13na3
Total Molybdenum	1	ug/L	120	105	80	20100602.R13na3
Total Nickel	1	ug/L	120	104	80	20100602.R13na3
Total Selenium	1	ug/L	120	101	80	20100602.R13na3
Total Thallium	1	ug/L	120	103	80	20100602.R13na3
Total Vanadium	1	ug/L	120	95.8	80	20100602.R13na3
Total Zinc	1	ug/L	120	95.1	80	20100602.R13na3

pHWATER

pH 7 Metrohm						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
pH	N/A	pH	7.2	7.14	6.8	20100602.R2F

Sulphide Water

0.5 mg/L Control						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Sulphide (as H2S)	0.05	mg/L	0.6	0.546	0.4	20100601.R11A

TDS

200 mg/L Control						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Dissolved Solids	25	mg/L	240	210	160	20100602.R27E

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Dissolved Solids	25	mg/L	50	<25	<25	20100602.R27E

TKN Water Dig.

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Kjeldahl Nitrogen	1	mg/L	<1	<1	<1	20100603.R58G

Control Sample						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Kjeldahl Nitrogen	1	mg/L	30	27.3	20	20100603.R58G

TP Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Phosphorus (as P)	0.002	mg/L	0.005	<0.002	<0.002	20100601.R23.2C

Control (0.05 mg/L)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Phosphorus (as P)	0.002	mg/L	0.06	0.0489	0.04	20100601.R23.2C

TSS - 500

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Suspended Solids	6	mg/L	<6	<6	<6	20100602.R27B

Control Standard						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Suspended Solids	6	mg/L	230	171	150	20100602.R27B

UCL Upper Control Limit
LCL Lower Control Limit

TESTMARK Laboratories Ltd.
Committed to Quality and Service

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Contact: Shawna Davy
Phone: (705) 525-6075 Fax: (705) 525-6072

Testmark Quote: 2965 ORG
Client P.O. #:
Client Project #: SB8931-14
DWS/SDWS #:
Email Address: sdavy@wesa.ca

O.Reg 318/319 Only:
Public Health Unit: Phone: Fax:

REPORTING FORMAT
☐ Fax ☑ Email ☐ Mail

QC DATA REPORTED
☑ Yes ☐ No

SAMPLE DISPOSAL
☐ Hold ☑ Dispose ☐ Return

TURN AROUND TIME (TAT)*
☐ 1 Day ☐ 2 Days
☐ 3 Days ☐ Standard
SPECIFIC DATE: FRI 13
*RUSH analysis may involve additional charges

SAMPLING

DATE	TIME	TYPE	MATRIX	SAMPLE DESCRIPTION (This Will Appear On The Report)	NUMBER OF CONTAINERS	TSS	TDS	pH	pOH	Alk	ICPMS-T	Fe+3	Sulphide	TKN	TP	Bicarbonate	Carbonate	Anions(Cl, NO2, NO3, PO4, SO4)	Field Fe+2	RESIDUAL CHLORINE (IF APPLICABLE)	CONTAINERS RECEIVED	TEMP	LAB ID	BOTTLE TYPE
Aug 4	1730	G	SW	SW - 1																	6	13	298030	28,4M
Aug 4	1800	G	SW	SW - 3																	6	13	298031	

ORG

LABORATORY USE ONLY
WORK ORDER NUMBER: 109138

LEGEND
TYPE: G=Grab, C=Composite **O.REG. 170 / O.REG. 318/319 / O.REG. 243:** R=Raw, E=Entry / Treated, D=Distribution, P=Plumbing
Matrix: A=Air, B=Biota, F=Fish, GW=Groundwater, O=Oil, P=Paint, S=Soil, SD=Sediment, SL=Sludge, SW=Water, W=Water, DW=Drinking Water

Page: _____ of _____

REGULATION
☐ O.Reg. 153: Record of Site Condition Table (☐1 ☐2 ☐3 ☐4 ☐5 ☐6) Column
☐ O.Reg.170 ☐ O.Reg 318/319 ☐ O.Reg. 243 ☐ ODWS ☑ PWQO ☐ MISA
☐ O.Reg. 558 ☐ C of A ☐ Other: _____ ☐ None

COMMENTS:
CONFIRMATION REPORT SENT

Sampled By (Signature) Lisa Keeble	Date Aug 4/10	Time	Shipped By PUD	Shipping Reference 1082 4515 323	
Received By (Signature)	Date	Time	Relinquished to-Testmark By (Signature)	Date	Time
Received By (Signature)	Date	Time	Received at Testmark By	Date 08/04/10	Time 15:00

V2008-2

TESTMARK Laboratories Ltd.

Committed to Quality and Service

Analytical Report

Client:	Shawna Davy	**Work Order Number:**	**109138**
Company:	WESA	**Date Order Received:**	08/06/10
Address:	273 Elm Street	**Regulation:**	PWQO
	Sudbury, ON, P3C 1V5	**PO #:**	
Phone:	(705) 525-6075	**Project #:**	SB8931-14
Fax:	(705) 525-6077		
Email:	sdavy@wesa.ca		
Notes:	Field Fe+2: SW-1 0.03mg/l, SW-3 - 0.00mg/l		

Analyses were performed on the following samples submitted with your order.
The results relate only to the items tested.

Sample Name	Lab #	Matrix	Type	Comments	Date Collected	Time Collected
SW - 1	298030	Water	Grab		08/04/10	17:30
SW - 3	298031	Water	Grab		08/04/10	18:00

The following instrumentation and reference methods were used for your sample(s)

Method Name	Description	Reference
ALKA	Determination of Alkalinity **Instrument group:** Metrohm Analyzer	Based on APHA-2320
Anions Water	Determination of Anions by Ion Chromatography **Instrument group:** Dionex IC	Based on SW846-9056
Carbonate	Determination of Carbonate and Bi-Carbonate **Instrument group:** Calculation	Based on APHA-2330
FE2FE3 Water	Determination of Fe2+ and Fe3+ **Instrument group:** UV/Vis Spectrophotometer	Based on APHA 3500
ICPMS Tot. Water	Determination of Total Metals in Water by ICP/MS with Digestion **Instrument group:** Perkin Elmer ICPMS	Based on SW846-6020
pHWATER	Determination of water pH by ion selective electrode **Instrument group:** Metrohm Analyzer	Based on APHA-4500
pOH	Calculation of pOH in water **Instrument group:** Calculation	Based on APHA-4500
Sulphide Water	Determination of Sulphide in Water **Instrument group:** UV/Vis Spectrophotometer	Based on APHA-4500
TDS	Determination of Total Dissolved Solids in water by gravimetry **Instrument group:** Mettler Toledo Balance	Based on APHA-2540
TKN Water Dig.	Determination of Total Kjeldahl Nitrogen in Waters with Block Digestion **Instrument group:** UV/Vis Spectrophotometer	Based on APHA 4500-N
TP Water	Determination of Total Phosphorus in Water **Instrument group:** UV/Vis Spectrophotometer	Based on APHA-4500
TSS - 500	Determination of Total Suspended Solids in water by gravimetry **Instrument group:** Mettler Toledo Balance	Based on APHA-2540

This report has been approved by:

Brad Halvorson, B. Sc.
Inorganic Section Head

Sample Data:

Sample Name: SW - 1 **Date: 08/04/10** **Matrix: Water** **Lab #: 298030**

ALKA				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1	33.1	mg/L	20100809.R1B

Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.2	15.7	mg/L	20100811.R5C
Nitrate (as N)	0.1	<0.1	mg/L	20100811.R5C
Nitrite (as N)	0.03	<0.03	mg/L	20100811.R5C
Phosphate	1	<1	mg/L	20100811.R5C
Sulfate	1	49.2	mg/L	20100811.R5C

Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bi-Carbonate	1	32.8	mg/L	20100811.R94A
Carbonate	1	<1	mg/L	20100811.R94A

FE2FE3 Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Iron (II)	1	<1	mg/L	20100809.R87B
Iron (III)	1	<1	mg/L	20100809.R87B

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Aluminum	1	58.2	ug/L	20100812.R13na11
Total Antimony	0.5	<0.5	ug/L	20100812.R13na11
Total Arsenic	1	2.2	ug/L	20100812.R13na11
Total Barium	1	21.8	ug/L	20100812.R13na11
Total Berylium	0.5	<0.5	ug/L	20100812.R13na11
Total Bismuth	1	<1	ug/L	20100812.R13na11
Total Boron	2	17	ug/L	20100812.R13na11
Total Cadmium	0.1	<0.1	ug/L	20100812.R13na11
Total Calcium	50	31100	ug/L	20100812.R13na11
Total Cerium	1	<1	ug/L	20100812.R13na11
Total Cesium	1	<1	ug/L	20100812.R13na11
Total Chromium	0.8	<0.8	ug/L	20100812.R13na11
Total Cobalt	0.1	0.53	ug/L	20100812.R13na11
Total Copper	1	7.6	ug/L	20100812.R13na11
Total Europium	1	<1	ug/L	20100812.R13na11
Total Gallium	1	<1	ug/L	20100812.R13na11
Total Iron	20	93	ug/L	20100812.R13na11
Total Lanthanum	1	<1	ug/L	20100812.R13na11
Total Lead	1	<1	ug/L	20100812.R13na11
Total Lithium	5	<5	ug/L	20100812.R13na11
Total Magnesium	40	8980	ug/L	20100812.R13na11
Total Manganese	1	57.7	ug/L	20100812.R13na11
Total Mercury	0.1	<0.1	ug/L	20100812.R13na11
Total Molybdenum	1	<1	ug/L	20100812.R13na11

Sample Name: SW - 1 **Date: 08/04/10** **Matrix: Water** **Lab #: 298030**

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Nickel	1	40.9	ug/L	20100812.R13na11
Total Niobium	1	<1	ug/L	20100812.R13na11
Total Potassium	100	830	ug/L	20100812.R13na11
Total Rubidium	1	6.1	ug/L	20100812.R13na11
Total Scandium	1	<1	ug/L	20100812.R13na11
Total Selenium	1	<1	ug/L	20100812.R13na11
Total Silicon	2	873	ug/L	20100812.R13na11
Total Silver	0.1	<0.1	ug/L	20100812.R13na11
Total Sodium	100	13800	ug/L	20100812.R13na11
Total Strontium	1	121	ug/L	20100812.R13na11
Total Sulfur	800	21800	ug/L	20100812.R13na11
Total Thallium	0.1	<0.1	ug/L	20100812.R13na11
Total Thorium	1	<1	ug/L	20100812.R13na11
Total Tin	1	<1	ug/L	20100812.R13na11
Total Titanium	1	1.2	ug/L	20100812.R13na11
Total Tungsten	1	<1	ug/L	20100812.R13na11
Total Uranium	1	<1	ug/L	20100812.R13na11
Total Vanadium	1	1	ug/L	20100812.R13na11
Total Yttrium	1	<1	ug/L	20100812.R13na11
Total Zinc	1	25.7	ug/L	20100812.R13na11
Total Zirconium	1	<1	ug/L	20100812.R13na11

pHWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	7.86	pH	20100809.R2F

pOH				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pOH	N/A	6.14	pOH	20100811.R2B

Sulphide Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Sulphide (as H2S)	0.021	<0.021	mg/L	20100809.R11A

TDS				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Dissolved Solids	25	190	mg/L	20100809.R27F

TKN Water Dig.				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Kjeldahl Nitrogen	0.1	<0.1	mg/L	20100809.R58D

TP Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Phosphorus (as P)	0.002	0.0058	mg/L	20100809.R23.2B

TSS - 500				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Suspended Solids	0.4	1.4	mg/L	20100809.R27C

Sample Name: SW - 3 **Date: 08/04/10** **Matrix: Water** **Lab #: 298031**

ALKA				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1	32.8	mg/L	20100809.R1B

Anions Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Chloride	0.2	15	mg/L	20100811.R5C
Nitrate (as N)	0.1	<0.1	mg/L	20100811.R5C
Nitrite (as N)	0.03	<0.03	mg/L	20100811.R5C
Phosphate	1	<1	mg/L	20100811.R5C
Sulfate	1	53.2	mg/L	20100811.R5C

Carbonate				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Bi-Carbonate	1	32.6	mg/L	20100811.R94A
Carbonate	1	<1	mg/L	20100811.R94A

FE2FE3 Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Iron (II)	1	<1	mg/L	20100809.R87B
Iron (III)	1	<1	mg/L	20100809.R87B

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Aluminum	1	38.3	ug/L	20100812.R13na11
Total Antimony	0.5	<0.5	ug/L	20100812.R13na11
Total Arsenic	1	2	ug/L	20100812.R13na11
Total Barium	1	22.4	ug/L	20100812.R13na11
Total Berylium	0.5	<0.5	ug/L	20100812.R13na11
Total Bismuth	1	<1	ug/L	20100812.R13na11
Total Boron	2	18	ug/L	20100812.R13na11
Total Cadmium	0.1	<0.1	ug/L	20100812.R13na11
Total Calcium	50	30400	ug/L	20100812.R13na11
Total Cerium	1	<1	ug/L	20100812.R13na11
Total Cesium	1	<1	ug/L	20100812.R13na11
Total Chromium	0.8	<0.8	ug/L	20100812.R13na11
Total Cobalt	0.1	0.58	ug/L	20100812.R13na11
Total Copper	1	7.8	ug/L	20100812.R13na11
Total Europium	1	<1	ug/L	20100812.R13na11
Total Gallium	1	<1	ug/L	20100812.R13na11
Total Iron	20	79	ug/L	20100812.R13na11
Total Lanthanum	1	<1	ug/L	20100812.R13na11
Total Lead	1	<1	ug/L	20100812.R13na11
Total Lithium	5	<5	ug/L	20100812.R13na11
Total Magnesium	40	8950	ug/L	20100812.R13na11
Total Manganese	1	71.2	ug/L	20100812.R13na11
Total Mercury	0.1	<0.1	ug/L	20100812.R13na11
Total Molybdenum	1	<1	ug/L	20100812.R13na11
Total Nickel	1	45.2	ug/L	20100812.R13na11
Total Niobium	1	<1	ug/L	20100812.R13na11

Sample Name: SW - 3 **Date: 08/04/10** **Matrix: Water** **Lab #: 298031**

ICPMS Tot. Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Potassium	100	650	ug/L	20100812.R13na11
Total Rubidium	1	5.6	ug/L	20100812.R13na11
Total Scandium	1	<1	ug/L	20100812.R13na11
Total Selenium	1	1.9	ug/L	20100812.R13na11
Total Silicon	2	868	ug/L	20100812.R13na11
Total Silver	0.1	<0.1	ug/L	20100812.R13na11
Total Sodium	100	13500	ug/L	20100812.R13na11
Total Strontium	1	108	ug/L	20100812.R13na11
Total Sulfur	800	21600	ug/L	20100812.R13na11
Total Thallium	0.1	<0.1	ug/L	20100812.R13na11
Total Thorium	1	<1	ug/L	20100812.R13na11
Total Tin	1	<1	ug/L	20100812.R13na11
Total Titanium	1	<1	ug/L	20100812.R13na11
Total Tungsten	1	<1	ug/L	20100812.R13na11
Total Uranium	1	<1	ug/L	20100812.R13na11
Total Vanadium	1	<1	ug/L	20100812.R13na11
Total Yttrium	1	<1	ug/L	20100812.R13na11
Total Zinc	1	11.7	ug/L	20100812.R13na11
Total Zirconium	1	<1	ug/L	20100812.R13na11

pHWATER				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pH	N/A	7.72	pH	20100809.R2F

pOH				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
pOH	N/A	6.28	pOH	20100811.R2B

Sulphide Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Sulphide (as H2S)	0.021	<0.021	mg/L	20100809.R11A

TDS				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Dissolved Solids	25	190	mg/L	20100809.R27F

TKN Water Dig.				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Kjeldahl Nitrogen	0.1	<0.1	mg/L	20100809.R58D

TP Water				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Phosphorus (as P)	0.002	0.0078	mg/L	20100809.R23.2B

TSS - 500				
Parameter	**MDL**	**Result**	**Units**	**QAQCID**
Total Suspended Solids	0.42	1.1	mg/L	20100809.R27C

MDL *Method detection limit or minimum reporting limit.*
% Rec *Surrogate compounds are added to the sample in some cases and the recovery is reported as a percent recovered.*
QAQCID *This is a unique reference to the quality control data set used to generate the reported value.*
Data reported for organic analysis in soil samples are corrected for moisture content
Matrix *If the matrix is a leachate, the sample was extracted according to regulation 558.*
INT *Interferences*
TNTC *Too numerous to count*
ND *Not detected*

Quality Control Data:

ALKA

155 mg/L Control-Metroh						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
M-Alkalinity as CaCO3 (pH 4.5)	1.3	mg/L	175	160	145	20100809.R1B

Anions Water

Blank (IC-2)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Chloride	0.2	mg/L	0.5	<0.2	<0.2	20100811.R5C
Nitrate (as N)	0.1	mg/L	0.5	<0.1	<0.1	20100811.R5C
Nitrite (as N)	0.03	mg/L	0.5	<0.03	<0.03	20100811.R5C
Phosphate	1	mg/L	1	<1	<1	20100811.R5C
Sulfate	1	mg/L	1	<1	<1	20100811.R5C

Control (IC-2)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Chloride	0.2	mg/L	115	88.2	85	20100811.R5C
Nitrate (as N)	0.1	mg/L	57.5	49.6	40	20100811.R5C
Nitrite (as N)	0.03	mg/L	57.5	49.4	42.5	20100811.R5C
Phosphate	1	mg/L	130	93.5	70	20100811.R5C
Sulfate	1	mg/L	115	94.7	78	20100811.R5C

ICPMS Tot. Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Aluminum	1	ug/L	1	<1	<1	20100812.R13na11
Total Antimony	1	ug/L	1	<1	<1	20100812.R13na11
Total Arsenic	1	ug/L	1	<1	<1	20100812.R13na11
Total Barium	1	ug/L	1	<1	<1	20100812.R13na11
Total Berylium	1	ug/L	1	<1	<1	20100812.R13na11
Total Bismuth	1	ug/L	1	<1	<1	20100812.R13na11
Total Boron	2	ug/L	2	<2	<2	20100812.R13na11
Total Cadmium	1	ug/L	1	<1	<1	20100812.R13na11
Total Cerium	1	ug/L	1	<1	<1	20100812.R13na11
Total Cesium	1	ug/L	1	<1	<1	20100812.R13na11
Total Chromium	1	ug/L	1	<1	<1	20100812.R13na11
Total Cobalt	1	ug/L	1	<1	<1	20100812.R13na11
Total Copper	1	ug/L	1	<1	<1	20100812.R13na11
Total Europium	1	ug/L	1	<1	<1	20100812.R13na11
Total Gallium	1	ug/L	1	<1	<1	20100812.R13na11
Total Iron	20	ug/L	20	<20	<20	20100812.R13na11
Total Lanthanum	1	ug/L	1	<1	<1	20100812.R13na11
Total Lead	1	ug/L	1	<1	<1	20100812.R13na11
Total Lithium	5	ug/L	5	<5	<5	20100812.R13na11
Total Magnesium	4	ug/L	4	<4	<4	20100812.R13na11
Total Manganese	1	ug/L	1	<1	<1	20100812.R13na11

ICPMS Tot. Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Mercury	0.1	ug/L	0.1	<0.1	<0.1	20100812.R13na11
Total Molybdenum	1	ug/L	1	<1	<1	20100812.R13na11
Total Nickel	1	ug/L	1	<1	<1	20100812.R13na11
Total Niobium	1	ug/L	1	<1	<1	20100812.R13na11
Total Rubidium	1	ug/L	1	<1	<1	20100812.R13na11
Total Selenium	1	ug/L	1	<1	<1	20100812.R13na11
Total Silver	5	ug/L	5	<5	<5	20100812.R13na11
Total Sodium	100	ug/L	300	<100	<100	20100812.R13na11
Total Strontium	1	ug/L	1	<1	<1	20100812.R13na11
Total Thallium	1	ug/L	1	<1	<1	20100812.R13na11
Total Thorium	1	ug/L	1	<1	<1	20100812.R13na11
Total Tin	1	ug/L	1	<1	<1	20100812.R13na11
Total Tungsten	1	ug/L	1	<1	<1	20100812.R13na11
Total Uranium	1	ug/L	1	<1	<1	20100812.R13na11
Total Vanadium	1	ug/L	1	<1	<1	20100812.R13na11
Total Yttrium	1	ug/L	1	<1	<1	20100812.R13na11
Total Zinc	1	ug/L	1	<1	<1	20100812.R13na11
Total Zirconium	1	ug/L	1	<1	<1	20100812.R13na11

Positive Control (1011)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Aluminum	1	ug/L	600	499	400	20100812.R13na11
Total Arsenic	1	ug/L	120	101	80	20100812.R13na11
Total Barium	1	ug/L	120	91.1	80	20100812.R13na11
Total Berylium	1	ug/L	125	93.2	75	20100812.R13na11
Total Boron	2	ug/L	110	107	90	20100812.R13na11
Total Cadmium	1	ug/L	120	102	80	20100812.R13na11
Total Calcium	50	ug/L	1200	1060	800	20100812.R13na11
Total Chromium	1	ug/L	110	93.7	90	20100812.R13na11
Total Cobalt	1	ug/L	120	94.9	80	20100812.R13na11
Total Copper	1	ug/L	120	96.2	80	20100812.R13na11
Total Iron	20	ug/L	600	524	400	20100812.R13na11
Total Lead	1	ug/L	120	96.4	80	20100812.R13na11
Total Magnesium	4	ug/L	1200	1060	800	20100812.R13na11
Total Manganese	1	ug/L	120	95.2	80	20100812.R13na11
Total Molybdenum	1	ug/L	120	96.2	80	20100812.R13na11
Total Nickel	1	ug/L	120	97.4	80	20100812.R13na11
Total Selenium	1	ug/L	120	105	80	20100812.R13na11
Total Sodium	100	ug/L	22000	20300	18000	20100812.R13na11
Total Thallium	1	ug/L	120	94.8	80	20100812.R13na11
Total Vanadium	1	ug/L	120	96	80	20100812.R13na11
Total Zinc	1	ug/L	120	93.5	80	20100812.R13na11

pHWATER

pH 7 Metrohm						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
pH	N/A	pH	7.2	7.15	6.8	20100809.R2F

Sulphide Water

0.5 mg/L Control						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Sulphide (as H2S)	0.05	mg/L	0.6	0.514	0.4	20100809.R11A

TDS

200 mg/L Control						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Dissolved Solids	25	mg/L	240	230	160	20100809.R27F

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Dissolved Solids	25	mg/L	50	<25	<25	20100809.R27F

TKN Water Dig.

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Kjeldahl Nitrogen	0.5	mg/L	<0.5	<0.5	<0.5	20100809.R58D

Control Sample						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Kjeldahl Nitrogen	0.5	mg/L	30	21.5	20	20100809.R58D

TP Water

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Phosphorus (as P)	0.002	mg/L	0.005	<0.002	<0.002	20100809.R23.2B

Control (0.05 mg/L)						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Phosphorus (as P)	0.002	mg/L	0.06	0.0514	0.04	20100809.R23.2B

TSS - 500

Blank						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Suspended Solids	6	mg/L	<6	<6	<6	20100809.R27C

Control Standard						
Parameter	**MDL**	**Units**	**UCL**	**Result**	**LCL**	**QAQCID**
Total Suspended Solids	6	mg/L	230	158	150	20100809.R27C

UCL Upper Control Limit
LCL Lower Control Limit

CLIENT REGULATION REPORT*

* Please note that the terms "Regulation Report" and "Reg. Value" in the context of this report may refer to regulatory limits, regulatory guidelines, standards or objectives, or client-specific operational limits or guidelines from sources such as a site-specific Certificate of Approval, as selected by the client on the Chain of Custody. Highlighted results indicate a measured value that exceeds the reported Reg. Value.

TESTMARK Laboratories Ltd. has included the criteria values set by the appropriate government agency as part of this report for purposes of reference only. These values may or may not accurately reflect the current values prescribed by government regulation and it is the Client's responsibility to compare the results reported herein with official government sources to ensure it meets the prescribed critera. Should any discrepancies be discovered or should you have any questions or comments regarding the information in this report, please contact TESTMARK Laboratories Ltd. by phone or by email at reg.report@testmark.ca

Regulation: PWQO

Sample Name: SW - 1 **Lab #:298030**

Parameter	Reg. Value	Result	RDL	MDL	Reg Units	Units
Total Aluminum	75	58.2	7.5	1	ug/L	ug/L
Total Antimony	20	<0.5	20	0.5	ug/L	ug/L
Total Arsenic	100	2.2	100	1	ug/L	ug/L
Total Berylium	11	<0.5	11	0.5	ug/L	ug/L
Total Boron	200	17	200	2	ug/L	ug/L
Total Cadmium	0.2	<0.1	0.2	0.1	ug/L	ug/L
Total Chromium	1	<0.8	1	0.8	ug/L	ug/L
Total Cobalt	0.9	0.53	0.1	0.1	ug/L	ug/L
Total Copper	5	7.6	1	1	ug/L	ug/L
Total Iron	300	93	300	20	ug/L	ug/L
Total Lead	1	<1	1	1	ug/L	ug/L
Total Molybdenum	40	<1	4	1	ug/L	ug/L
Total Nickel	25	40.9	25	1	ug/L	ug/L
Total Selenium	100	<1	100	1	ug/L	ug/L
Total Silver	0.1	<0.1	0.1	0.1	ug/L	ug/L
Total Thallium	0.3	<0.1	0.3	0.1	ug/L	ug/L
Total Tungsten	30	<1	30	1	ug/L	ug/L
Total Uranium	5	<1	5	1	ug/L	ug/L
Total Vanadium	6	1	2	1	ug/L	ug/L
Total Zinc	30	25.7	30	1	ug/L	ug/L
Total Zirconium	4	<1	4	1	ug/L	ug/L

Regulation: PWQO

Sample Name: SW - 3 **Lab #:298031**

Parameter	Reg. Value	Result	RDL	MDL	Reg Units	Units
Total Aluminum	75	38.3	7.5	1	ug/L	ug/L
Total Antimony	20	<0.5	20	0.5	ug/L	ug/L
Total Arsenic	100	2	100	1	ug/L	ug/L
Total Berylium	11	<0.5	11	0.5	ug/L	ug/L
Total Boron	200	18	200	2	ug/L	ug/L
Total Cadmium	0.2	<0.1	0.2	0.1	ug/L	ug/L
Total Chromium	1	<0.8	1	0.8	ug/L	ug/L
Total Cobalt	0.9	0.58	0.1	0.1	ug/L	ug/L
Total Copper	5	7.8	1	1	ug/L	ug/L
Total Iron	300	79	300	20	ug/L	ug/L
Total Lead	1	<1	1	1	ug/L	ug/L
Total Molybdenum	40	<1	4	1	ug/L	ug/L
Total Nickel	25	45.2	25	1	ug/L	ug/L
Total Selenium	100	1.9	100	1	ug/L	ug/L
Total Silver	0.1	<0.1	0.1	0.1	ug/L	ug/L
Total Thallium	0.3	<0.1	0.3	0.1	ug/L	ug/L
Total Tungsten	30	<1	30	1	ug/L	ug/L
Total Uranium	5	<1	5	1	ug/L	ug/L
Total Vanadium	6	<1	2	1	ug/L	ug/L
Total Zinc	30	11.7	30	1	ug/L	ug/L
Total Zirconium	4	<1	4	1	ug/L	ug/L

Additional Table Information:

O. Reg. 153/04 Table 1 Ground Water - It is the sum of 1- and 2- methylnapthalene which is the limit expressed
O. Reg. 153/04 Table 2 Soil (any) - It is the sum of 1- and 2- methylnapthalene which is the limit expressed
O. Reg. 153/04 Table 2 Ground Water - The Sum of F1 + F2 cannot exceed 1000 ug/L
O. Reg. 153/04 Table 2 Ground Water - The Sum of F3+F4 cannot exceed 1000 ug/L
O. Reg. 153/04 Table 3 Soil (any) - It is the sum of 1- and 2- methylnapthalene which is the limit expressed
O. Reg. 153/04 Table 4 Soil (any) - It is the sum of 1- and 2- methylnapthalene which is the limit expressed
O. Reg. 153/04 Table 4 Ground Water - The Sum of F1 + F2 cannot exceed 1000 ug/L
O. Reg. 153/04 Table 4 Ground Water - The Sum of F3+F4 cannot exceed 1000 ug/L
O. Reg. 153/04 Table 5 Soil (any) - It is the sum of 1- and 2- methylnapthalene which is the limit expressed
O. Reg. 153/04 Table 6 - It is the sum of 1- and 2- methylnapthalene which is the limit expressed

All O. Reg. 153/04 Tables - The limits presented for o-xylene, and m/p-xylene are the limits for Total Xylene. Accordingly, the regulation limit expressed in this report is for the Sum of these parameters.

Hutchinson

Environmental Sciences Ltd.

Wabageshik Rapids,

Vermilion River

Proposed Hydroelectric Generating Station

Surface Water Quality and Fish Sampling Guidance

Prepared for: Xeneca Power Development Inc.
Job No.: J120022

July 18, 2012

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July 18, 2012

Project No.: J120022

Ed Laratta
Manager, Environmental Programs and Approvals
Xeneca Power Development Inc.
5160 Yonge Street, Suite 520
Toronto, ON
M2N 6L9

Dear Mr. Laratta:

We are pleased to provide the surface water quality and fish tissue sampling guidance for the proposed Wabageshik Rapids hydroelectric generating facility on the Vermilion River, east of Espanola, Ontario. The complete document describing the rationale used to develop the guidance is included in Appendix A of the attached report and water quality results from the spring 2012 baseline water quality sampling event are briefly described in the report and included in Appendix B.

The guidance was developed based on the recommendations provided in the Ontario Ministry of the Environment's draft guidance document titled ""From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's (MOE) Technical Requirements for Waterpower" (January, 2012), subsequent discussions with the MOE and proven scientific approaches used to assess the environmental quality of surface water and fish tissue.

If you have any questions regarding the guidance or its supporting rationale, please do not hesitate to contact me or Dr. Neil Hutchinson. Thank you for the opportunity to assist Xeneca with this project!

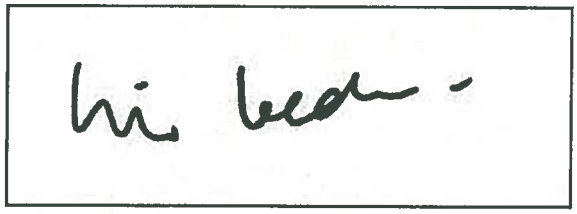
Sincerely,

Hutchinson Environmental Sciences Ltd.

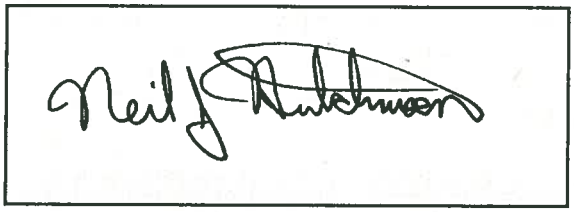
David Leeder
Intermediate Environmental Scientist

david.leeder@environmentalsciences.ca

Signatures



David Leeder
Environmental Scientist



Neil J. Hutchinson, Ph.D.
Principal Scientist

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Appendices

1. Introduction

Hutchinson Environmental Sciences Ltd. (HESL) was retained by Xeneca Power Development Inc. to develop water quality and fish tissue sampling programs and conduct baseline sampling for Xeneca's proposed hydropower development sites at a series of Ontario locations. A guidance document for the program has been developed for each proposed facility. Each guidance document contains a description of the project and its location (as provided to HESL by Xeneca), an assessment of water quality data previously collected by Xeneca, a summary of available water quality data from the Provincial Water Quality Monitoring Network (PWQMN) of the Ontario Ministry of the Environment (MOE) and a summary of fish data collected previously by Xeneca.

The information was interpreted and used to develop sampling programs to assess the baseline and post-development surface water quality and mercury concentrations in fish tissue at each of the proposed developments. The rationale for the programs is provided in the companion HESL document titled "Surface Water Quality and Fish Sampling Program, Hydroelectric Generating Facility Monitoring for Baseline Conditions and Early Operation" (January, 2012 – Appendix A) and is consistent with the draft MOE document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012) and discussions with the MOE.

This document describes the program for the Wabageshik Rapids hydroelectric project on the Vermilion River, east of Espanola, Ontario. The program is designed to monitor:

1) The surface water quality indicator parameters recommended by the MOE (2012). Monitoring will assess the pre-development water quality in the location of the proposed facility, as well as the post-development water quality upstream, in the impoundment and downstream of the facility; and,

2) Any differences in the mercury concentrations in fish tissue pre- and post-development in the impoundment and downstream of the proposed facility using the sample sizes and methodologies recommended in the January, 2012 MOE draft guidance referenced above.

2. Facility Description

The proposed Wabageshik Rapids hydroelectric generating facility is located approximately 12 km east of Espanola, Ontario on the Vermilion River, approximately 600 m downstream from the outflow of Wabageshik Lake. Figure 1 shows the location of the proposed facility.

A control dam will be constructed on the north side of the Vermilion River at the project site, with an open conveyance channel on the south side of the river directing water to a power house intake and one or more turbine(s) therein. Figure 2 shows the layout of the proposed facility.

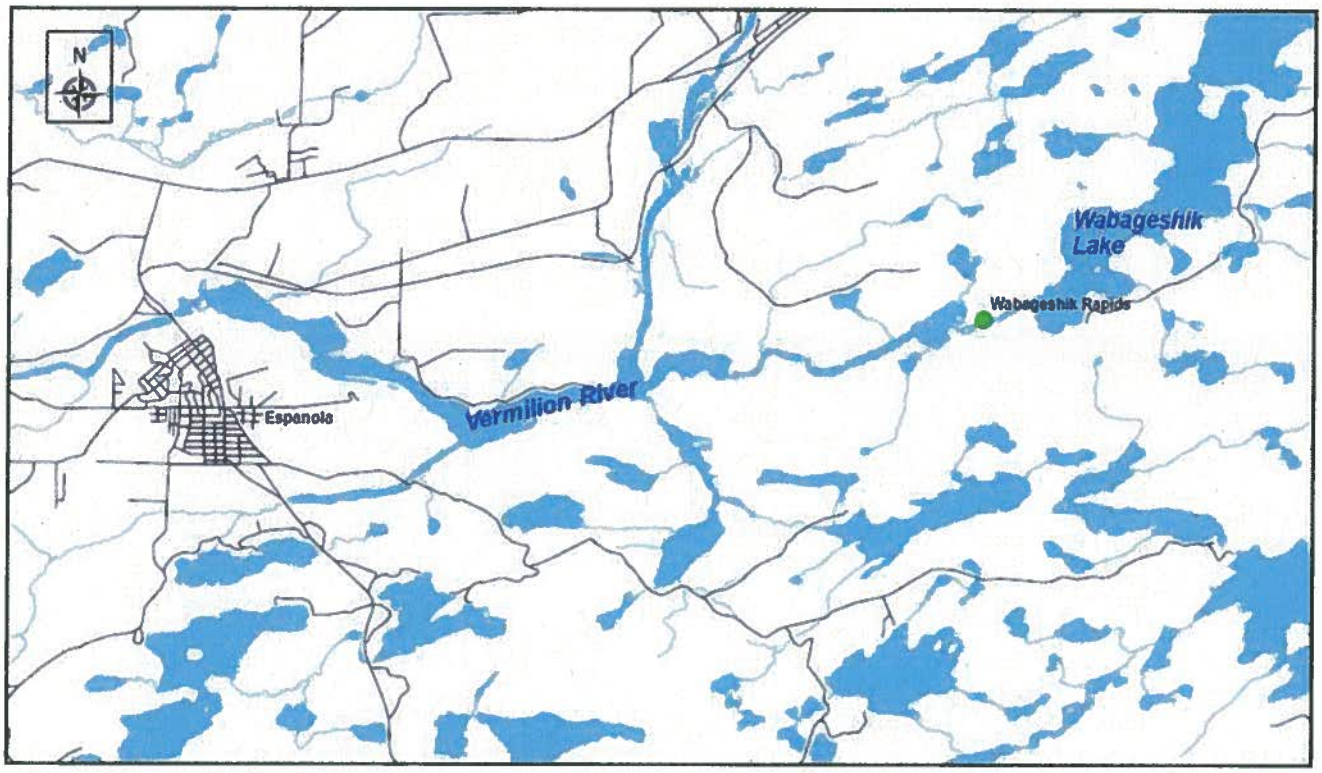

Figure 1. The location of the proposed Wabageshik Rapids hydroelectric generating facility.

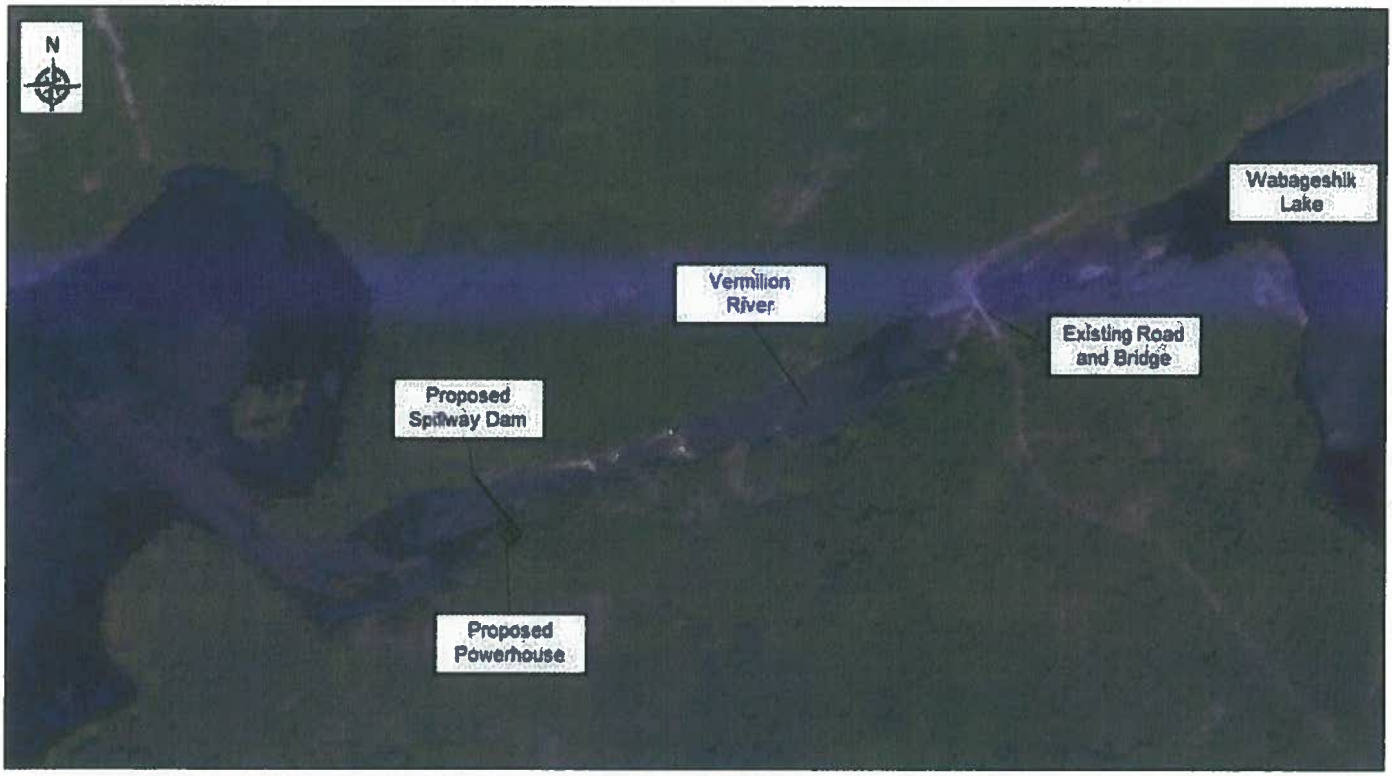

Figure 2. Proposed structures and layout of the proposed Wabageshik Rapids facility.

The project is considered to be a run-of-the-river project, with modified peaking controlling water flows through a spillway dam and directing water through the power house. The project will result in 600 m of inundation up the rapids to the outlet of Wabageshik Lake. HESL understands from Xeneca that the facility will not impound water in Wabageshik Lake. The inundation will not result in appreciable lateral flooding of land on either side of the existing river channel due to the steep slopes on either side of the existing rapids.

Xeneca has informed HESL that the dam and power house will not represent impassable barriers to upstream fish migration. Fish will be able to move freely into Wabageshik Lake from the head pond upstream of the facility. If the status of fish passage at the facility changes, HESL requests to be notified immediately, and the fish sampling program will need to be revised.

3. Water Quality

3.1 Existing Data

3.1.1 Project Related Monitoring

On April 14, 2012, baseline water quality samples were collected from the Vermilion River at the proposed facility. The results of the sampling event indicate that the Vermilion River at the facility is slightly alkaline with low nutrient concentrations, low turbidity, conductivity of 138 µS/cm and high dissolved organic carbon (DOC) concentrations. The concentrations of total aluminum, copper and nickel at the proposed facility exceeded Ontario Provincial Water Quality Objectives (PWQOs), the regulatory surface water quality objectives that apply to water at the proposed facility.

The concentrations of nickel (> 34 µg/L) and copper (> 6.5 µg/L) are unusually high for surface water on the Canadian Shield and may reflect local mineralization or the response to historical nickel-copper sulphide smelting in Sudbury. Future sampling events will determine if the measured values were anomalies or typical of the Vermilion River. The concentrations of aluminum and iron were also high and may be the result of measured high dissolved organic carbon (DOC) concentrations which is commonly associated with wetland drainage. No other parameter concentrations exceeded PWQOs.

Spring, 2012 baseline analytical results will be discussed in detail along with summer and fall 2012 results, in a 2012 baseline year end water quality report (to be completed in December, 2012). Water quality results from the spring 2012 baseline water quality sampling event are included in Appendix B.

Prior to spring 2012 sampling, water quality sampling at the proposed facility was limited to two events during the 2010 open water season. The 2010 sampling consisted of field parameter measurements and two water samples analyzed for iron. The 2010 data has limited water chemistry analysis but is useful for establishing trends in water quality through the project area over time, when combined with other data.

3.1.2 PWQMN Data

A PWQMN monitoring station was in operation on the Vermilion River at Regional Road 10 (old Highway 549) approximately 24 km east of the proposed facility and upstream of Wabageshik Lake from 1994 to

1996 (PWQMN station 14002805802). The monitoring site was sampled monthly by the MOE between January and November in each year of operation. The PWQMN monitoring station was on a stretch of the Vermilion River that is similar to where the proposed facility will be located and was immediately downstream of a lake of comparable size to Wabageshik Lake, on a similarly sized reach of river and surrounded by undeveloped forested land.

The data from PWQMN monitoring indicates that water quality on the Vermilion River is closely tied to the river's hydrograph as described in the HESL Rationale Document. There are notable differences in water quality associated with the spring freshet (early May to early June), during the summer low-flow period (early August to early September) and during the late fall mid-flow period (late October to late November). These seasonal trends were used to develop the temporal aspects of the water quality sampling program as described in Section 3.2 below.

3.2 Proposed Water Quality Sampling Program

3.2.1 Temporal Water Quality Sampling

All water quality samples will be collected three times per year during the open water season to sample the spring freshet, the summer low-flow period and the fall mid-flow periods. Sampling will correspond to the river's hydrograph and be adjusted temporally to occur during the targeted periods. For years that are different than the historical trend for the river, this will require monitoring the river's hydrograph and sampling accordingly. In the spring of 2011 and 2012 for example, the spring freshet occurred in mid to late April which is earlier than the historical trend for the Vermilion River, and the spring 2012 sampling was conducted in late April.

Water quality sampling will be conducted for two years prior to facility development to establish a baseline of water quality, as recommended by MOE. Baseline water quality samples will provide a benchmark from which to compare post-development water quality and assess whether or not the project is having an effect on water quality within the area of inundation (impounded water) and immediately downstream. If the construction schedule does not allow for two years of sampling, then duplicate samples taken in each of the field visits in one year may address sampling and analytical variance related to a limited number of samples in a dataset (described further in Section 3.2.5). Duplicate water quality samples were collected in the spring of 2012 as a contingency.

Following development, water quality sampling will be conducted for three years to assess the facility's impact on water quality (if any). Typically, a response of water quality to water impoundment is fairly rapid and will be observed in the first three years following development. Water quality may also reach a stable state by the end of year three, depending on the conditions of the river and the extent of the water inundation. At Wabageshik Rapids, the extent of inundation will be relatively small with a high flushing rate, and the change and stabilization of water quality should happen fairly quickly. If after three years, additional water quality data is required to confirm that water quality has stabilized, a longer term monitoring program will be designed.

3.2.2 Baseline Water Quality Sample Locations

The spring 2012 baseline water quality samples were collected downstream of the proposed facility at the location shown as "Baseline" on Figure 3. The remaining baseline water quality samples (summer and

fall) will also be collected at this location. The baseline sample location is downstream of all inputs to the Vermilion River from the facility's limit of inundation to its proposed powerhouse tailrace, and represents the most stringent baseline reference.

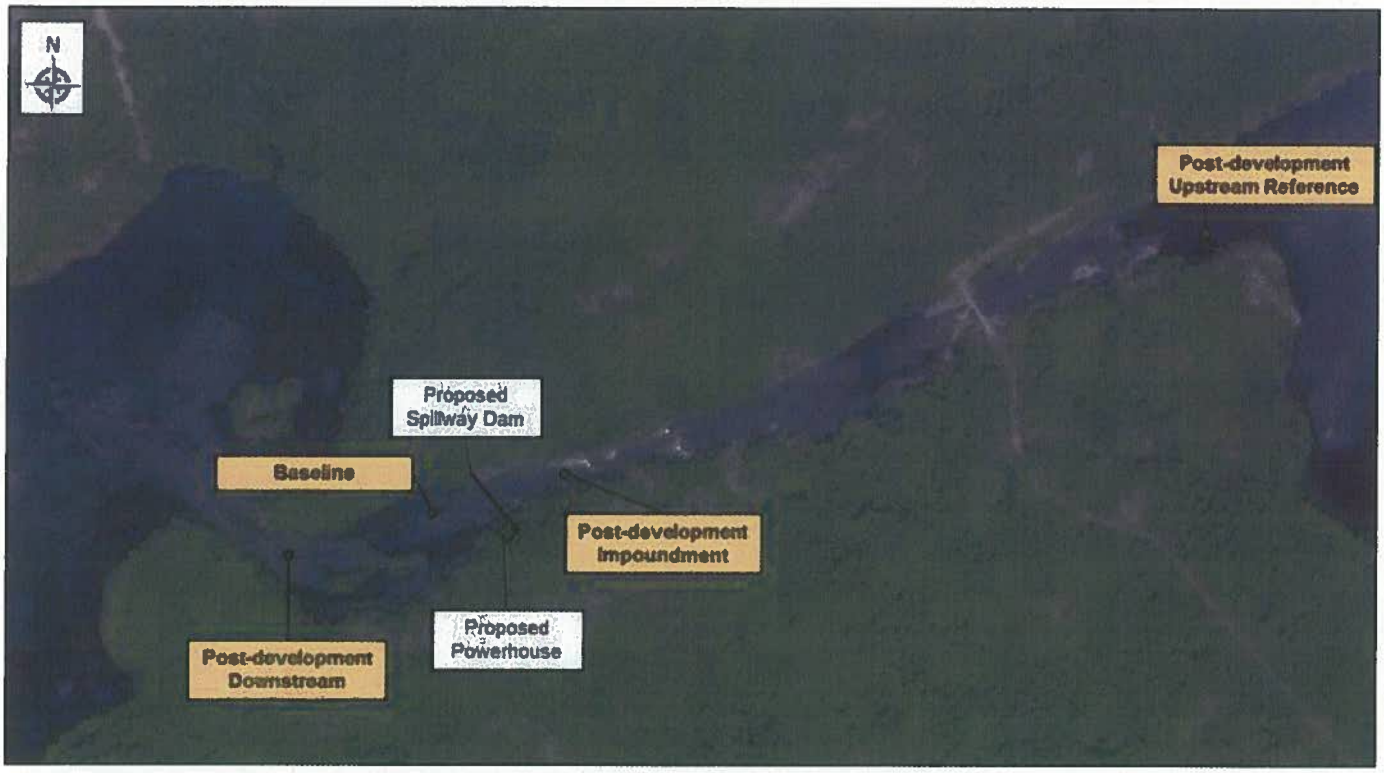

Figure 3. Water quality sampling locations at the Wabageshik Rapids facility.

The baseline samples represent the pre-development water quality immediately downstream of the proposed facility and in the proposed inundation area, and should have water quality similar to the future upstream reference site which will be unaffected by the proposed facility. There are no appreciable tributaries or inputs that would change the water quality between the facility and the future upstream reference site.

3.2.3 Post-Development Water Quality Sample Locations

Surface water quality samples will be collected in each of the three years following development in the following locations:

Upstream Reference

Post-development reference water quality samples will be collected upstream of the limit of inundation in the southwest bay at the outlet of Wabageshik Lake, as shown on Figure 3. The upstream reference sample will be collected to monitor the natural variability in water entering the impoundment to differentiate between naturally occurring changes in water quality from influences such as climate change and land use changes, and the changes to water quality as a result of impoundment.

Impoundment

Post-development water quality samples will be collected in the deepest part of the impoundment to monitor the change in water quality in the inundated area. In addition to the water quality analyses and field parameters that will be measured at the other sampling locations (Section 4.3.3) a temperature and dissolved oxygen profile with measurements taken every metre of depth, will be conducted at the impoundment water sample location to determine if thermal stratification is occurring in the impoundment. If thermal stratification is identified, a discrete water quality sample will be collected from each thermally stratified layer. The proposed impoundment water quality sample location is shown as "Post-development, Impoundment" on Figure 3. This sample location may be moved if post-development, the deepest part of the impoundment is in another location.

Downstream

Post-development water quality samples will be collected in the pool immediately downstream of the proposed facility. The spillway dam and tailrace from the power house will both discharge to this pool and collecting samples from this pool will measure the combined discharge of both of these structures. This sample location is shown on Figure 3 as "Post-development, Downstream".

3.2.4 Water Quality Sample Parameter List

All water quality samples will be analyzed for the following parameters, as recommended in the MOE (2012) guidance:

- pH, conductivity, alkalinity;
- suspended and dissolved solids;
- cations (Mg, Na, Ca, K);
- anions (chloride, sulphate);
- dissolved organic carbon;
- total phosphorus;
- nitrate, nitrite, ammonia and total Kjeldahl nitrogen (TKN);
- metals;
- low level total mercury (0.1 ng/L detection limit); and,
- low level methyl mercury (0.02 ng/L detection limit).

Water temperature, dissolved oxygen, pH, conductivity and turbidity will be measured in the field at the time of sample collection. A field data sheet for recording field parameter measurements and other pertinent information at the time of sampling (e.g., weather, precipitation in the last 24 hours, field parameter meter calibration) has been developed by HESL and will be provided to field staff for each sampling event.

Low-level phosphorus analysis will be conducted by the Trent University Laboratory in Dorset, Ontario as the higher detection limits of commercial laboratories may not provide good resolution of phosphorus concentrations in surface waters.

3.2.5 Water Quality Duplicates and QA/QC

A duplicate water quality sample will be collected during each baseline and post-development sampling event. Analytical results from the sample and its duplicate pair will be compared to identify significant differences in parameter concentrations and provide confidence in sample representativeness via replication and the precision of the lab's analytical methods. Samples from multiple projects will be collected in approximately the same time frame by sampling teams across Ontario. 10% or more of all samples taken over the multiple projects will be submitted as duplicates.

If only one year of baseline sampling is conducted, a replicate sample will be collected at the baseline sample location during each visit, slightly after the first sample was collected to confirm that the samples are representative of the river's water quality. A sample collected at a slightly different time measures different water moving through the same location of the river; if both samples are representative of this location of the river, the analytical results should be similar. Replicate sampling address some sampling and analytical variance issues associated with small analytical datasets.

4. Fish Tissue Sampling

Methyl mercury is a concern associated with all hydro-electric projects that inundate previously unflooded land and mercury bio-accumulation is a well described response to land inundation. Soils and vegetation in Ontario contain mercury from natural sources and from atmospheric deposition. Decomposition of flooded organic matter enhances the methylation of inorganic mercury in soil and sediment to the bioavailable and toxic form of methyl mercury.

Mercury may accumulate in the food chain, affecting the health of higher organisms such as predatory fish and humans. Downstream fish populations may also be exposed to mercury as the inundated water flows, or organisms and detritus containing mercury migrate, downstream. Upstream fish populations may also be affected by inundation-generated mercury, as fish can migrate upstream against the river's current. Mercury concentrations in fish in the project area should be established at baseline to provide a comparative baseline for any post-development changes of concentrations in fish.

4.1 Sample Locations

4.1.1 Baseline

Fish can move upstream and downstream throughout the project area and fish found in one location of the project area could be exposed to mercury throughout their preferred habitats in other locations within the project area. Specific sample sites will be selected within the project area based on the type of forage fish or large fish targeted for sampling, as permitted by the Ontario Ministry of Natural Resources (MNR) and according to the MNR "Riverine Index Netting, Manual of Instructions" (March, 2010).

MOE (2012) recommended that reference sampling be conducted upstream of barriers to fish migration. There is no barrier to upstream fish migration at the proposed Wabageshik Rapids facility. Therefore, upstream reference sampling will not be conducted for the facility as fish can freely migrate from the project area, upstream, and 'upstream references' would not provide an accurate reference of naturally occurring mercury concentrations in fish. Sampling fish in a different branch of the river than the facility is proposed for may not represent a reference for fish at the proposed facility due to different environmental conditions.

4.1.2 Post-Development

Post-development, fish will be sampled within the same reach of the river as at baseline. There will be an overflow weir at the facility which will not impede fish migration, and as such, fish will be able to move throughout the project area as they did prior to facility development. Upstream reference sampling is not recommended post-development as there is no upstream barrier to fish migration in the same branch of the river as the proposed facility.

4.2 Sampling Schedule

4.2.1 Baseline and Post-Development

Fish tissue sampling will be conducted prior to construction (baseline) and on three occasions following development starting on the third year, followed by sampling on the sixth and ninth years of operation. Pre-development sampling will establish a baseline of mercury concentrations in fish tissue from which to compare post-development mercury concentrations. Mercury accumulation in the food chain has a slower response to inundation than water quality, and MOE (2012) recommends sampling on years three, six and nine after development to assess mercury accumulation in fish tissue. If mercury concentrations in fish tissue have not stabilized by year nine, additional sampling may be required and a revised program can be derived at that time.

Baseline fish sampling was conducted by other consultants for Xeneca in the reach of the river that the facility will be constructed on, from 500 m upstream of the impoundment to 500 m downstream of the furthest proposed downstream discharge. Additional sampling will be conducted in the summer of 2012 in the same part of the river to complete the baseline fish sampling program.

4.2.2 Annual Timing of Sample Events

Fish sampling should be conducted during the most likely time of the year to catch the fish that are in the area of the proposed facility. In most rivers, including the Vermilion, forage fish catches are most abundant in late summer or early fall. Large fish may need to be sampled at a different time of the year, depending on the habitat and species present at the facility.

Sampling over multiple visits in one year to obtain the required catch should be avoided for forage fish, particularly if the sampling is focussed on yearlings, as relative sizes will increase quickly over the course of one year, possibly resulting in problems interpreting mercury body burdens. For larger fish, sampling over multiple visits in a single season, or even over two years is acceptable, provided that a comparable size and distribution of fish are submitted for each sampling event.

Where possible, fish sampling should be co-ordinated with water quality sampling to help relate the results of the programs to each other and reduce expenses.

4.3 Existing Fish Samples

In 2010 and 2011, fish sampling was conducted by Natural Resource Solutions Inc. (NRSI) at the proposed facility. Sampling was conducted according to the MNR's Riverine Index Netting protocol.

72 fish were caught during the 2010 and 2011 programs. The most common sport fish species' caught were Walleye (*Sander vitreus*), Northern Pike (*Esox Lucius*), Yellow Perch (*Perca flavescens*) and Smallmouth Bass (*Micropterus dolomieu*). Brown Bullhead (*Ameiurus nebulosus*), Lake Herring (*Coregonus artedi*), Lake Sturgeon (*Acipenser fulvescens*), Longnose Sucker (*Catostomus catostomus*) and White Sucker (Catostomus commersonii) were caught in lower abundance. Cyprinid species caught and considered to be forage fish were Bluntnose Minnow (Pimephales notatus) and Fathead Minnow (Pimephales promelas).

NSRI collected fish tissue samples from 17 Walleye (large fish) according to MOE's "Protocol for the Collection of Sport Fish Samples for Inorganic and Organic Contaminant Analyses". These samples are currently frozen and archived at NRSI's facility in Waterloo, Ontario and will be analyzed when the collections are complete in 2012.

4.4 2012 Fish Tissue Sampling Program

The MOE (2012) recommends that the following fish sizes and numbers of fish be sampled at each location during each baseline and post-development sampling program:

- Large Fish: 20 individuals of at least 25 to 55 cm size; fish species common to the area that can be caught in subsequent years and piscivorous fish are preferred; and,
- Forage Fish: five (5) composite samples of 5 to 10 individuals of yearling perch or other cyprinid species; fish should be sufficient size to yield a composite sample of 10 grams.

The following fish remain to meet MOE (2012) recommendations and will be targeted in 2012 to complete the baseline fish sampling program:

- Large fish: three (3) samples by angling from Walleye or Northern Pike to be consistent with the archived samples and meet MOE (2012) recommendations. If Pike are sampled, at least two individuals are needed to meet MOE (2012) recommendations (i.e., two or more samples of any one species are required for the species to be included in the sampling population); and,
- Forage fish: five (5) composite samples of 5 fish each using gill nets and minnow traps, preferably Bluntnose Minnow and Fathead minnow, or yearling Yellow Perch, as these species commonly occur at the proposed facility.

The large fish and forage fish samples collected in 2012 and the 17 large fish samples collected in 2010 to 2011 by NSRI (currently archived) will be submitted to Flett Research in Winnipeg, Manitoba for analysis of low level total mercury (detection limit < 2.0 ng/g). Low level methyl mercury analysis

(detection limit < 1.0 ng/g) will be conducted by Flett on the 2012 composite forage fish samples in additional to total mercury analysis.

It will be conservatively assumed that all mercury in large fish is methyl-mercury for fish consumption guideline purposes. Methyl-mercury will be measured in addition to total mercury in forage fish to provide information to the MOE on methyl-mercury accumulation in the food chain.

5. Closing

This document has been prepared to describe the surface water quality and mercury-in-fish sampling programs to be conducted at the proposed Wabageshik Rapids hydroelectric generating facility. Supporting rationale for the programs is provided in the HESL document titled "Surface Water Quality and Fish Sampling Program, Hydroelectric Generating Facility Monitoring for Baseline Conditions and Early Operation" (January, 2012) and the draft MOE document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012). Please direct any questions concerning this guidance or the rationale used to develop it to David Leeder or Neil Hutchinson of Hutchinson Environmental Sciences Ltd.

Appendix A

HESL Rationale Document (January, 2012)

Hutchinson

Environmental Sciences Ltd.

Xeneca Power Development Surface Water Quality and Fish Sampling Program

Hydroelectric Generating Facility Monitoring
For Baseline Conditions and Early Operation

Prepared for: Xeneca Power Development Inc.
Job No.: J100036

June, 2012

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121 Charles St. W. Unit C406, Kitchener, ON N2G 1H6 ph: 519 576 1711

Hutchinson
Environmental Sciences Ltd.
3-1 Taylor Road, Bracebridge, ON P1L 1S6 ph: 705-645-0021

July 16, 2012

Project No.: J100036

Mr. Ed Laratta
Manager, Environmental Programs and Approvals
Xeneca Power Development Inc.
5160 Yonge Street, Suite 520
Toronto, ON
M2N 6L9

Dear Mr. Laratta:

The Surface Water Quality and Fish Sampling Programs for Hydroelectric Generating Facility Monitoring has been prepared based on the Draft Ontario Ministry of the Environment (MOE) document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012), and subsequent conversations with MOE regarding their guidance and its application to Xeneca's proposed hydroelectric generating facilities. This revised document supersedes our May, 2012 reported (titled the same).

The revised draft describes our application of the MOE (2012) guidance to the proposed Xeneca facilities and provides the rationale for the application for the MOE's review and acceptance. In most cases, MOE's 2012 guidance has been applied as recommended by the ministry. In some cases, the MOE guidance does not apply to the conditions at the Xeneca facilities and we have recommended an alternative sampling or analytical approach which meets the intent of the MOE guidance as we understand it.

Facility-specific sampling plans are currently being finalized for the priority Xeneca facilities that are being sampled in 2012 for water quality and mercury concentrations in fish. These reports are site-specific companion documents to this report. Water quality and fish sampling was mostly completed in 2011 for the four proposed Xeneca facilities on the Kapuskasing River, prior to MOE's current guidance (2012), and as such the recommendations presented herein do not apply to those facilities.

Please review this report and do not hesitate to get in touch if you have any questions or concerns. I thank you for the opportunity to assist Xeneca and look forward to the next stages of the project.

Sincerely,

Neil J. Hutchinson, Ph.D.
President, Principal Aquatic Scientist
neil.hutchinson@environmentalsciences.ca

Signatures

Bev Clark
Senior Aquatic Scientist

David Leeder
Intermediate Environmental Scientist

Neil J. Hutchinson, Ph.D.
Principal Scientist

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1. Introduction

Xeneca Power Development Inc. retained Hutchinson Environmental Sciences Ltd. (HESL) to provide technical input for developing a cost-effective strategy to sample water quality and the mercury concentrations in fish tissue as part of the environmental assessment (EA) process for 15 hydroelectric generating facilities proposed for northern and eastern Ontario. This document recommends an approach and rationale for assessing the surface water quality and mercury concentrations in fish tissue for the 15 projects. The program design is based on the Ontario Ministry of the Environment's (MOE) draft document, "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012), our interpretation of the guidance and on the specific conditions associated with each of the proposed Xeneca projects.

This report is part one of a two-part document for each facility:

- Part 1: This report provides the rationale for the water quality and fish tissue sampling programs and discusses how the approach applies the MOE's recommendations for water quality and fish tissue mercury monitoring at the 15 proposed facilities; and,

- Part 2: A facility-specific document which applies the principles of this document and the draft MOE guidance (2012) to each facility, and provides a sampling plan with supporting rationale for the facility. Currently, eight facility-specific sampling plans have been prepared for the facilities which are considered to be a priority for development, by Xeneca. Water quality sampling and fish sampling is being conducted at the eight priority facilities in 2012. The location of each priority facility is shown in Figure 1.

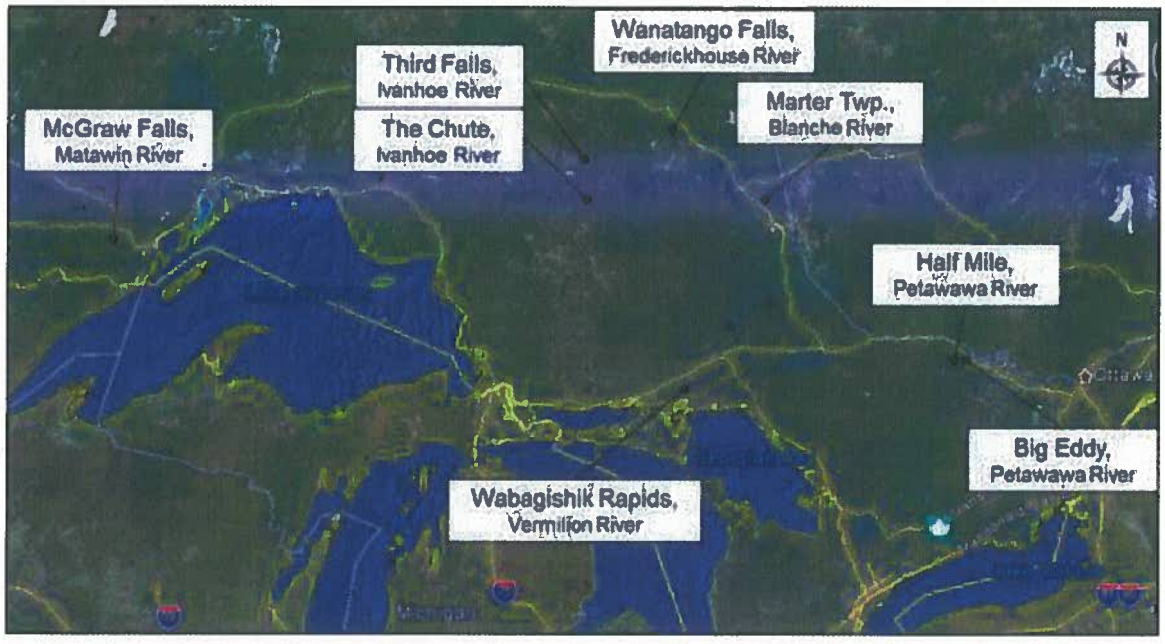

Figure 1. Proposed priority Xeneca hydroelectric generating facilities.

The EAs for four proposed Xeneca facilities on the Kapuskasing River are currently under final regulatory review. The water quality and fish assessment work on these facilities was completed in the fall of 2011, with the exception of some minor data gap filling field work that is being conducted in 2012. Hatch Consultants conducted this work and it is HESL's understanding from Xeneca that the work has satisfied the recommendations presented in MOE's draft document titled "Guidance for Conducting Baseline and Post Development Monitoring of Water Quality and Fish Tissue for Proposed Waterpower Projects" (November, 2010) and the intent of MOE's 2012 draft guidance document. Since the work on the Kapuskasing River facilities was mostly completed prior to MOE's current guidance document (January, 2012), the recommendations presented herein do not apply to those facilities.

2. Background

2.1 Relevance of Monitoring

Surface water quality and mercury accumulation in fish tissue may be affected by any hydropower development, or impounding of surface water, including the impoundments related to the proposed Xeneca projects. Water quality and mercury in fish tissue should be monitored before and after facility development to assess if change is occurring as a result of the development and if this change poses a human health or environmental risk. For example, mercury concentrations are elevated in fish tissue through much of Ontario as a result of atmospheric deposition and natural soil weathering, and a pre-development baseline of mercury concentrations in fish should be established so that post-development concentrations are not mistakenly attributed to a development involving water impoundment. Conversely, if unacceptable change is occurring as a result of development, monitoring results provide valuable information on the trend(s) of the change relative to pre-development conditions, and informed mitigating action can be undertaken. The monitoring results from existing projects can also be used to design and operate future projects in a way that will have less of an environmental impact.

2.2 Mechanisms of Post-Development Change

Water will be impounded or diverted to some extent as part of each of the proposed Xeneca projects. The extent of impoundment and diversion will vary between the projects depending on the operating regime of the project, the conditions at each facility, and stakeholder as well as environmental requirements. Diversion and impoundment are required to increase the head (fall) of water through the facility to generate power, and water storage is required so that there is a relatively constant water supply through the year for consistent power generation, to maintain flows in the natural watercourse, or a combination of the two.

Impounding a river creates an environment in the impounded area that can be more pond- or lake-like than the original river. This results in physical changes to the aquatic environment which may include vertical thermal stratification in the impounded water body, a change in nutrient or metal cycling and concentrations, and/or changes to the fish and invertebrate communities. Similar effects may occur in lakes that increase in depth and surface area as a result of impounding water in their basins, although HESL understands that lakes will not be affected by the impoundments of the proposed Xeneca projects.

Impounded water will be exposed to areas of rock, soil and vegetation that have not been historically saturated with water. Impoundment creates both physical and chemical changes to the water as flooded land changes from a terrestrial environment to an aquatic or riparian environment with nutrients, metals, organic carbon, dissolved and suspended solids being released to the impounded water. The rate and nature of this change from a terrestrial to an aquatic environment will affect the rate of release of these materials and will depend on several factors, including the type of terrestrial vegetation, the depth and type of soil saturated by the impounded area, and the depth and duration of the impoundment.

Typically, following impoundment, water chemistry will change quickly and then stabilize. Nutrients, metals, cations (i.e., Mg, Na, Ca, K), anions (i.e., chloride and sulphate), dissolved organic carbon (DOC), dissolved and suspended solids, conductivity, alkalinity, dissolved oxygen, and temperature may all change as a result of:

- Chemical and physical inputs to surface water from the inundated land;
- A shift in the aquatic processes of the water in the impoundment; and,
- The physical structure of the water in the impoundment (e.g., water depth, thermal stratification, surface area of the impoundment and water residence time in the impoundment).

Changes in water quality downstream of a facility may occur as the impounded water moves through downstream surface water systems.

Water quality changes in the impoundment and downstream may be reflected in increased concentrations of some parameters and decreases in others. The physical effects of impoundment may also affect the chemical effects of impoundment. For example, the impoundment may trap and store particulate material as sediment, thus decreasing the downstream export of total nutrients or metals that adsorb to sediment. In all cases, water chemistry and physical parameters may stabilize at different conditions after impoundment than prior to impoundment or conditions may show a response to impoundment and then return to pre-impoundment conditions. These changes should be compared to baseline conditions and environmental guidelines to assess if they will result in a negative environmental impact.

Mercury is present naturally in soils and rocks in Ontario, and environmental concentrations are enhanced by atmospheric deposition from human sources such as the combustion of coal. Inundating land with water results in the partial release of natural and anthropogenic inorganic mercury (Hg) accumulated in the vegetation and soils (Bodaly et al. 1984, Hecky et al. 1991). Decomposition of flooded organic matter in soils and vegetation enhances the methylation of inorganic Hg to the bioavailable and toxic form of methyl mercury (Kelly 1997, Montgomery 2000). These elevated concentrations of mercury and methyl mercury may biomagnify within the food chain and can pose a health concern to humans and wildlife through fish consumption (Bodaly et al. 1984, Jackson 1988, Hall et al. 2005). Mercury is therefore always a potential concern associated with hydro-electric projects and bio-accumulation is a well-described response to impoundment.

Mercury concentrations in fish may increase rapidly after impoundment and then decrease and stabilize in subsequent years. This cycle has been observed in hydroelectric projects in Quebec where mercury is

also present in the soils and vegetation of impounded areas from natural and anthropogenic sources (http://www.hydroquebec.com/sustainable-development/documentation/mercure.html).

Mercury accumulation in fish is not confined to the impounded area. If there are no barriers to fish migration, fish will move from the impounded area to adjacent areas and mercury accumulated in the impoundment will be passed on to higher predators if the fish are consumed. Conversely, mercury is present in all Ontario water courses and background mercury concentrations may be higher and bioavailable in water bodies unaffected by the impoundment; mercury accumulated in areas outside of the impoundment may be observed in fish in the impoundment if fish migrate to-and-from the impoundment.

3. Monitoring Objectives

The water quality and fish sampling programs are designed to assess:

1. Any differences in surface water quality pre- and post-development using the indicator parameters and protocols recommended by the MOE (2012) in waters upstream, in the impoundments of, and downstream of the proposed facilities; and,

2. Any differences in mercury concentrations in fish tissue pre- and post-development in the reach of the river that the facility will be constructed on, as recommended by the MOE (2012). Where barriers to fish migration are present on the same reach of the river as the facility, or the facility when constructed will create a barrier, the differences in mercury concentrations in fish tissue upstream and downstream of the barriers should also be assessed.

The overall sampling program is intended to meet the MOE (2012) draft guidance objectives and recommendations.

4. Surface Water Quality Monitoring

4.1 Water Quality Parameters

All water quality samples should be analyzed for the following parameters, recommended by MOE (2012):

- pH, conductivity, alkalinity;
- suspended and dissolved solids;
- cations (Mg, Na, Ca, K);
- anions (chloride, sulphate);
- dissolved organic carbon;
- total phosphorus;
- nitrate, nitrite, ammonia and total Kjeldahl nitrogen (TKN);
- metals;

- low level total mercury (0.1 ng/L detection limit); and,
- low level methyl mercury (0.02 ng/L detection limit).

Water temperature, dissolved oxygen, pH, conductivity and turbidity should also be measured in the field at the time of sample collection. A field data sheet for recording field parameter measurements and other pertinent information at the sample location will be completed at the time of sampling.

Low-level phosphorus analysis should be conducted by the Trent University Laboratory in Dorset, Ontario as the detection limits of commercial laboratories are often too high to provide good resolution of phosphorus concentrations in surface waters.

All water samples should be collected using 'ultra clean' protocols and be analyzed by a laboratory that can achieve the minimum detection limits for low-level mercury and the Ontario Provincial Water Quality Objectives (PWQOs). Water samples should be collected just below the surface of the water, except in areas where thermal stratification is present (e.g., lakes, ponds, impoundments or quiescent pools). In the case of thermal stratification, a depth profile should be conducted at deepest known point of the water body, with water temperature and dissolved oxygen measured with every metre of depth. Once the thermal stratification is determined, a water sample will be collected from the well-mixed surface layer and the thermally isolated bottom layers.

4.2 Water Sampling – Temporal

4.2.1 Program Duration

Water quality sampling is proposed for two years prior to development and in the early stages of each facility's operation. Two years of pre-development sampling will establish a baseline for water quality against which post-development water quality can be compared to assess whether or not a project is having an effect on water quality within the impoundment and immediately downstream.

In some cases, it may not be possible to collect two years of baseline data before construction begins. If only one year of baseline sampling is conducted, a replicate sample should be collected at each water sample location at a slightly different time, to confirm that the sampling is representative of the river's water quality moving through the sample location on the sample day. This will address some sampling and analytical variance issues associated with small analytical datasets. Baseline sampling can also be conducted upstream of a facility during construction, provided the natural water elevations and flow have not been altered by construction.

Following development, early operation monitoring should be conducted annually for the first three years of facility operation. Given the typical response of water quality to impoundment with a rapid change in water quality shortly after impoundment, followed by water quality stabilizing in the early stages of a facility's operation, this time frame should be sufficient to monitor changes and establish a new baseline of water quality (if any). If water quality does not reach a stable state by the end of year three, a longer term monitoring program can be developed. Construction-phase water quality monitoring (if required) is not discussed in this document.

4.2.2 Annual Sampling Schedule

Seasonal water quality in Ontario rivers is strongly tied to the river's hydrograph, and seasonal differences in water quality can be represented by water samples collected during each of the annual hydrograph periods. All water quality samples should be collected three times per year during the open water season to sample the spring freshet commonly occurring in mid-April to mid-May during the descending hydrograph, the summer low-flow period commonly in early August to early September and the fall mid-flow period commonly in late October to late November on the ascending arm of the hydrograph, as recommended by MOE (2012).

Sampling should correspond to the river's hydrograph and be adjusted temporally to occur during the targeted periods as required. For years that are different than the historical trend for the river, this will require monitoring the river's hydrograph and sampling accordingly.

4.3 Water Sampling – Spatial

4.3.1 Pre-Development (Baseline) Water Quality

For each proposed facility, pre-development, baseline water quality samples (with duplicates) should be collected within the project area (i.e., from somewhere between the proposed upstream extent of the impoundment and the discharge of the power house tailrace). This assumes that water quality is the same within the reach of the project area in an unobstructed river. Where the project area is not uniform, other strategies should be considered. Four examples of baseline water quality sampling locations are proposed to reflect different project environments:

1. One sampling location is adequate for an unobstructed and uniform project area (Figure 1, Scenario A – following page);

2. A tributary or other influence (e.g., urban runoff) entering the river within the project area could affect water quality. In this case, a water sample collected upstream and downstream of the influence differentiates between the water quality of the river entering the project area and the combined water quality of the river and the tributary within the project area (Figure 1, Scenario B);

3. If the impoundment provides direct hydraulic connection with an upstream lake, an upstream sample should be collected from the lake to determine its pre-development water quality (Figure 1, Scenario C), as lake water quality can vary appreciably from that in a downstream river. If the pond or lake is thermally stratified, a temperature and dissolved oxygen depth profile should be taken at its deepest point and water samples collected from each thermal stratification layer (if present). None of the proposed priority Xeneca facilities impound water to a lake at this time; and,

4. If there is a ponded water or an impoundment within the project area, a pre-development water quality sample should be collected downstream of the pond, within the pond and upstream of the pond (Figure 1, Scenario D) as the water quality may vary appreciably between these locations. If the pond or lake is thermally stratified, a temperature and dissolved oxygen depth profile should be taken at its deepest point and water samples collected from each thermal stratification layer (if

present). If an impoundment will be present in the pond or lake post-development, the 'within' pond sample will be useful in measuring changes to the water body.

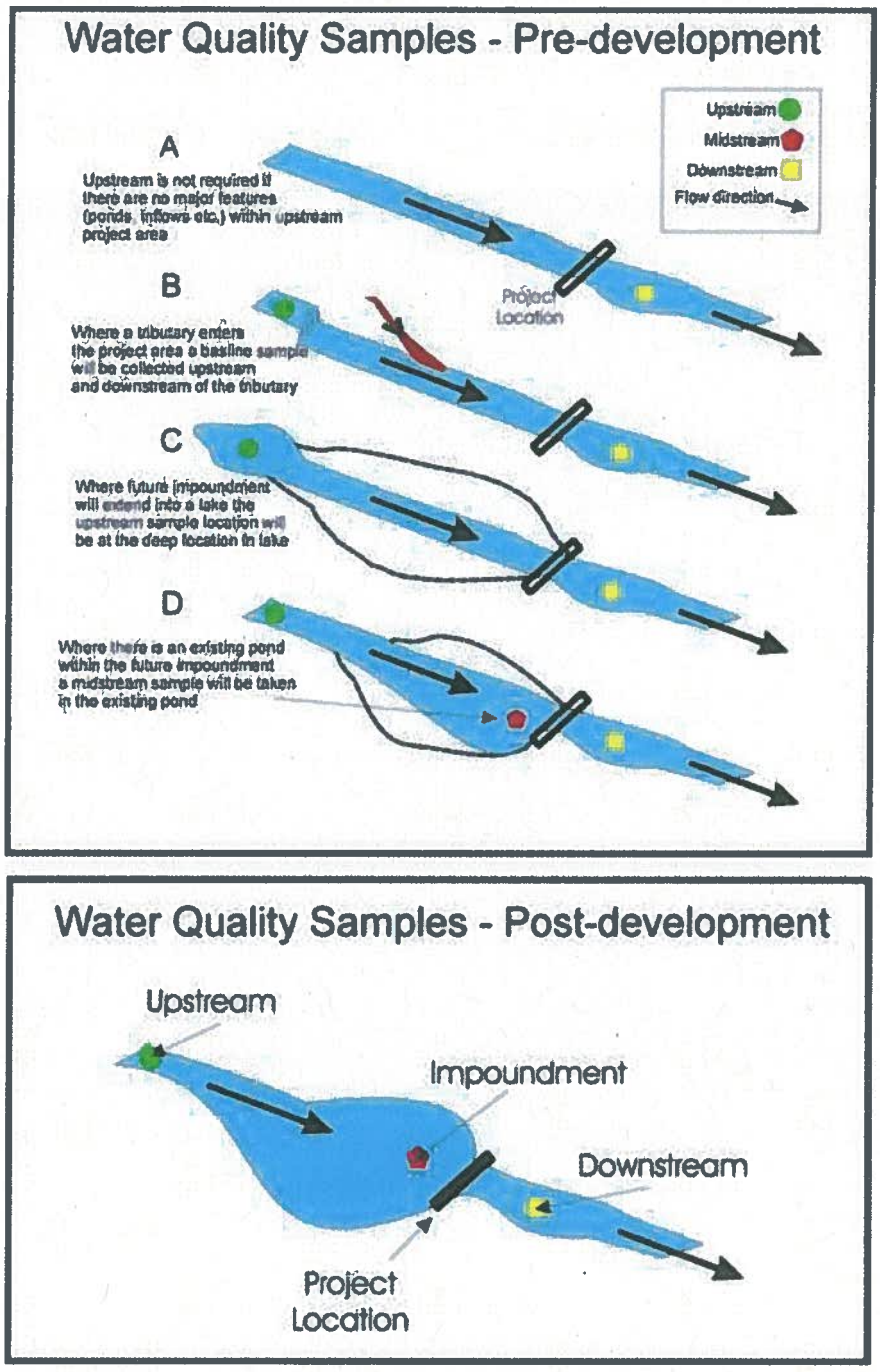

Figure 1. Water quality sample location conceptual diagrams.

4.3.2 Post-Development Water Quality

For each proposed facility, post-development water quality samples will be collected during the first three years of facility operation as shown at the bottom of Figure 1 and described below:

- Upstream: A water sample should be collected in the reach of river immediately upstream of the impoundment. The upstream reference sample is to assess the quality of the water entering the impoundment (unaffected by the development) to provide a reference from which to compare impoundment water quality. The upstream sample will also assess the effects of natural variability on water quality by comparing upstream water quality, unaffected by the development, over time and to pre-development baseline water quality. Upstream post-development water quality and baseline water quality should be comparable; if it is not, natural variability is affecting water quality, and the difference between baseline and post-development upstream water quality should be considered when interpreting post-development impoundment and downstream water quality. This will differentiate between natural or regional environmental effects and impoundment-related effects on water quality.

- Impoundment: A water sample should be collected one meter off of the bottom in the deepest part of each impoundment. In cases where an impoundment is thermally stratified, a temperature and dissolved oxygen profile should be measured, and water samples collected from the mixed surface layer and the deeper hypolimnion (if present).

- Downstream: A water sample should be collected in the reach of the river within 500 m downstream of all project discharges so that any project effects can be determined.

4.3.3 Water Quality QA/QC

A blind duplicate water quality sample should be collected during each baseline or post-development sampling event. Analytical results from the sample and its duplicate pair can be compared assess confidence in sample representativeness via replication. The blind duplicate can also be used to confirm the accuracy of the lab's analytical methods by comparison to its sample pair.

Samples from multiple projects will be collected in approximately the same time frame by sampling teams across Ontario. 10% or more of all samples taken over the multiple projects will be submitted as blind duplicates to assess analytical error for each sampling event.

5. Mercury in Fish Tissue

Mercury can bio-magnify through the food chain and can result in increases in fish body burdens even when increased mercury concentrations are not detectable in ambient water samples, as mercury uptake in fish is primarily through food sources. Fish will integrate spatial and temporal changes in contaminant availability over time as contaminants accumulate in their tissues, as they forage in different areas seasonally and during different life stages. Measuring the mercury in fish measures the mercury in living

receptors directly and provides a means of measuring mercury increases in surface water that might not otherwise be detectable.

Mercury accumulation can affect fish health and the health of predators that consume fish, including humans. Sampling young forage fish that have only accumulated mercury over one or two years provides an indication of mercury change in the environment over a relatively short time – comparing the mercury concentrations in these samples to previous samples of similar age, species and habitat, provides an empirical record of mercury change over time. In the case of mercury increases in the environment, this record is an important 'early warning' of unacceptable mercury concentrations and allows time for mitigating actions to be implemented before increased mercury in the environment accumulates in predators higher up the food chain. Sampling mercury in large piscivorous predatory fish provides an indication of mercury concentrations near the top of the food chain and information from which to base human fish consumption guidelines.

Mercury sampling in fish tissue has the following objectives:

1. To evaluate the potential impacts of waterpower development on mercury burdens in fish; and,

2. To advise fish consumption guidelines over the life of a facility.

Fish sizes and quantities, sampling locations and frequencies, and sample analysis as recommended by MOE (2012) and adapted to suit the Xeneca priority projects are described in the following sub-sections.

5.1 Fish Sample Sizes and Quantities

MOE (2012) recommend that fish be sampled in the following sizes and quantities, at each sampling location.

- Large Fish: 20 individuals of at least 25 to 55 cm length. It is preferred that a fillet be collected of each fish sample, 20 grams in weight minimum and preferably 50 grams, as described in MOE's "Protocol for the Collection of Sport Fish Samples for Inorganic and Organic Contaminant Analyses".

  Fish smaller than 15 cm total length are unacceptable. If only one fish of a species is caught it is also unacceptable as it may not be common to the area of the facility or representative of its population. Following development, the number of large fish collected from each sample location can be decreased to 10 for each sampling event. Where possible, non-lethal fish tissue sampling techniques are encouraged for large fish (e.g., 100 mg tissue plugs obtained using a dermal punch - Baker et al, 2004). Non-lethal sampling may not be possible for some species or for forage fish.

- Forage Fish: 5 composite samples of 5 to 10 individuals of yearling perch or other cyprinid species. The fish should be sufficient size to yield a composite sample of 10 grams within the following range:

  - Spottail shiners and minnows: 50 to 70 mm in total length; and,

  - Yearling yellow perch: 50 to 100 mm total length.

Yearling perch are preferred because they are easy to identify and the accumulation of mercury in perch is well known. With other small fish species, the ages of the fish may not be readily known and the only reliable qualifying data for sampled fish may be that they are of the same species and size, captured from the same area.

A sampling location is considered to be the area of a facility that is sampled (i.e., upstream, impoundment or downstream) and may include several sub-sample sites in each area to catch the recommended number of fish. For example, post-development there will be at least two sampling locations per facility: one in the impoundment and one downstream, possibly with several nets deployed in different locations of each the impoundment and downstream areas to catch the recommended number of fish for each area. The age and location of all fish samples retained for mercury analysis should be recorded.

At baseline, the fish selected for sampling should be common to the area of the facility and available following development. Different fish species accumulate mercury differently, so it is important to monitor the same species pre- and post-development so that the effects of mercury increases (if any) are not confused with differences in fish foraging/prey habits or fish physiology. The population effects from lethal sampling pre- and post-development should be considered for sample comparison and the numbers of fish sampled should be decreased if sampling will stress the fish population.

In some cases large predatory fish may not be available in the numbers recommended by MOE (e.g., at the proposed Big Eddy and Half Mile facilities on the Petawawa River). In these cases, large omnivorous fish such as catfish that may be consumed by humans should be substituted for large predatory fish. The species to be substituted for large predatory fish should be proposed to MOE on facility-by-facility basis with rationale supporting the substitution.

5.2 Fish Sampling - Temporal

5.2.1 Program Duration

MOE (2012) recommends that fish tissue sampling be conducted pre-development and every three years post-development starting on the third year of operation of the facility and ending on the ninth year of operation. Pre-development sampling will establish a baseline for mercury concentrations in fish tissue from which to compare post-development mercury concentrations and to assess if a hydroelectric facility is causing an increase in mercury concentrations in fish. The need to continue with this sampling frequency should be reviewed after the ninth year to determine if mercury concentrations have increased and if so, if the accumulation has stabilized.

5.2.2 Number and Timing of Events Annually

Fish sampling should be conducted during the most likely time of the year to catch the fish that are in the area of each proposed facility (e.g., if Walleye are targeted, sampling would be conducted during the spring spawning season, permits providing). For some locations, multiple visits may be required over the year to obtain enough fish to meet minimum sample sizes. Sampling over multiple visits should be avoided for forage fish, particularly if the sampling is focussed on yearling fish, as relative sizes will increase quickly over the course of one year, with potential problems interpreting body burdens. For

larger fish, sampling over multiple visits in a single season, or even over two years is acceptable, provided that the same sized fish are analyzed for mercury each year.

Fish sampling programs have been conducted at all of the proposed priority facilities to date and the types of fish, their locations during the year and effective capture methods are generally known. The species of fish targeted for sampling varies between the proposed facilities and is described in detail along with the time of sampling for each facility in the site-specific sampling plans. Where possible, fish sampling should be co-ordinated with water quality sampling to help relate the results of each program to each other and reduce expenses.

5.3 Fish Sample Locations

5.3.1 Baseline

Fish can migrate up and downstream through a river depending on their needs at different life stages or as a result of seasonal influences that affect water flow and forage. Unless a barrier to fish migration currently exists at a proposed facility, it is assumed that fish captured upstream of a proposed facility could move downstream of the facility, and vice-versa. Therefore, if there is no barrier to fish passage at a proposed facility, pre-development fish sampling can focus on locations within the project area where the highest catches of fish are expected. There is no need to separate upstream from downstream sites in this case.

If a barrier to fish migration currently exists within the project area, fish may migrate downstream through the barrier but cannot migrate back upstream. Barriers may cause some populations of fish to be isolated in upstream areas which will be influenced by the development. In these cases the fish in the upstream area should also be sampled pre-development to establish baseline conditions.

To provide a reference of mercury in fish from a location that fish cannot migrate to from a proposed facility once it is developed, MOE (2012) recommends that fish sampling be conducted upstream of the proposed facility on the upstream side of the nearest barrier to fish migration. This sampling is recommended at baseline and post-development for spatial and temporal comparison of results.

At most of the proposed Xeneca facilities, there is no barrier to fish migration upstream of the proposed facility and on the same reach of the river. The reach of the river is defined as a length of river that does not have any tributaries or wetlands draining into it, or any changes in land use or land type adjacent to it, up to 10 km upstream of a proposed facility and 5 km downstream. Drainage inputs to a river or changes in adjacent land may alter the downstream condition of the river and the fish in it, and sampling upstream or of these influences relative to a facility may not be representative of the river conditions at the facility. Upstream reference sampling is not recommended at facilities where there is no barrier to fish migration within 10 km of and within the same reach of the river as a proposed facility, as the reference sampling may not represent conditions at the facility. For the same reason, sampling should not be conducted downstream of a facility and downstream of a change in adjacent land or other influence, as the results may not be representative of the conditions at the facility.

5.3.2 Post-Development

Post-development, fish should be sampled in the following locations, within the same reach of the river as the facility:

- Upstream (reference): In cases where there is barrier to fish migration upstream of the proposed facility and within the same reach of the river, fish sampling should be conducted upstream of the barrier to fish migration to provide a temporal and spatial reference. The upstream reference will also assess the natural variability of water and fish quality entering the area of the facility. If there is no upstream reference for a facility, natural variability should be conservatively considered during interpretation of fish sampling data;

- Impoundment: Upstream fish sampling should be conducted in the impoundment. This represents the 'worst-case' condition, as these fish are most likely to be exposed to any mercury increases in water or the food chain resulting from the impoundment. The fish species sampled post-development should be the same as those sampled at baseline. However, this may not be possible in the impoundment if the physical environment of the river has changed post-development, resulting in a change of fish community. For example, if the river has become more quiescent, species preferring moving water may no longer be abundant. In this case it will be important to monitor mercury in forage fish pre- and post-development, as composite forage fish samples will represent the mean mercury accumulation at lower trophic levels. If the original large fish baseline species is not present post-development, other large fish species should be sampled for setting fish consumption guidelines; and,

- Downstream: Fish sampling should be conducted downstream of each proposed facility to monitor the effects of mercury generated in the impoundment area (if any) on downstream fish. In some cases the water retention structure(s) at each facility will be an impassable barrier to some fish moving upstream. However, fish from the impoundment and upstream may migrate downstream through the structures. Therefore, the mercury concentrations in fish downstream of the facility may be measured from:

  a) Fish that have migrated downstream from the impoundment into the downstream area;

  b) Fish that inhabit the area where they have been collected immediately downstream of the proposed facility and are affected by changes in water quality, detritus and food migrating downstream from the impoundment;

  c) Fish that have foraged in a different reach of the river than the facility, including adjoining tributaries, and have accumulated mercury in these areas that is unrelated to the facility; or,

  d) A combination of the above.

  Site conditions must be considered when interpreting post-development fish sample results to differentiate between the effects that the impoundment might have on downstream fish, and the conditions of fish that have never been exposed to effects of the impoundment but have been collected downstream of the facility.

Figure 2 (following page) shows a conceptual pre- and post-development fish sampling plan.

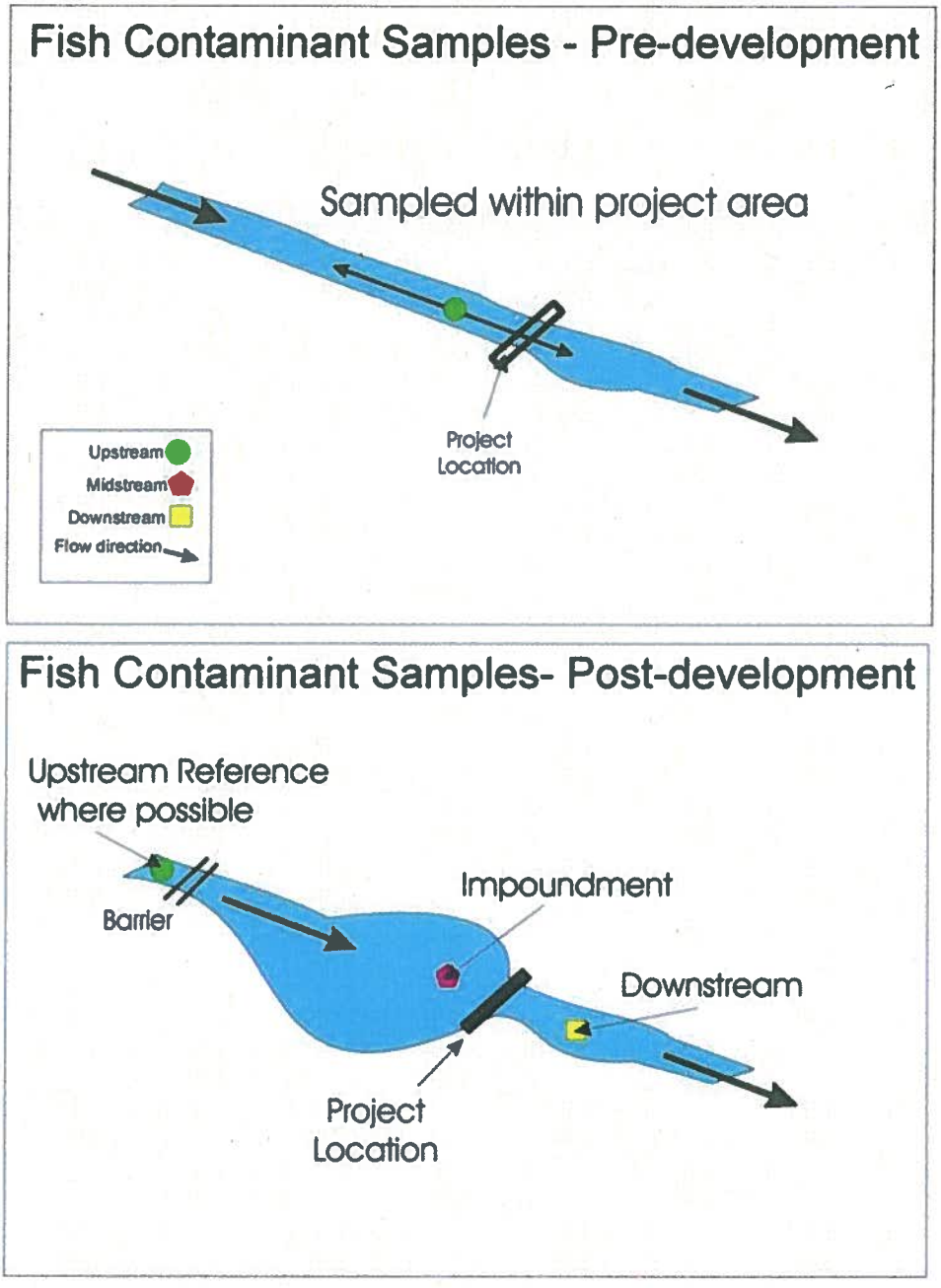

Figure 2. Fish sample location conceptual diagrams.

5.4 Fish Mercury Analysis

At each sample location, fish should be sampled for the following species of mercury, in the following quantities:

- Baseline:
  - Large fish: total mercury – 20 samples; methyl mercury – 5 samples;
  - Forage fish: total mercury and methyl mercury – 5 composite samples;
- Post-development:
  - Large fish: total mercury – 10 samples; methyl mercury – 5 samples; and,
  - Forage fish: total mercury and methyl mercury – 5 composite samples.

Most mercury in fish is methyl mercury (Rodgers et al, 1982). For the purpose of setting fish consumption guidelines and assessing the toxicity of mercury in fish, it is conservatively assumed that all mercury measured in fish is methyl mercury. Therefore, the measured total mercury concentrations can be considered to represent the methyl mercury concentrations and the number of methyl mercury samples can be reduced from MOE (2012) recommendations. MOE fish consumption guidelines are currently based on the concentration of total mercury in fish.

To confirm the assumptions that most mercury in fish is methyl mercury and to monitor methyl mercury accumulation in the food chain, five forage fish composite samples per sampling location per sampling event should also be analyzed for methyl mercury.

6. Closing

This guidance document has been prepared to provide the rationale for the water quality and fish tissue mercury sampling programs for the hydroelectric generating facilities proposed for northern and southeastern Ontario by Xeneca. The guidance presented herein is similar to the recommendations in MOE document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012). Any guidance or recommendations that differ from MOE (2012) are specific to the proposed Xeneca developments and the conditions that exist at the developments. The recommendations herein are consistent with HESL's understanding of the intent of the MOE (2012) guidance.

A site-specific guidance document has been prepared describing the sampling to be conducted at each of Xeneca's eight proposed priority facilities. Each site-specific document contains a description of the sampling program for the subject facility based on the conditions at that facility, the recommendations of this document and the recommendations of MOE (2012).

Water quality and fish sampling was mostly completed in 2011 for four proposed Xeneca facilities on the Kapuskasing River, with the exception of some minor data gap filling field work being conducted in 2012.

The work on the Kapuskasing River facilities was mostly completed prior to MOE's current guidance document (January, 2012) and the recommendations presented herein do not apply to those facilities.

7. References

Baker, R.F.; Blanchfield, P.J.; Patterson, M. J.; Flett, R. J.; Wesson, L. *Evaluation of Nonlethal Methods for the Analysis of Mercury in Fish Tissue*. Transactions of the American Fisheries Society, 133: 568-576. 2004.

Bodaly, We A., R. E. Hecky, and W. J. P. Fudge. 1984. *Increases in fish mercury levels in lakes flooded by the Churchill River diversion, northern Manitoba.* Canadian Journal of Fisheries and Aquatic Sciences. 41: 682-691.

Hall BD, St. Louis VL, Rolfhus KR, Bodaly RA, Beaty KG, Paterson M. 2005. *The impact of reservoir creation on the biogeochemical cycling of methyl and total mercury in boreal upland forests.* Ecosystems 2005;8(3):248 – 66.

Hecky RE, Ramsey DJ, Bodaly RA, Strange NE. 1991. *Increased methylmercury contamination in fish in newly formed freshwater reservoirs.* In: Suzuki T, Imura N, Clarkson TW, editors. Advances in mercury toxicology. New York: Plenum Press, 33-52.

Jackson, T. A. 1988. *The mercury problem in recently formed reservoirs of northern Manitoba (Canada): effects of impoundment and other factors on the production of methyl mercury by microorganisms in sediments.* Canadian Journal of Fisheries and Aquatic Sciences 45: 97-121.

Kelly, C.A., J.W.M. Rudd, R.A. Bodaly, N.P. Roulet, V.L. St. Louis, A. Heyes, T.R . Moore, S. Schiff, R. Aravena, K.J. Scott, B. Dyck, R. Harris, B. Warner, G. Edwards 1997. *Increases in fluxes of greenhouse gases and methyl mercury following flooding of an experimental reservoir.* Environmental Science and Technology 31: 1334-1344.

Montgomery, S., M. Lucotte, I. Rheault 2000. *Temporal and spatial influences of flooding on dissolved mercury in boreal reservoirs*. The Science of the Total Environment. 260: 147-157.

Ontario Ministry of the Environment. 2010. Guidance for Conducting Baseline and Post Development Monitoring of Water Quality and Fish Tissue for Proposed Waterpower Projects. Draft Document, November 2010.

Rodgers, D. W., and S. U. Qadri. 1982. *Growth and mercury accumulation in yearling yellow perch, Perca flavescens, in the Ottawa River, Ontario.* Environmental Biology of Fishes 7:377-383.

Appendix B
Spring, 2012 Water Quality Results

Table 1. Wabageshik Rapids Spring 2012 Baseline Water Quality Results: Field Parameters

Parameter	Units	PWQO	Wabageshik Rapids	
			Baseline	Dup-1 (of Baseline)
			14-Apr-12	14-Apr-12
Laboratory Results				
Conductivity	µmhos/cm	N/V	146	147
pH	pH	6.5 - 8.5	7.32	7.33
Total Suspended Solids	mg/L	N/V	<3.0	<3.0
Total Dissolved Solids	mg/L	N/V	88	94
Field Measurements				
Dissolved Oxygen	mg/L	> 7[1]	12.23	--
Water Temperature	°C	N/V	6.53	--
Conductivity	microS/cm	N/V	138	--
pH	pH	6.5 - 8.5	7.22	--
Turbidity	NTU	< 10% variance from background	1.89	--

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.
N/V - No value applicable to ambient surface water not influenced by a point source discharge.
-- Parameter not measured
1. PWQO for dissolved oxygen at 0°C

Table 2. Wabageshik Rapids Spring 2012 Baseline Water Quality Results: Nutrients

Parameter	Units	PWQO	Wabageshik Rapids	
			Baseline	Dup-1 (of Baseline)
			14-Apr-12	14-Apr-12
Alkalinity, Total (as $CaCO_3$)	mg/L	No decrease > 25% of background.	16	15
Ammonia, Total (as N)	mg/L	20	<0.050	<0.050
Chloride	mg/L	N/V	11.7	11.7
Nitrate-N	mg/L	N/V	0.15	0.15
Nitrite-N	mg/L	N/V	<0.10	<0.10
Total Kjeldahl Nitrogen	mg/L	N/V	0.46	0.5
Total Phosphorus (ALS)	mg/L	0.02	0.0078	0.0069
Total Phosphorus (Dorset)	mg/L	0.02	0.01072	0.01032
Sulphate	mg/L	N/V	30.1	30.1
Dissolved Organic Carbon	mg/L	N/V	11.7	8.7

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.
N/V - No value applicable to ambient surface water not influenced by a point source discharge.
-- Parameter not measured
1. PWQO for dissolved oxygen at 0°C

Table 3. Wabageshik Rapids Spring 2012 Water Quality Results: Metals

Parameter	Units	PWQO	Wabageshik Rapids	
			Baseline	Dup-1 (of Baseline)
			14-Apr-12	14-Apr-12
Aluminum (Al)	µg/L	75[1.]	**108**	**100**
Antimony (Sb)	µg/L	20	<5.0	<5.0
Arsenic (As)	µg/L	100	<1.0	<1.0
Barium (Ba)	µg/L	N/V	11	10
Beryllium (Be)	µg/L	11[2.]	<1.0	<1.0
Bismuth (Bi)	µg/L	N/V	<1.0	<1.0
Boron (B)	µg/L	200	<50	<50
Cadmium (Cd)-Total	µg/L	0.2	<0.090	<0.090
Calcium (Ca)	µg/L	N/V	1,370	1,250
Chromium (Cr)	µg/L	8.9[3.]	<0.50	<0.50
Cobalt (Co)	µg/L	0.9	0.79	0.76
Copper (Cu)	µg/L	5	**6.7**	**6.5**
Iron (Fe)	µg/L	300	232	215
Lead (Pb)	µg/L	5[4.]	<1.0	<1.0
Magnesium (Mg)	µg/L	N/V	2380	2290
Manganese (Mn)	µg/L	N/V	38.8	37.1
Mercury (Hg)	µg/L	0.2	0.00003	0.00003
Methyl Mercury [$(CH_3Hg)^+$]	µg/L	N/V	0.00003	0.00003
Molybdenum (Mo)	µg/L	40	<1.0	<1.0
Nickel (Ni)	µg/L	25	**35.6**	**34.9**
Potassium (K)	µg/L	N/V	1100	1100
Selenium (Se)-Total	µg/L	100	0.73	0.71
Silicon (Si)	µg/L	N/V	2,600	2,500
Silver (Ag)	µg/L	0.1	<0.10	<0.10
Strontium (Sr)	µg/L	N/V	33.4	32.4
Thallium (Tl)	µg/L	0.3	<0.30	<0.30
Tin (Sn)	µg/L	N/V	<1.0	<1.0
Titanium (Ti)	µg/L	N/V	3.1	2.6
Tungsten (W)	µg/L	30	<10	<10
Uranium (U)	µg/L	5	<5.0	<5.0
Vanadium (V)	µg/L	6	<1.0	<1.0
Zinc (Zn)	µg/L	30	10.1	4.3
Zirconium (Zr)	µg/L	4	<4.0	<4.0

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.

N/V - No value applicable to ambient surface water not influenced by a point source discharge.

1. Interim PWQO for pH >6.5
2. Interim PWQO for hardness as $CaCO_3$ <75 mg/L.
3. PWQO for trivalent chromium.
4. PWQO for alkalinity as $CaCO_3$ < 20 mg/L.

HUTCHINSON ENVIRONMENTAL
SCIENCES LTD
ATTN: David Leeder
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Date Received: 19-APR-12
Report Date: 25-APR-12 14:02 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1136530
Project P.O. #: NOT SUBMITTED
Job Reference: 120022
C of C Numbers:
Legal Site Desc:

Lindsay Zuiker

Lindsay D. Zuiker
Account Manager

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Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-1 WABAGISHIK - BASELINE						
Sampled By: D LEEDER on 14-APR-12 @ 14:1(	***Sample Qualifiers Refer to Reference Information***					
Matrix: WATER						
Physical Tests						
Conductivity	146		3.0	umhos/cm	19-APR-12	
pH	7.32		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	88		20	mg/L	20-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	16		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	11.7		2.0	mg/L	21-APR-12	
Nitrate-N	0.15		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.46		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0078		0.0030	mg/L	23-APR-12	0.02
Sulphate	30.1		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	11.7		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.108		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.011		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	13.7		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00079		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0067		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.232		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	2.38		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0388		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0356		0.0020	mg/L	20-APR-12	*0.025
Potassium (K)	1.1		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00073		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.6		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0334		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0031		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-1 WABAGISHIK - BASELINE Sampled By: D LEEDER on 14-APR-12 @ 14:1(Matrix: WATER	***Sample Qualifiers Refer to Reference Information***					#1
Total Metals						
Zinc (Zn)	0.0101		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-2 THE CHUTE - BASELINE Sampled By: D LEEDER on 16-APR-12 @ 10:1(Matrix: WATER						#1
Physical Tests						
Conductivity	114		3.0	umhos/cm	19-APR-12	
pH	7.76		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	3.6		3.0	mg/L	20-APR-12	
Total Dissolved Solids	90		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	49		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.40		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0086		0.0030	mg/L	23-APR-12	0.02
Sulphate	2.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	15.1		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.070		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	15.5		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.114		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.59		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0201		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.2		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-2	THE CHUTE - BASELINE						
Sampled By:	D LEEDER on 16-APR-12 @ 10:1(						#1
Matrix:	WATER						
Total Metals							
	Strontium (Sr)	0.0230		0.0010	mg/L	20-APR-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
	Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
	Titanium (Ti)	0.0023		0.0020	mg/L	20-APR-12	
	Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
	Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
	Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
	Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-3	THE CHUTE - REPLICATE						
Sampled By:	D LEEDER on 16-APR-12 @ 10:2(						#1
Matrix:	WATER						
Physical Tests							
	Conductivity	114		3.0	umhos/cm	19-APR-12	
	pH	7.80		0.10	pH units	19-APR-12	6.5-8.5
	Total Suspended Solids	4.4		3.0	mg/L	20-APR-12	
	Total Dissolved Solids	94		20	mg/L	23-APR-12	
Anions and Nutrients							
	Alkalinity, Total (as CaCO3)	51		10	mg/L	19-APR-12	
	Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
	Chloride	<2.0		2.0	mg/L	21-APR-12	
	Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
	Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
	Total Kjeldahl Nitrogen	0.43		0.15	mg/L	20-APR-12	
	Total Phosphorus	0.0065		0.0030	mg/L	23-APR-12	0.02
	Sulphate	2.7		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon							
	Dissolved Organic Carbon	17.9		1.0	mg/L	25-APR-12	
Total Metals							
	Aluminum (Al)	0.067		0.010	mg/L	20-APR-12	*0.015
	Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
	Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
	Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
	Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
	Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
	Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
	Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
	Calcium (Ca)	15.9		0.50	mg/L	20-APR-12	
	Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
	Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
	Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Iron (Fe)	0.111		0.050	mg/L	20-APR-12	0.3
	Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Magnesium (Mg)	3.57		0.50	mg/L	20-APR-12	
	Manganese (Mn)	0.0206		0.0010	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-3 THE CHUTE - REPLICATE						
Sampled By: D LEEDER on 16-APR-12 @ 10:25						
Matrix: WATER						#1
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.1		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0238		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0022		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-4 THIRD FALLS - BASELINE						
Sampled By: D LEEDER on 15-APR-12 @ 13:45						
Matrix: WATER						#1
Physical Tests						
Conductivity	117		3.0	umhos/cm	19-APR-12	
pH	7.77		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	98		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	49		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.40		0.15	mg/L	20-APR-12	
Total Phosphorus	0.182		0.0030	mg/L	23-APR-12	*0.02
Sulphate	2.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	18.8		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.044		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	15.8		0.50	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-4 THIRD FALLS - BASELINE						
Sampled By: D LEEDER on 15-APR-12 @ 13:45						
Matrix: WATER						#1
Total Metals						
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.096		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.54		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0197		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.2		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0230		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-5 THIRD FALLS - REPLICATE						
Sampled By: D LEEDER on 15-APR-12 @ 13:55						
Matrix: WATER						#1
Physical Tests						
Conductivity	116		3.0	umhos/cm	19-APR-12	
pH	7.78		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	94		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	52		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0185		0.0030	mg/L	23-APR-12	0.02
Sulphate	2.7		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	14.4		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.046		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-5	THIRD FALLS - REPLICATE						
Sampled By:	D LEEDER on 15-APR-12 @ 13:5						
Matrix:	WATER						#1
Total Metals							
	Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
	Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
	Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
	Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
	Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
	Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
	Calcium (Ca)	16.9		0.50	mg/L	20-APR-12	
	Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
	Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
	Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Iron (Fe)	0.100		0.050	mg/L	20-APR-12	0.3
	Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Magnesium (Mg)	3.81		0.50	mg/L	20-APR-12	
	Manganese (Mn)	0.0206		0.0010	mg/L	20-APR-12	
	Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
	Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
	Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
	Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
	Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
	Silicon (Si)	2.4		1.0	mg/L	20-APR-12	
	Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
	Strontium (Sr)	0.0244		0.0010	mg/L	20-APR-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
	Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
	Titanium (Ti)	<0.0020		0.0020	mg/L	20-APR-12	
	Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
	Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
	Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
	Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-6	WANATANGO FALLS - BASELINE						
Sampled By:	D LEEDER on 16-APR-12 @ 15:1						
Matrix:	WATER						#1
Physical Tests							
	Conductivity	164		3.0	umhos/cm	19-APR-12	
	pH	7.79		0.10	pH units	19-APR-12	6.5-8.5
	Total Suspended Solids	6.0		3.0	mg/L	20-APR-12	
	Total Dissolved Solids	138		20	mg/L	23-APR-12	
Anions and Nutrients							
	Alkalinity, Total (as CaCO3)	52		10	mg/L	19-APR-12	
	Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
	Chloride	2.4		2.0	mg/L	21-APR-12	
	Nitrate-N	0.19		0.10	mg/L	21-APR-12	
	Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
	Total Kjeldahl Nitrogen	0.67		0.15	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-6 WANATANGO FALLS - BASELINE						
Sampled By: D LEEDER on 16-APR-12 @ 15:1(						#1
Matrix: WATER						
Anions and Nutrients						
Total Phosphorus	0.0148		0.0030	mg/L	23-APR-12	0.02
Sulphate	21.3		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	27.2		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.775		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.013		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	22.0		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.00137		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0031		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.783		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	4.33		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0428		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00049		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	3.4		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0414		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0308		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0016		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	0.0055		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-7 MARTER TWP - BASELINE						
Sampled By: D LEEDER on 17-APR-12 @ 12:0(						#1
Matrix: WATER						
Physical Tests						
Conductivity	151		3.0	umhos/cm	19-APR-12	
pH	7.91		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	75.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	116		20	mg/L	25-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-7 MARTER TWP - BASELINE Sampled By: D LEEDER on 17-APR-12 @ 12:0C Matrix: WATER						#1
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	56		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	6.1		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0726		0.0030	mg/L	23-APR-12	*0.02
Sulphate	5.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	13.1		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	4.89		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.054		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	0.127		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	19.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.0115		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00207		0.00050	mg/L	20-APR-12	*0.0009
Copper (Cu)	0.0070		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	4.61		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	0.0020		0.0010	mg/L	20-APR-12	*0.001
Magnesium (Mg)	6.36		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0897		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	0.0032		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0070		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	2.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	11.4		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.101		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.215		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0082		0.0010	mg/L	20-APR-12	*0.006
Zinc (Zn)	0.0146		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-8 DUP-1 Sampled By: D LEEDER on 14-APR-12 @ 14:1C Matrix: WATER						#1

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-8 DUP-1						
Sampled By: D LEEDER on 14-APR-12 @ 14:1(						
Matrix: WATER						
Physical Tests						
Conductivity	147		3.0	umhos/cm	19-APR-12	
pH	7.33		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	94		20	mg/L	20-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	15		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	11.7		2.0	mg/L	21-APR-12	
Nitrate-N	0.15		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.50		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0069		0.0030	mg/L	23-APR-12	0.02
Sulphate	30.1		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	8.7		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.100		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	12.5		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00076		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0065		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.215		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	2.29		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0371		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0349		0.0020	mg/L	20-APR-12	*0.025
Potassium (K)	1.1		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00071		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.5		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0324		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0026		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-8 DUP-1						
Sampled By: D LEEDER on 14-APR-12 @ 14:1(						#1
Matrix: WATER						
Total Metals						
Zinc (Zn)	0.0043		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-9 DUP-2						
Sampled By: D LEEDER on 17-APR-12 @ 12:0(						#1
Matrix: WATER						
Physical Tests						
Conductivity	151		3.0	umhos/cm	19-APR-12	
pH	7.83		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	82.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	118		20	mg/L	25-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	54		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	6.1		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.46		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0889		0.0030	mg/L	24-APR-12	*0.02
Sulphate	5.9		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	15.5		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	5.06		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.052		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	20-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	18.6		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.0118		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00206		0.00050	mg/L	20-APR-12	*0.0009
Copper (Cu)	0.0058		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	4.57		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	0.0017		0.0010	mg/L	20-APR-12	*0.001
Magnesium (Mg)	6.07		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0905		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	0.0031		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0069		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	1.9		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	12.0		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-9 DUP-2						
Sampled By: D LEEDER on 17-APR-12 @ 12:0(						
Matrix: WATER						
Total Metals						
Strontium (Sr)	0.0979		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.221		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0088		0.0010	mg/L	20-APR-12	*0.006
Zinc (Zn)	0.0129		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-10 DUP-3						
Sampled By: D LEEDER on 16-APR-12 @ 15:1(						
Matrix: WATER						#1
Physical Tests						
Conductivity	165		3.0	umhos/cm	19-APR-12	
pH	7.75		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	5.2		3.0	mg/L	20-APR-12	
Total Dissolved Solids	136		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	48		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	2.4		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.62		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0143		0.0030	mg/L	23-APR-12	0.02
Sulphate	21.3		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	22.2		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.800		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.013		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	20-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	21.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.00134		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0031		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.812		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	4.31		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0433		0.0010	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-10 DUP-3						
Sampled By: D LEEDER on 16-APR-12 @ 15:1(						
Matrix: WATER						
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00057		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	3.5		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0420		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0317		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0016		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	0.0055		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Reference Information

Qualifiers for Individual Samples Listed:

Sample Numbe	Client ID	Qualifier	Description
L1136530-1	WABAGISHIK - BASELINE	EHT	some samples were taken on 14-apr-12 - Exceeded Recommended Holding Time Prior To Analysis

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS4-WT	Water	CL,NO2,NO3,SO4	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

HG-ONT-PWQO-WT	Water	Mercury (Hg) -Total PWQO	SW846 7470A
MET-ONT-PWQO-WT	Water	Metals, Total PWQO	EPA 200.8 (ICP/MS)
NH3-WT	Water	Ammonia as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2353651								
WG1459197-4 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			85.9		%		80-120	19-APR-12
WG1459197-2 CVS								
Alkalinity, Total (as CaCO3)			96.8		%		85-115	19-APR-12
WG1459197-3 DUP		**L1136139-1**						
Alkalinity, Total (as CaCO3)		687	690		mg/L	0.45	20	19-APR-12
WG1459197-5 DUP		**L1136451-1**						
Alkalinity, Total (as CaCO3)		106	107		mg/L	1.3	20	19-APR-12
WG1459197-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-APR-12
ANIONS4-WT	Water							
Batch R2355159								
WG1460308-6 DUP		**L1136530-1**						
Chloride		11.7	11.7		mg/L	0.051	20	21-APR-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	21-APR-12
Nitrate-N		0.15	0.15		mg/L	0.0	20	21-APR-12
Sulphate		30.1	30.1		mg/L	0.030	20	21-APR-12
WG1460308-3 LCS								
Chloride			98.7		%		85-115	21-APR-12
Nitrite-N			87.7		%		85-115	21-APR-12
Nitrate-N			96.6		%		85-115	21-APR-12
Sulphate			100.9		%		85-115	21-APR-12
WG1460308-4 LCSD		**WG1460308-3**						
Chloride		98.7	98.9		%	0.16	25	21-APR-12
Nitrite-N		87.7	88.5		%	0.98	25	21-APR-12
Nitrate-N		96.6	96.7		%	0.070	25	21-APR-12
Sulphate		100.9	101.1		%	0.13	25	21-APR-12
WG1460308-1 MB								
Chloride			<2.0		mg/L		2	21-APR-12
Nitrite-N			<0.10		mg/L		0.1	21-APR-12
Nitrate-N			<0.10		mg/L		0.1	21-APR-12
Sulphate			<2.0		mg/L		2	21-APR-12
C-DIS-ORG-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2354329								
WG1460450-11 DUP		**L1137295-10**						
Dissolved Organic Carbon		1.1	1.0		mg/L	9.5	20	25-APR-12
WG1460450-5 DUP		**L1136360-14**						
Dissolved Organic Carbon		2.4	2.5		mg/L	6.5	20	25-APR-12
WG1460450-7 DUP		**L1136539-1**						
Dissolved Organic Carbon		10.7	10.7		mg/L	0.19	20	25-APR-12
WG1460450-9 DUP		**L1136539-20**						
Dissolved Organic Carbon		2.4	2.5		mg/L	4.5	20	25-APR-12
WG1460450-4 LCS								
Dissolved Organic Carbon			91.5		%		80-120	25-APR-12
WG1460450-3 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-APR-12
WG1460450-10 MS		**L1136539-20**						
Dissolved Organic Carbon			89.1		%		70-130	25-APR-12
WG1460450-6 MS		**L1136360-14**						
Dissolved Organic Carbon			86.1		%		70-130	25-APR-12
WG1460450-8 MS		**L1136539-1**						
Dissolved Organic Carbon			76.7		%		70-130	25-APR-12
EC-WT	Water							
Batch R2353394								
WG1459052-1 CVS								
Conductivity			99.4		%		90-110	19-APR-12
WG1459052-3 DUP		**L1136000-1**						
Conductivity		482	485		umhos/cm	0.62	10	19-APR-12
WG1459052-4 DUP		**L1136260-1**						
Conductivity		468	468		umhos/cm	0.0	10	19-APR-12
WG1459052-5 DUP		**L1136530-1**						
Conductivity		146	145		umhos/cm	0.69	10	19-APR-12
WG1459052-2 MB								
Conductivity			<3.0		umhos/cm		3	19-APR-12
HG-ONT-PWQO-WT	Water							
Batch R2353301								
WG1459132-6 DUP		**WG1459132-4**						
Mercury (Hg)		0.00556	0.00628		mg/L	12	20	19-APR-12
WG1459132-2 LCS								
Mercury (Hg)			90.0		%		80-120	19-APR-12
WG1459132-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	19-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-ONT-PWQO-WT	Water							
Batch R2353301								
WG1459132-5 MS		**WG1459132-3**						
Mercury (Hg)			92.4		%		70-130	19-APR-12
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459650-2 CVS								
Aluminum (Al)			99.8		%		80-120	20-APR-12
Antimony (Sb)			99.4		%		80-120	20-APR-12
Arsenic (As)			96.6		%		80-120	20-APR-12
Barium (Ba)			98.1		%		80-120	20-APR-12
Beryllium (Be)			115.1		%		80-120	20-APR-12
Bismuth (Bi)			92.4		%		80-120	20-APR-12
Boron (B)			114.6		%		70-130	20-APR-12
Cadmium (Cd)-Total			101.4		%		80-120	20-APR-12
Calcium (Ca)			97.4		%		80-120	20-APR-12
Chromium (Cr)			100.9		%		80-120	20-APR-12
Cobalt (Co)			97.6		%		80-120	20-APR-12
Copper (Cu)			98.5		%		80-120	20-APR-12
Iron (Fe)			101.5		%		70-130	20-APR-12
Lead (Pb)			98.5		%		80-120	20-APR-12
Magnesium (Mg)			98.2		%		80-120	20-APR-12
Manganese (Mn)			108.6		%		80-120	20-APR-12
Molybdenum (Mo)			92.1		%		90-110	20-APR-12
Nickel (Ni)			98.3		%		80-120	20-APR-12
Potassium (K)			96.1		%		80-120	20-APR-12
Selenium (Se)-Total			99.6		%		80-120	20-APR-12
Silicon (Si)			101.9		%		70-130	20-APR-12
Silver (Ag)			102.6		%		80-120	20-APR-12
Strontium (Sr)			93.0		%		80-120	20-APR-12
Thallium (Tl)			100.8		%		80-120	20-APR-12
Tin (Sn)			97.8		%		70-130	20-APR-12
Titanium (Ti)			98.8		%		80-120	20-APR-12
Tungsten (W)			96.6		%		70-130	20-APR-12
Uranium (U)			95.1		%		80-120	20-APR-12
Vanadium (V)			99.7		%		80-120	20-APR-12

ALS Environmental

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459650-2 CVS								
Zinc (Zn)			97.3		%		80-120	20-APR-12
Zirconium (Zr)			91.1		%		80-120	20-APR-12
WG1459559-4 DUP		**WG1459559-3**						
Aluminum (Al)		0.016	0.017		mg/L	6.0	20	20-APR-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Barium (Ba)		0.108	0.115		mg/L	5.4	20	20-APR-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Boron (B)		0.054	0.054		mg/L	1.1	20	20-APR-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	20-APR-12
Calcium (Ca)		83.2	87.0		mg/L	4.4	20	20-APR-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Copper (Cu)		0.0013	0.0014		mg/L	8.1	20	20-APR-12
Iron (Fe)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-APR-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Magnesium (Mg)		22.9	23.7		mg/L	3.5	20	20-APR-12
Manganese (Mn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Molybdenum (Mo)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Potassium (K)		2.1	2.2		mg/L	5.0	20	20-APR-12
Selenium (Se)-Total		0.00070	<0.00040	RPD-NA	mg/L	N/A	20	20-APR-12
Silicon (Si)		2.6	2.7		mg/L	4.9	20	20-APR-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-APR-12
Strontium (Sr)		0.513	0.540		mg/L	5.2	20	20-APR-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	20-APR-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Zinc (Zn)		0.0109	0.0116		mg/L	6.3	20	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-4 DUP		**WG1459559-3**						
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	20-APR-12
WG1459561-4 DUP		**WG1459561-3**						
Aluminum (Al)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Barium (Ba)		0.025	0.025		mg/L	0.30	20	20-APR-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-APR-12
Cadmium (Cd)-Total		0.000133	0.000132		mg/L	0.75	20	20-APR-12
Calcium (Ca)		18.5	18.1		mg/L	1.9	20	20-APR-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Copper (Cu)		0.0032	0.0029		mg/L	7.3	20	20-APR-12
Iron (Fe)		0.296	0.301		mg/L	1.7	20	20-APR-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Magnesium (Mg)		5.82	5.93		mg/L	2.0	20	20-APR-12
Manganese (Mn)		0.0801	0.0828		mg/L	3.4	20	20-APR-12
Molybdenum (Mo)		0.0335	0.0315		mg/L	6.4	20	20-APR-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Potassium (K)		2.8	2.7		mg/L	1.5	20	20-APR-12
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	20-APR-12
Silicon (Si)		2.1	2.1		mg/L	2.1	20	20-APR-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-APR-12
Strontium (Sr)		0.115	0.109		mg/L	5.4	20	20-APR-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	20-APR-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Zinc (Zn)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	20-APR-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-2 LCS								
Aluminum (Al)			97.5		%		80-120	20-APR-12
Antimony (Sb)			88.2		%		70-130	20-APR-12
Arsenic (As)			94.2		%		70-130	20-APR-12
Barium (Ba)			96.6		%		70-130	20-APR-12
Beryllium (Be)			105.7		%		70-130	20-APR-12
Bismuth (Bi)			97.6		%		70-130	20-APR-12
Boron (B)			98.9		%		70-130	20-APR-12
Cadmium (Cd)-Total			92.6		%		70-130	20-APR-12
Calcium (Ca)			95.4		%		70-130	20-APR-12
Chromium (Cr)			96.9		%		70-130	20-APR-12
Cobalt (Co)			94.8		%		70-130	20-APR-12
Copper (Cu)			93.4		%		70-130	20-APR-12
Iron (Fe)			98.2		%		70-130	20-APR-12
Lead (Pb)			98.0		%		70-130	20-APR-12
Magnesium (Mg)			90.4		%		70-130	20-APR-12
Manganese (Mn)			99.0		%		70-130	20-APR-12
Molybdenum (Mo)			91.5		%		70-130	20-APR-12
Nickel (Ni)			96.1		%		70-130	20-APR-12
Potassium (K)			91.2		%		70-130	20-APR-12
Selenium (Se)-Total			93.8		%		70-130	20-APR-12
Silicon (Si)			99.1		%		70-130	20-APR-12
Silver (Ag)			96.2		%		70-130	20-APR-12
Strontium (Sr)			93.2		%		70-130	20-APR-12
Thallium (Tl)			97.9		%		70-130	20-APR-12
Tin (Sn)			93.1		%		70-130	20-APR-12
Titanium (Ti)			95.2		%		70-130	20-APR-12
Tungsten (W)			96.4		%		70-130	20-APR-12
Uranium (U)			98.8		%		70-130	20-APR-12
Vanadium (V)			97.4		%		70-130	20-APR-12
Zinc (Zn)			94.3		%		70-130	20-APR-12
Zirconium (Zr)			90.0		%		70-130	20-APR-12
WG1459561-2 LCS								
Aluminum (Al)			102.7		%		80-120	20-APR-12
Antimony (Sb)			89.7		%		70-130	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-2 LCS								
Arsenic (As)			98.6		%		70-130	20-APR-12
Barium (Ba)			95.0		%		70-130	20-APR-12
Beryllium (Be)			99.0		%		70-130	20-APR-12
Bismuth (Bi)			101.0		%		70-130	20-APR-12
Boron (B)			92.7		%		70-130	20-APR-12
Cadmium (Cd)-Total			94.5		%		70-130	20-APR-12
Calcium (Ca)			96.4		%		70-130	20-APR-12
Chromium (Cr)			98.6		%		70-130	20-APR-12
Cobalt (Co)			96.7		%		70-130	20-APR-12
Copper (Cu)			94.1		%		70-130	20-APR-12
Iron (Fe)			100.3		%		70-130	20-APR-12
Lead (Pb)			99.2		%		70-130	20-APR-12
Magnesium (Mg)			95.2		%		70-130	20-APR-12
Manganese (Mn)			101.4		%		70-130	20-APR-12
Molybdenum (Mo)			95.7		%		70-130	20-APR-12
Nickel (Ni)			95.3		%		70-130	20-APR-12
Potassium (K)			94.1		%		70-130	20-APR-12
Selenium (Se)-Total			98.6		%		70-130	20-APR-12
Silicon (Si)			102.5		%		70-130	20-APR-12
Silver (Ag)			95.6		%		70-130	20-APR-12
Strontium (Sr)			95.5		%		70-130	20-APR-12
Thallium (Tl)			98.1		%		70-130	20-APR-12
Tin (Sn)			95.1		%		70-130	20-APR-12
Titanium (Ti)			97.0		%		70-130	20-APR-12
Tungsten (W)			103.3		%		70-130	20-APR-12
Uranium (U)			98.4		%		70-130	20-APR-12
Vanadium (V)			99.1		%		70-130	20-APR-12
Zinc (Zn)			99.1		%		70-130	20-APR-12
Zirconium (Zr)			92.1		%		70-130	20-APR-12
WG1459559-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	20-APR-12
Antimony (Sb)			<0.0050		mg/L		0.005	20-APR-12
Arsenic (As)			<0.0010		mg/L		0.001	20-APR-12
Barium (Ba)			<0.010		mg/L		0.01	20-APR-12

ALS Environmental

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-1 MB								
Beryllium (Be)			<0.0010		mg/L		0.001	20-APR-12
Bismuth (Bi)			<0.0010		mg/L		0.001	20-APR-12
Boron (B)			<0.050		mg/L		0.05	20-APR-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	20-APR-12
Calcium (Ca)			<0.50		mg/L		0.5	20-APR-12
Chromium (Cr)			<0.00050		mg/L		0.0005	20-APR-12
Cobalt (Co)			<0.00050		mg/L		0.0005	20-APR-12
Copper (Cu)			<0.0010		mg/L		0.001	20-APR-12
Iron (Fe)			<0.050		mg/L		0.05	20-APR-12
Lead (Pb)			<0.0010		mg/L		0.001	20-APR-12
Magnesium (Mg)			<0.50		mg/L		0.5	20-APR-12
Manganese (Mn)			<0.0010		mg/L		0.001	20-APR-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	20-APR-12
Nickel (Ni)			<0.0020		mg/L		0.002	20-APR-12
Potassium (K)			<1.0		mg/L		1	20-APR-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	20-APR-12
Silicon (Si)			<1.0		mg/L		1	20-APR-12
Silver (Ag)			<0.00010		mg/L		0.0001	20-APR-12
Strontium (Sr)			<0.0010		mg/L		0.001	20-APR-12
Thallium (Tl)			<0.00030		mg/L		0.0003	20-APR-12
Tin (Sn)			<0.0010		mg/L		0.001	20-APR-12
Titanium (Ti)			<0.0020		mg/L		0.002	20-APR-12
Tungsten (W)			<0.010		mg/L		0.01	20-APR-12
Uranium (U)			<0.0050		mg/L		0.005	20-APR-12
Vanadium (V)			<0.0010		mg/L		0.001	20-APR-12
Zinc (Zn)			<0.0030		mg/L		0.003	20-APR-12
Zirconium (Zr)			<0.0040		mg/L		0.004	20-APR-12
WG1459561-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	20-APR-12
Antimony (Sb)			<0.0050		mg/L		0.005	20-APR-12
Arsenic (As)			<0.0010		mg/L		0.001	20-APR-12
Barium (Ba)			<0.010		mg/L		0.01	20-APR-12
Beryllium (Be)			<0.0010		mg/L		0.001	20-APR-12
Bismuth (Bi)			<0.0010		mg/L		0.001	20-APR-12

ALS Environmental

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-1 MB								
Boron (B)			<0.050		mg/L		0.05	20-APR-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	20-APR-12
Calcium (Ca)			<0.50		mg/L		0.5	20-APR-12
Chromium (Cr)			<0.00050		mg/L		0.0005	20-APR-12
Cobalt (Co)			<0.00050		mg/L		0.0005	20-APR-12
Copper (Cu)			<0.0010		mg/L		0.001	20-APR-12
Iron (Fe)			<0.050		mg/L		0.05	20-APR-12
Lead (Pb)			<0.0010		mg/L		0.001	20-APR-12
Magnesium (Mg)			<0.50		mg/L		0.5	20-APR-12
Manganese (Mn)			<0.0010		mg/L		0.001	20-APR-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	20-APR-12
Nickel (Ni)			<0.0020		mg/L		0.002	20-APR-12
Potassium (K)			<1.0		mg/L		1	20-APR-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	20-APR-12
Silicon (Si)			<1.0		mg/L		1	20-APR-12
Silver (Ag)			<0.00010		mg/L		0.0001	20-APR-12
Strontium (Sr)			<0.0010		mg/L		0.001	20-APR-12
Thallium (Tl)			<0.00030		mg/L		0.0003	20-APR-12
Tin (Sn)			<0.0010		mg/L		0.001	20-APR-12
Titanium (Ti)			<0.0020		mg/L		0.002	20-APR-12
Tungsten (W)			<0.010		mg/L		0.01	20-APR-12
Uranium (U)			<0.0050		mg/L		0.005	20-APR-12
Vanadium (V)			<0.0010		mg/L		0.001	20-APR-12
Zinc (Zn)			<0.0030		mg/L		0.003	20-APR-12
Zirconium (Zr)			<0.0040		mg/L		0.004	20-APR-12
WG1459559-5 MS		**WG1459559-3**						
Aluminum (Al)			98.0		%		70-130	20-APR-12
Antimony (Sb)			89.7		%		70-130	20-APR-12
Arsenic (As)			98.2		%		70-130	20-APR-12
Barium (Ba)			N/A	MS-B	%		-	20-APR-12
Beryllium (Be)			91.6		%		70-130	20-APR-12
Bismuth (Bi)			94.8		%		70-130	20-APR-12
Boron (B)			89.4		%		70-130	20-APR-12
Cadmium (Cd)-Total			93.5		%		70-130	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-5 MS		**WG1459559-3**						
Calcium (Ca)			N/A	MS-B	%		-	20-APR-12
Chromium (Cr)			96.5		%		70-130	20-APR-12
Cobalt (Co)			96.0		%		70-130	20-APR-12
Copper (Cu)			92.4		%		70-130	20-APR-12
Iron (Fe)			96.7		%		70-130	20-APR-12
Lead (Pb)			95.0		%		70-130	20-APR-12
Magnesium (Mg)			N/A	MS-B	%		-	20-APR-12
Manganese (Mn)			98.8		%		70-130	20-APR-12
Molybdenum (Mo)			97.2		%		70-130	20-APR-12
Nickel (Ni)			95.1		%		70-130	20-APR-12
Potassium (K)			101.4		%		70-130	20-APR-12
Selenium (Se)-Total			96.1		%		70-130	20-APR-12
Silicon (Si)			N/A	MS-B	%		-	20-APR-12
Silver (Ag)			94.7		%		70-130	20-APR-12
Strontium (Sr)			N/A	MS-B	%		-	20-APR-12
Thallium (Tl)			93.8		%		70-130	20-APR-12
Tin (Sn)			94.7		%		70-130	20-APR-12
Titanium (Ti)			97.6		%		70-130	20-APR-12
Tungsten (W)			97.5		%		70-130	20-APR-12
Uranium (U)			96.3		%		70-130	20-APR-12
Vanadium (V)			97.2		%		70-130	20-APR-12
Zinc (Zn)			96.1		%		70-130	20-APR-12
Zirconium (Zr)			95.4		%		70-130	20-APR-12
WG1459561-5 MS		**WG1459561-3**						
Aluminum (Al)			106.9		%		70-130	20-APR-12
Antimony (Sb)			90.2		%		70-130	20-APR-12
Arsenic (As)			96.6		%		70-130	20-APR-12
Barium (Ba)			97.9		%		70-130	20-APR-12
Beryllium (Be)			102.3		%		70-130	20-APR-12
Bismuth (Bi)			100.2		%		70-130	20-APR-12
Boron (B)			105.4		%		70-130	20-APR-12
Cadmium (Cd)-Total			95.6		%		70-130	20-APR-12
Calcium (Ca)			N/A	MS-B	%		-	20-APR-12
Chromium (Cr)			99.7		%		70-130	20-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-5 MS		**WG1459561-3**						
Cobalt (Co)			91.7		%		70-130	20-APR-12
Copper (Cu)			88.8		%		70-130	20-APR-12
Iron (Fe)			100.4		%		70-130	20-APR-12
Lead (Pb)			96.8		%		70-130	20-APR-12
Magnesium (Mg)			100.4		%		70-130	20-APR-12
Manganese (Mn)			108.8		%		70-130	20-APR-12
Molybdenum (Mo)			89.5		%		70-130	20-APR-12
Nickel (Ni)			91.3		%		70-130	20-APR-12
Potassium (K)			N/A	MS-B	%		-	20-APR-12
Selenium (Se)-Total			91.8		%		70-130	20-APR-12
Silicon (Si)			105.9		%		70-130	20-APR-12
Silver (Ag)			96.8		%		70-130	20-APR-12
Strontium (Sr)			N/A	MS-B	%		-	20-APR-12
Thallium (Tl)			96.5		%		70-130	20-APR-12
Tin (Sn)			94.3		%		70-130	20-APR-12
Titanium (Ti)			95.9		%		70-130	20-APR-12
Tungsten (W)			103.1		%		70-130	20-APR-12
Uranium (U)			98.2		%		70-130	20-APR-12
Vanadium (V)			99.7		%		70-130	20-APR-12
Zinc (Zn)			93.4		%		70-130	20-APR-12
Zirconium (Zr)			87.5		%		70-130	20-APR-12
Batch R2354629								
WG1460567-2 CVS								
Beryllium (Be)			111.9		%		80-120	23-APR-12
NH3-WT	Water							
Batch R2353811								
WG1459635-2 CVS								
Ammonia, Total (as N)			100.7		%		85-115	20-APR-12
WG1459635-3 DUP		**L1135917-1**						
Ammonia, Total (as N)		0.420	0.420		mg/L	0.0024	20	20-APR-12
WG1459635-5 DUP		**L1136460-1**						
Ammonia, Total (as N)		0.076	0.070		mg/L	8.5	20	20-APR-12
WG1459635-7 DUP		**L1136539-7**						
Ammonia, Total (as N)		0.057	0.067		mg/L	15	20	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2353811								
WG1459635-9 DUP		**L1136539-28**						
Ammonia, Total (as N)		0.077	0.093		mg/L	19	20	20-APR-12
WG1459635-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	20-APR-12
WG1459635-10 MS		**L1136539-28**						
Ammonia, Total (as N)			79.0		%		75-125	20-APR-12
WG1459635-4 MS		**L1135917-1**						
Ammonia, Total (as N)			86		%		75-125	20-APR-12
WG1459635-6 MS		**L1136460-1**						
Ammonia, Total (as N)			97.5		%		75-125	20-APR-12
WG1459635-8 MS		**L1136539-7**						
Ammonia, Total (as N)			109.4		%		75-125	20-APR-12
P-TOTAL-LOW-WT	Water							
Batch R2354736								
WG1460642-3 DUP		**L1136186-1**						
Total Phosphorus		0.0097	0.0088		mg/L	9.8	20	23-APR-12
WG1460642-2 LCS								
Total Phosphorus			98.7		%		80-120	23-APR-12
WG1460642-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	23-APR-12
WG1460642-4 MS		**L1136186-1**						
Total Phosphorus			106.9		%		70-130	23-APR-12
Batch R2355627								
WG1461246-3 DUP		**L1136539-16**						
Total Phosphorus		0.272	0.273		mg/L	0.59	20	24-APR-12
WG1461246-5 DUP		**L1136709-2**						
Total Phosphorus		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	24-APR-12
WG1461246-2 LCS								
Total Phosphorus			95.9		%		80-120	24-APR-12
WG1461246-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	24-APR-12
WG1461246-4 MS		**L1136539-16**						
Total Phosphorus			N/A	MS-B	%		-	24-APR-12
WG1461246-6 MS		**L1136709-2**						
Total Phosphorus			96.4		%		70-130	24-APR-12
PH-WT	Water							

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R2353353								
WG1459048-2 DUP		**L1136096-1**						
pH		7.95	8.04		pH units	1.1	20	19-APR-12
WG1459048-3 DUP		**L1136139-1**						
pH		8.26	8.31		pH units	0.60	20	19-APR-12
WG1459048-4 DUP		**L1136530-1**						
pH		7.32	7.29		pH units	0.41	20	19-APR-12
WG1459048-1 LCS								
pH			100		%		95-105	19-APR-12
SOLIDS-TDS-WT	Water							
Batch R2353760								
WG1459464-3 DUP		**L1134218-1**						
Total Dissolved Solids		362	370		mg/L	2.2	20	20-APR-12
WG1459464-4 DUP		**L1134218-2**						
Total Dissolved Solids		1140	1140		mg/L	0.18	20	20-APR-12
WG1459464-1 LCS								
Total Dissolved Solids			94.0		%		70-130	20-APR-12
WG1459464-2 MB								
Total Dissolved Solids			<20		mg/L		20	20-APR-12
Batch R2354538								
WG1459890-3 DUP		**L1134715-12**						
Total Dissolved Solids		970	972		mg/L	0.21	20	23-APR-12
WG1459890-4 DUP		**L1134715-13**						
Total Dissolved Solids		316	314		mg/L	0.63	20	23-APR-12
WG1459890-1 LCS								
Total Dissolved Solids			98.7		%		70-130	23-APR-12
WG1459890-2 MB								
Total Dissolved Solids			<20		mg/L		20	23-APR-12
Batch R2355798								
WG1461298-3 DUP		**L1136000-9**						
Total Dissolved Solids		288	300		mg/L	4.1	20	25-APR-12
WG1461298-4 DUP		**L1136000-10**						
Total Dissolved Solids		286	288		mg/L	0.70	20	25-APR-12
WG1461298-1 LCS								
Total Dissolved Solids			91.3		%		70-130	25-APR-12
WG1461298-2 MB								
Total Dissolved Solids			<20		mg/L		20	25-APR-12
SOLIDS-TSS-WT	Water							

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Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R2353740								
WG1459107-3 DUP		**L1134507-2**						
Total Suspended Solids		4150	4150		mg/L	0.00000000	20	20-APR-12
WG1459107-4 DUP		**L1134678-4**						
Total Suspended Solids		3870	3870		mg/L	0.0	20	20-APR-12
WG1459107-5 DUP		**L1134678-13**						
Total Suspended Solids		1240	1160		mg/L	6.7	20	20-APR-12
WG1459107-6 DUP		**L1134556-2**						
Total Suspended Solids		2280	2020		mg/L	12	20	20-APR-12
WG1459107-7 DUP		**L1135041-1**						
Total Suspended Solids		1570	1470		mg/L	6.6	20	20-APR-12
WG1459107-8 DUP		**L1135041-2**						
Total Suspended Solids		1630	1600		mg/L	2.1	20	20-APR-12
WG1459107-1 LCS								
Total Suspended Solids			100.8		%		80-120	20-APR-12
WG1459107-2 MB								
Total Suspended Solids			<3.0		mg/L		3	20-APR-12
TKN-WT	Water							
Batch R2353780								
WG1459616-2 CVS								
Total Kjeldahl Nitrogen			92.5		%		80-120	20-APR-12
WG1459558-3 DUP		**L1136495-1**						
Total Kjeldahl Nitrogen		0.56	0.54		mg/L	3.2	20	20-APR-12
WG1459558-4 DUP		**L1135917-3**						
Total Kjeldahl Nitrogen		81.1	79.5		mg/L	2.0	20	20-APR-12
WG1459558-2 LCS								
Total Kjeldahl Nitrogen			100.5		%		80-120	20-APR-12
WG1459558-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-APR-12

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	14-APR-12 14:10	19-APR-12 16:09	4	5	days	EHTR
	8	14-APR-12 14:10	19-APR-12 16:17	4	5	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1136530 were received on 19-APR-12 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

C of C # XXXXX

PAGE 1 OF 1

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: HESL
Account # 20126
PROJECT MANAGER: David Leeder
Address:
Job # 120022
Phone: 705-645-0021
Fax:
QUOTATION # Q33580 PO#

SAMPLING INFORMATION

CRITERIA: Criteria on report (y/n) y
Reg 153/04
Table 1
TCLP ____ MISA ____ PWQO ✓
OTHER ____
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ____
EMAIL1 David.Leeder@environmentalsciences.ca
EMAIL2 ____
SELECT: pdf ____ digital ____ both ____

ANALYSIS REQUEST — INDICATE BOTTLES FIELD FILTERED/PRESERVED (F/P)

SUBMISSION # L1136530
ENTERED BY: RH
DATE/TIME ENTERED: 19-APR-12
BIN # 38

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	Anions4	Alk, EC, pH, TDS, TSS	DOC	Metals (PWQO)	NH3, TKN, TP(LL)	COMMENTS	LAB ID
14 Apr-12	14:10			X			Wabagishik – Baseline	5	X	X	X	X	X		1
16 Apr-12	10:10			X			The Chute – Baseline	5	X	X	X	X	X		2
16 Apr-12	10:25			X			The Chute – Replicate	5	X	X	X	X	X		3
15 Apr-12	13:45			X			Third Falls – Baseline	5	X	X	X	X	X		4
15 Apr-12	13:55			X			Third Falls – Replicate	5	X	X	X	X	X		5
16 Apr-12	15:10			X			Wanatango Falls – Baseline	5	X	X	X	X	X		6
17 Apr-12	12:00			X			Marter Twp. – Baseline	5	X	X	X	X	X		7
14 Apr-12	14:10			X			Dup-1	6	X	X	X	X	X		8
17 Apr-12	12:00			X			Dup-2	6	X	X	X	X	X		9
16 Apr-12	15:10			X			Dup-3	6	X	X	X	X	X		10

L1136530-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLE CONDITION: FROZEN ____ COLD ✓ AMBIENT ____ MEAN TEMP 10.1
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____ INIT RH

SAMPLED BY: D. Leeder	DATE & TIME	RECEIVED BY:	DATE & TIME
RELINQUISHED BY: D Leeder	DATE & TIME: 11:00, 18 Apr-12	RECEIVED AT LAB BY: RH	DATE & TIME: 19-APR-12 0900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

Total Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Enveronmental:
3-1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Received: April 19, 2012
Sampling Date(s): April 14, 2012 to April 17, 2012
Date Analysed: April 26, 2012
Analyst(s): Zorica B.

Analytical Method: Total Mercury in Water by Oxidation, Purge and Trap, and CVAFS (T00120 version 5)

Comments: Sample bottles for 'The Chute Baseline' , 'The Chute Baseline Replicate' and 'Wanatango Falls Baseline' broke during transit to the laboratory and all sample lost. A subsample was removed from the methyl mercury bottle for total mercury analysis.

Detection Limit: MDL = 0.04 ng Hg/L (based on 7 replicates of analytical blanks (98% confidence level)). The ML of 0.5 ng/L, as stated in Method 1631e, has been adopted for our laboratory to reflect occasional elevated bottle blanks (< 0.5 ng/L) observed in reused acid-cleaned Teflon bottles.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 13 % @ 95 % confidence at a concentration level of 0.5-1000 ng/L.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

				Mean of 3 Bubblers	Bubbler 1	Bubbler 2	Bubbler 3	
	Bubbler Blanks	Bubbler Blank Mean		730	931	535	725	
		Bubbler Blank (pg)		0.22	0.28	0.16	0.22	
	Standards			Gross Peak Area	Net Peak Area	Area Units/ ng		
		Hg STD Mean				3364182		
			Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)	Percent Recovery
	QC Samples	OPR mean (5.12 ng/L)		549997		4.97	0.03	97
		Baker QCS (1000 ng/L)	QCS-3	339144	0.10	1005.93	0.00	100.6
	Method/Bottle Blanks	125ml glass bottle #1	MBlk-1	14767	31.21	0.08	0.02	
		125ml glass bottle #2	MBlk-2	11296	32.56	0.04	0.02	
		125ml glass bottle #3	MBlk-3	6190	30.06	0.00	0.02	

Sample Details	Sample ID/Bottle Number	Date Sampled	Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)
Vermilion River	Wabagisnik Baseline	April 14, 2012		649451	34.35	5.62	0.03
Vermilion River	Wabagisnik Baseline	April 14, 2012	Repeat Allquot	736628	38.49	5.69	0.03
Ivanhoe River	The Chute Baseline*	April 16, 2012		385565	32.94	3.46	0.03
Ivanhoe River	The Chute Baseline Replicate*	April 16, 2012		367427	32.26	3.37	0.03
Ivanhoe River	Third Falls Baseline	April 15, 2012		355279	31.41	3.34	0.03
Ivanhoe River	Third Falls Baseline	April 15, 2012	Repeat Allquot	341517	31.40	3.21	0.03
Ivanhoe River	Third Falls Baseline Replicate	April 15, 2012		398245	35.68	3.30	0.03
Frederickhouse R.	Wanatango Falls Baseline*	April 16, 2012		574849	30.94	5.52	0.03
Blanche River	Marter Twp Baseline	April 17, 2012		800242	30.41	7.83	0.03
Vermilion River	Dup-1	April 14, 2012		260945	34.12	2.25	0.03
Vermilion River	Dup-1	April 14, 2012	Repeat Allquot	277792	36.39	2.25	0.03
Blanche River	Dup-2	April 17, 2012		963672	36.36	7.89	0.03
Frederickhouse R.	Dup-3	April 16, 2012		699928	37.10	5.61	0.03

\\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-04 Sampling\Northeastern Ontario\TMWATR042612ZB1.xls : See 'Comments' section above for discussion.

~ : Below our official detection limit for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

Methyl Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental
3 - 1 Taylor Road
Bracebridge, ON P1L 1S6

Date Received: April 19, 2012
Sampling Date: April 14, 2012 to April 17, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: April 30, 2012
Analyst(s): Jason S.

Analytical Method: M10210 Methyl Mercury in Water by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS with Automated Instruments (Version 2)

Detection Limit: 0.08 ng/L (ML), MDL=0.03 ng/L (based on 7 replicates of method blanks with 98% confidence level). For reporting purpose samples will be flagged below a ML of 0.08ng/L which is considered a practical detection limit.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 10 % at methyl mercury concentrations of 0.5 and 2.5 ng/L (95 % confidence). Uncertainty at 0.1 ng/L is 13% (95% confidence).

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

Blanks		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)
	Ethylation blank (H_2O+Reagent)	0.54	1871	
	Mean Eth. Blank (last 30 runs)	0.63		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.01	1902	0.00
	Method Blank 2	-0.06	1852	0.00
	Method Blank 3	0.18	2446	0.01
	Mean Method Blank	0.04		0.00

Standards		MeHg Standard Added to Ethylation EPA Vial (pg CH_3Hg)	Gross Peak Area	Net Corrected MeHg Std Calibration Factor (units / pg)	RSD of MeHg Standard
	Mean Value			5931	1.0

Sample Spike Recovery	Sample Identification	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L)	CH_3Hg Recovery (%)
	Blanche River (Marter Twp Baseline)	MS1	332079	100%	46.8	4.01	91.5
	Blanche River (Marter Twp Baseline)	MS1D	320103	100%	47.2	4.09	94.4
	Mean of Recoveries						92.8
QC Samples	MeOPR ID0801 (1000ng/L)		114337	100%	0.2	832	83.2
	MeOPR ID0801 (1000ng/L)	Repeat Aliquot	140459	100%	0.2	787	78.7
	Mean of MeOPR					810	81.0
	A.S.S.-Alfa ID0702 (1000 ng/L)		353615	100%		1008	100.8

LAB ID	Sampling Details	Sample ID	Date Sampled	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L) [recovery corrected]	
57399	Vermilion River	Wabagisnik Baseline	April 14, 2012		4588	92.9	48.56	~0.03	
57400	Ivanhoe River	The Chute Baseline	April 16, 2012		9367	92.9	47.04	0.09	
57400	Ivanhoe River	The Chute Baseline	April 18, 2012	Duplicate	8881	92.9	47.54	0.09	
57401	Ivanhoe River	The Chute Baseline Replicate	April 16, 2012		6680	92.9	46.86	~0.08	
57402	Ivanhoe River	Third Falls Baseline	April 15, 2012		6317	92.9	46.74	~0.08	
57403	Ivanhoe River	Third Falls Baseline Replicate	April 15, 2012		6189	92.9	47.32	~0.08	
57404	Frederickhouse R.	Wanetango Falls Baseline	April 16, 2012		8370	92.9	47.55	0.08	
57405	Blanche River	Marter Twp Baseline	April 17, 2012		9222	92.9	47.38	0.09	
57406	Vermilion River	Dup-1	April 14, 2012		4266	92.9	47.03	~0.03	
57407	Blanche River	Dup-2	April 17, 2012		8364	92.9	46.97	0.09	
57408	Fredarickhouse R.	Dup-3	April 16, 2012		8153	92.9	47.00	0.09	

* : See 'Comments' section above for discussion.

\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-04 Sampling\Northeastern Ontario\MTWATR043012JS1.xls

~ : Below the minimum level of detection for this analyte in this metrix.

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Note: Results relate only to the items tested.

Lab Number	Description	TP1 ug/L	TP2 ug/L	Mean
T100747-0001	Half Mile Baseline upstream	4.87	5.27	5.07
T100747-0002	Half Mile Baseline downstream	5.07	5.17	5.12
T100747-0003	Big Eddy Baseline	5.17	5.37	5.27
T100747-0004	Wanatango Falls Baseline	22.47	23.47	22.97
T100747-0005	Third Falls Baseline	9.77	8.77	9.27
T100747-0006	Third Falls Baseline replicate	9.17	9.07	9.12
T100747-0007	Marter Township Baseline	190.27	191.07	190.67
T100747-0008	Wabagishik Rapids Baseline	10.47	10.97	10.72
T100747-0009	Third Chute Baseline	10.07	10.57	10.32
T100747-0010	Third Chute Baseline Replicate	11.57	10.37	10.97
T100747-0011	McGraw Falls Baseline Impoundment	10.67	11.17	10.92
T100747-0012	McGraw Falls Baseline Downstream	11.17	11.47	11.32
T100747-0013	McGraw Falls Baseline Upstream 1	7.17	7.77	7.47
T100747-0014	McGraw Falls Baseline Upstream 2	9.77	11.67	10.72
T100747-0015	McGraw Falls Baseline Replicate 1	11.47	10.97	11.22
T100747-0016	McGraw Falls Baseline Replicate 2	12.27	10.97	11.62
T100747-0017	McGraw Falls Baseline Replicate 3	7.87	7.27	7.57
T100747-0018	McGraw Falls Baseline Replicate 4	9.87	10.67	10.27
T100747-0019	Dup1	11.27	9.37	10.32
T100747-0020	Dup2	193.27	194.07	193.67
T100747-0021	Dup3	23.57	19.27	21.42

Hutchinson

Environmental Sciences Ltd.

Wabageshik Rapids Generating Facility

Pre-development Water Quality and Fish Tissue Mercury

Prepared for: Xeneca Power Development Ltd.
Job #: J130003

September 16, 2013

3-1 Taylor Road, Bracebridge, ON P1L 1S6 ph: 705 645 0021
Suite 202 – 501 Krug St., Kitchener, ON N2B 1L3 ph: 519 576 1711

Hutchinson
Environmental Sciences Ltd.

3-1 Taylor Road, Bracebridge, ON P1L 1S6 ph: 705-645-0021

September 17, 2013

Project No.: J130003

Mr. Ed Laratta
Manager, Environmental Programs and Approvals
Xeneca Power Development Inc.
5255 Yonge Street, Suite 1200
Toronto, ON
M2N 6P4

Re: Wabageshik Hydroelectric Generating Facility – Pre-Development Water and Fish Tissue Mercury Report, 2012 Results

Dear Mr. Laratta,

Please find enclosed our 2012 report on fish and water quality for Xeneca Power Development's Wabageshik hydroelectric generating facility, proposed for the Vermilion River east of Espanola, Ontario.

The report presents the 2012 reference surface water quality and concentrations of mercury in large fish and forage fish before facility development. This monitoring and analysis program will continue for two years pre-development and three years post-development.

The work reported herein was conducted according to the recommendations of the Ontario Ministry of the Environment (MOE) document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (Draft - January, 2012) and discussions with the MOE on application of the monitoring recommendations to the Wabageshik Project.

If you have any questions regarding this report, please do not hesitate to contact the undersigned. Thank you for the opportunity to conduct this work for Xeneca Power Developments Ltd.

Sincerely,

Hutchinson Environmental Sciences Ltd.

Brent Parsons, M.Sc.
brent.parsons@environmentalsciences.ca

Signatures

Brent Parsons, M.Sc.
Aquatic Scientist

Neil J. Hutchinson, Ph. D.
Principal Scientist

David Leeder
Environmental Scientist

Executive Summary

Water quality and fish sampling was conducted at Xeneca Power Development's proposed hydroelectric facility on the Vermilion River, approximately twelve kilometres east of Espanola, Ontario, at the present day location of the Wabageshik Rapids. Impounding rivers for hydroelectric generation can change their water quality through warming due to decreased water flow and increased surface area exposed to sun, changes to water chemistry from water contact with newly flooded soil and changes in flow, increases in oxygen demand and changes in microbial activity in the flooded soil. Typically, water quality has a very rapid response to inundation, changing quickly and then stabilizing within a few years.

The potential increase of available mercury in surface water is a particular concern with water impoundment. Mercury is present naturally in soils and rocks in Ontario and is enhanced by atmospheric deposition from human sources such as the combustion of coal. Inundating land with water results in the partial release of inorganic mercury accumulated in the vegetation and soils. Decomposing flooded organic matter and vegetation often stimulates the methylating microbial community which converts mercury to its bioavailable methyl mercury form.

Mercury concentrations in fish may increase after impoundment and then decrease and stabilize in subsequent years as observed in experimental inundation in Ontario and in hydroelectric projects in Quebec. Mercury and methyl mercury may biomagnify within the food chain and can pose a health concern to humans and wildlife that consume fish. The rate of mercury accumulation in fish depends on a variety of factors including fish size, diet and trophic position, as well as site-specific factors such as the type of terrain flooded, hydraulic residence time and water level fluctuation.

Baseline sampling establishes a reference of water quality and mercury in fish prior to facility development. This, plus upstream-downstream comparison in post-development monitoring will allow facility-related impacts to be assessed. The baseline program reported herein was conducted according to recommendations in the draft Ministry of Environment (MOE) document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012), discussions with the MOE on application of the recommendations and documentation in the sampling program design (Hutchinson Environmental Sciences Ltd., 2012). The information presented in this report includes year one of baseline water sampling (2012); it will be updated at the end of 2013 once the 2013 data collection is complete.

Water quality samples were collected during each of the river's three open water flow periods (i.e., during each of the waning portion of the spring freshet, summer low flow and the fall increasing flow) and documented the water quality during these distinctly different flow regimes. The water quality samples were analyzed for parameters which indicate the general water chemistry in the river, nutrients and total metals, including total and methyl mercury.

Current water quality monitoring indicates that the Vermilion River in the project area has relatively good water quality, typical of a northern Canadian Precambrian Shield river with limited impacts from mining activities. The water quality is summarized as follows:

- Aluminum, copper and nickel concentrations exceeded the Ontario Provincial Water Quality Objectives (PWQOs), possibly because of upstream mining activities and historical mining impacts to the Vermilion River watershed;

- Low total suspended solids, dissolved organic carbon and nutrient concentrations, with all parameter concentrations well below the PWQOs; and,

- The river's water quality is linked to its seasonal flows, indicated by increased suspended sediments and associated adsorbed metals and nutrients during high spring and fall flows.

Initial dissolved oxygen and water temperature monitoring results indicate that the two parameters are closely linked, exhibit diurnal patterns and are sensitive to weather patterns. According to the data, the area contains sufficient dissolved oxygen concentrations for the development of Walleye eggs and water temperatures indicated the spawning period was long over at the time of sampling.

Following hydropower development, the river's water quality could be affected as follows:

- If appreciable sediment accumulates in the impoundment of the project area, turbidity and total suspended solids could increase during peak flows as sediment flushes. The concentrations of metals and nutrients adsorbed to sediment would also increase, possibly resulting in reduced water quality;

- Mercury concentrations could increase independently of suspended sediment as a result of water impoundment alone but mercury transport out of the impoundment would be markedly higher with increased suspended sediment, as mercury – like other metals – adsorbs to sediment. Given that the facility will operate as a run-of-the-river project, water residence time in the impoundments will be limited which will in turn, dilute the concentrations of mercury relative to what would be expected from large impoundments with longer residence times. Post-development water sampling will monitor the changes of mercury in surface water; and,

- Following development, the water temperature in the impoundment will warm from increased river surface area, which may result in lower dissolved oxygen concentrations as the water's capacity to retain oxygen decreases. The magnitude of dissolved oxygen decrease will depend on how much the water warms and other factors such as changes in water turbulent flow which recharges water with oxygen, changes in aquatic plant growth and oxygen demand from the conversion of inundated soil to sediment.

In addition to the seasonal monitoring regime recommended by MOE, post development monitoring will be conducted during peak flows to establish a worst-case scenario for contaminants related to suspended sediment. Dissolved oxygen monitoring will be conducted in the early morning when it is typically lowest due to overnight oxygen use by plant respiration with no oxygen recharge from aquatic plant photosynthesis.

Baseline fish monitoring results from 2011 to 2012 indicated that the concentrations of total mercury in large and forage fish are related to size. The Wabageshik Rapids hydroelectric facility will not impede fish movement through the project area so the study design to assess mercury concentrations in fish was based on a before/after approach with one site that will be compared between years.

The mercury concentrations of most large fish did not exceed the majority of the provincial and federal fish consumption guidelines. No fish exceeded the MOE Guidelines for Women of Child-bearing Age and Children Under 15 (Complete Restriction), General Population Partial and Complete Restrictions, or the Health Canada Fish Consumption Guideline. Mercury concentrations in three fish exceeded the MOE Guidelines for Women of Child-bearing Age and Children Under 15 (Partial Restriction). The mercury concentrations in 19 fish exceeded the Canadian Council of Ministers of the Environment's Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota.

All fish sampled at Wabageshik Rapids contained mercury concentrations less than the average mercury concentration in Walleye (*Sander vitreus* - 0.65 µg/g) and Northern Pike (*Esox Lucius* - 0.52 µg/g) in 79 lakes throughout Ontario (Wren et al. 1991). Since inundation has the potential to elevate mercury concentrations it is important to note that:

1. Elevated mercury concentrations in fish tissue often occur independent of impacts associated with hydroelectric development; and,

2. Mercury in fish should continue to be monitored following development as the mercury concentrations in some fish at Wabageshik Rapids approach or exceed fish consumption guidelines.

The baseline results for mercury in fish will be considered post-development as follows:

- Forage and large fish may show higher concentrations of mercury than baseline populations;

- Since there is no real-time upstream reference area (i.e., a comparable area upstream of the facility that is separated by a barrier to fish migration) it will be difficult to differentiate naturally occurring variations in mercury from facility-driven changes. Therefore, the pre-development reference will be an important temporal benchmark; and,

- Water quality monitoring in years after operation will include mercury to determine any changes while monitoring of forage and large fish will allow for an assessment of bioaccumulation rates at different trophic levels.

This Executive Summary shall be read in conjunction with the remainder of this report, which describes the sampling methodology and rationale as well as analytical results, and discusses the results in the context of the current conditions at the proposed facility and post-development monitoring programs.

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1 Introduction

Water quality and fish sampling was conducted at Xeneca Power Development's proposed hydroelectric facility on the Vermilion River, approximately twelve kilometres east of Espanola, Ontario, at the present day location of the Wabageshik Rapids. The sampling programs aimed to characterize the conditions of water quality and mercury concentrations in fish prior to hydroelectric facility development and serve as a temporal reference with which to compare post-development conditions.

The water quality in the river may change following development and the mercury dynamics in the aquatic system may increase the uptake of mercury by fish. Post-development water quality conditions will be compared to pre-development conditions (i.e., the environmental baseline) to measure changes in the project area after development. The post-development assessment of change will be fine-tuned to account for natural changes in the aquatic system unrelated to hydropower development by collecting reference samples upstream of the area which are not impacted by the proposed project, and thus help infer natural variability.

This report describes the results, rationale and regulatory context of pre-development reference sampling conducted at the proposed Wabageshik Rapids facility. The following key components are included in the report:

1. A description of the water quality and fish sampling programs, including the rationale for the programs and their regulatory context;
2. Results from the pre-development water quality program developed in consultation with the Ontario Ministry of the Environment (MOE), the regulator who oversees the environmental quality aspects of hydropower development in Ontario. This report contains seasonal data collected in 2012, year one of the pre-development monitoring program;
3. Preliminary dissolved oxygen and water temperature monitoring results collected in the study area in May, 2013 as requested by MOE;
4. Mercury concentrations in large fish and forage fish, measured from 2011 to 2012; and,
5. An interpretive description of the current water and fish quality in the Vermilion River at the proposed facility.

2 Facility Description

Xeneca is proposing to construct a hydroelectric facility at the present day Wabageshik Rapids, approximately 600 m downstream from the outflow of Wabageshik Lake on the Vermilion River east of Espanola, Ontario (Figure 1). A powerhouse will be constructed on the south side of the Vermilion River, with an adjacent spillway and substation as shown on Figure 2.

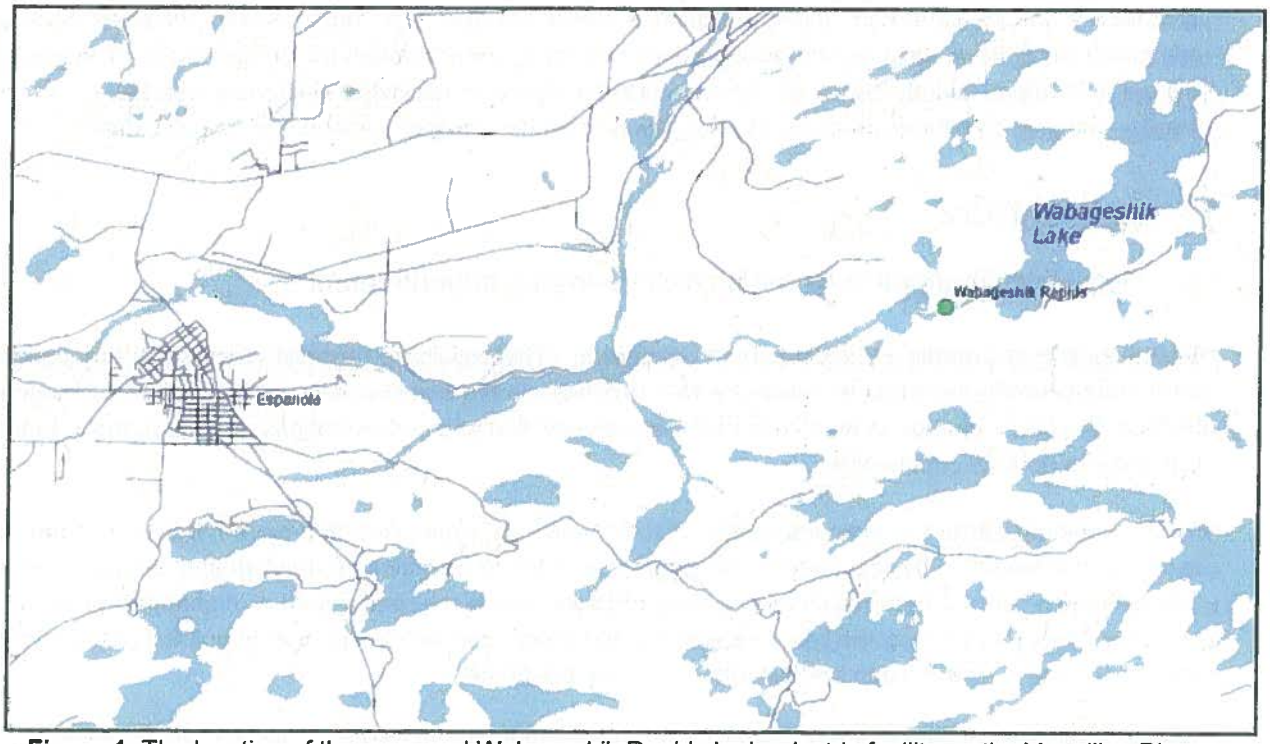


Figure 1. The location of the proposed Wabageshik Rapids hydroelectric facility on the Vermilion River.

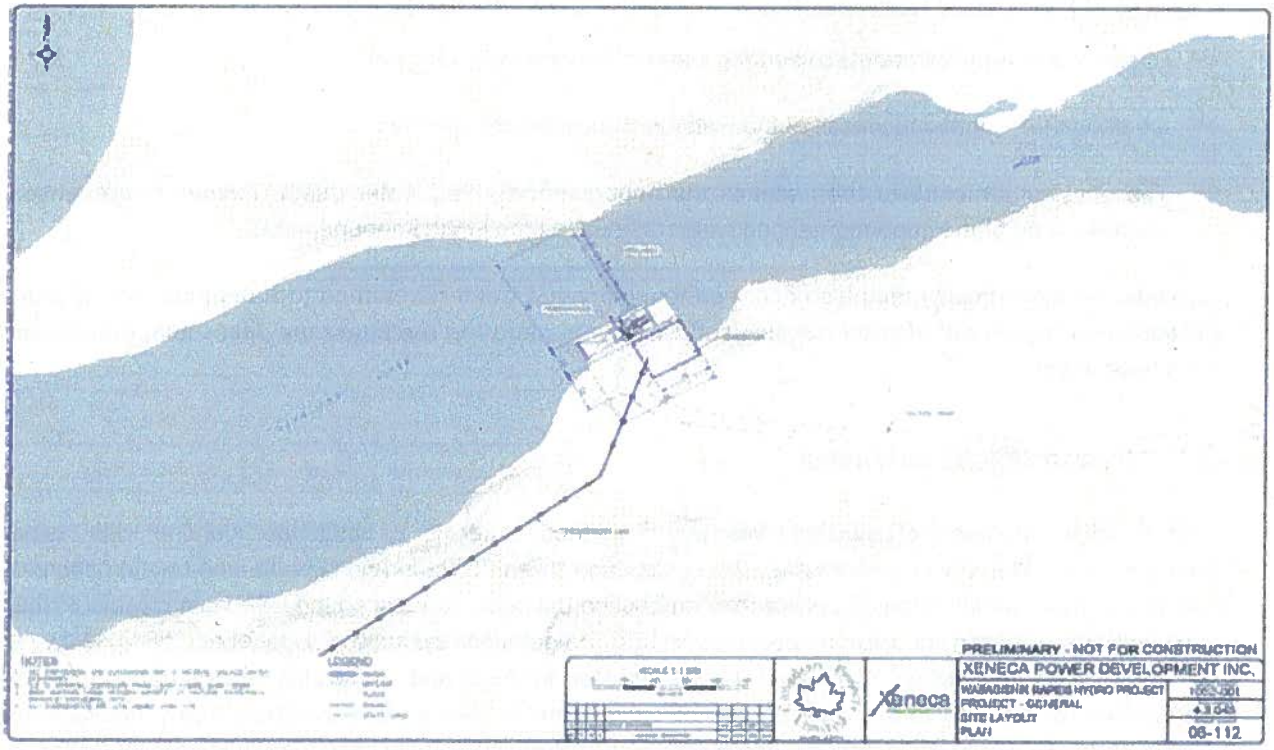


Figure 2. The layout of the proposed Wabageshik Rapids hydroelectric facility.

The facility will be operated under a modified run-of-the-river flow regime, with modified peaking controlling water flows daily through a spillway and directing water through the power house. The project will result in approximately 600 m of inundation up the rapids to the outlet of Wabageshik Lake. Due to the steep slopes on either side of the existing rapids, the lateral extent of inundation will be limited.

3 Background

3.1 Possible Changes to Water Quality Following Impoundment

Damming a river creates an impoundment upstream. This results in physical changes to the aquatic environment which may include vertical thermal stratification in the impounded water, increased exposure of water to soils, a change in aquatic nutrient or metal cycling and concentrations, and/or changes to the fish and invertebrate communities.

Newly impounded water is exposed to areas of rock, soil and vegetation that have not been historically saturated with water. Physical and chemical changes to the water occur as flooded land changes from a terrestrial environment to an aquatic or riparian environment; the rate and nature of change will depend on several factors including the type of terrestrial vegetation, the depth and type of soil saturated by the impounded water, and the depth and duration of the impoundment.

Typically, following flooding, water chemistry in an impoundment will change quickly and then stabilize. Nutrients, metals, major ions, dissolved organic carbon, dissolved and suspended solids, conductivity, alkalinity, dissolved oxygen, and temperature may all change as a result of:

- Chemical and physical inputs to surface water from the inundated land;
- A shift in the aquatic processes of the water in the impoundment; and,
- The physical structure of the water in the impoundment (e.g., water depth, thermal stratification, surface area of the impoundment and water residence time in the impoundment).

Changes in water quality may also occur as the impounded water is returned to a natural river channel downstream. Increased velocity may suspend sediments and the discharge may alter temperature and dissolved oxygen.

3.2 Mercury Bioaccumulation

The potential increase of available mercury in surface water is a particular concern with water impoundment. Mercury is present naturally in soils and rocks in Ontario and is enhanced by atmospheric deposition from human sources such as the combustion of coal. Inundating land with water results in the partial release of inorganic mercury accumulated in the vegetation and soils (Bodaly et al. 1984, Hecky et al. 1991). Decomposition of flooded organic matter in soils and vegetation usually enhances the methylation of mercury to the bioavailable and toxic form of methyl mercury (Kelly 1997, Montgomery 2000) because it can stimulate the methylating microbial community, but increased complexation of mercury to organic ligands can also decrease mercury bioavailability. Mercury and methyl mercury may

biomagnify within the food chain and can pose a health concern to humans and wildlife through fish consumption (Bodaly et al. 1984, Jackson 1988, Hall et al. 2005).

Mercury concentrations in fish may increase rapidly after impoundment and then decrease and stabilize in subsequent years. This cycle has been observed as a result of experimental inundation in Ontario (St. Louis et al. 2004) and in hydroelectric projects in Quebec where mercury is also present in the soils and vegetation of impounded areas from natural and anthropogenic sources (http://www.hydroquebec.com/sustainable-development/documentation/mercure.html).

Water quality and mercury in fish tissue will be monitored before and after facility development to assess if change is occurring as a result of the development, and if this change poses a human health or environmental risk. For example, mercury concentrations are elevated in fish tissue throughout much of Ontario as a result of atmospheric deposition and natural soil weathering, and a pre-development baseline of mercury concentrations in fish should be established so that post-development concentrations are not mistakenly attributed to the development or operation of the facility. If unacceptable change is occurring as a result of the development and/or operation of the hydroelectric facility, monitoring provides valuable information on the trend(s) of the change relative to pre-development conditions. The monitoring results from existing projects can also be used to design and operate future facilities in ways which minimize environmental impacts.

The rate of mercury accumulation in fish depends on a variety of factors. Fish size, diet and trophic position are important but site-specific factors such as the type of terrain flooded, hydraulic residence time and water level fluctuation are important considerations as well (Reed Harris Environmental Ltd. 2012). Schetagne et al. (2003) found that fish accumulate mercury at higher rates immediately downstream of hydroelectric facilities because some fish pass through turbines and are injured, making them more easily available as food for fish downstream, encouraging piscivory and increasing mercury bioaccumulation. Fish size, diet and trophic position variables were partly controlled during baseline sampling through the preferential sampling of piscivorous fish from a specific size class (described in Section 4.3 of this report). Forage fish were collected so that impacts could be assessed at multiple trophic levels and since these fish have a lower trophic position, any increasing mercury concentrations should be observed earlier.

Mercury chemistry in the environment is complex and spatial variation in mercury concentrations is difficult to quantify, typically varying within each system (Desrosiers et al. 2006). Research is sparse on small-scale projects like Wabageshik Rapids, which has a small area of inundation and rapid flow-through rate, making desk top predictions of mercury generation and bioaccumulation difficult. However, site specific factors including the type of terrain, hydraulic residence time and water level fluctuation can be used to identify site-specific sensitivities and develop appropriate mitigation measures. As the operating regime for the facility is established, these factors can be utilized to refine post-development monitoring and target the periods of highest sensitivity.

Mercury concentrations in water and mercury in fish tissue will be monitored before and after facility development to assess if change is occurring as a result of the development, or if concentrations reflect baseline conditions.

3.3 Regulatory Context

The pre-development water quality and fish sampling program for Wabageshik Rapids was conducted according to recommendations in the draft MOE document titled "From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower" (January, 2012) and discussions with the MOE on application of the recommendations.

The MOE guide was prepared to provide guidance to waterpower operators and developers on the Ministry's expectations for a comprehensive assessment of the impacts of a new waterpower facility on the quality of water in a river, and the accumulation of mercury in fish. Application of the guide to Xeneca's proposed facilities is described in the HESL document titled "Xeneca Power Development Surface Water Quality and Fish Sampling Program, Hydroelectric Generating Facility Monitoring for Baseline Conditions and Early Operation" (June, 2012). The specific implementation of the guide's recommendations related Wabageshik Rapids is described in this report.

4 Water Quality and Fish Sampling Programs

4.1 Objectives

The pre-development water quality and fish sampling programs were conducted to:

1) Measure the surface water quality indicator parameters recommended by the MOE (2012) before the facility is built to provide a temporal reference for water quality in the project area after development;

2) Monitor dissolved oxygen and water temperature downstream of the proposed facility and upstream of the area of inundation; and,

3) Establish a pre-development of total and methyl mercury in fish tissue using the sample sizes and methodologies recommended by MOE (2012).

The post-development sampling program will provide representative samples from upstream of the facility (reference), within the impoundment, and downstream of the facility, to monitor any effects of the facility on water and fish quality, taking into account natural variation. Post-development sampling will also be conducted according to the recommendations in MOE's draft guidance (2012), and will be compared to pre-development results to assess any changes in water and fish quality following development.

4.2 Water Sampling

The pre-development water quality program included representative samples of river water to provide a temporal reference of water quality and address changes in water quality in the river in response to the different seasonal flows. Samples were collected seasonally and in duplicate pairs to address potential variances in water quality.

Pre-development sampling is conducted over two years to reduce the variability associated with one year of water quality data and provide a more representative temporal reference. Year 1 was completed in 2012 and year 2 will be completed in 2013 using the same design.

Post-development water quality samples will be collected in years 1, 2 and 3 following development, as recommended by MOE (2012). The results of the post-development sampling will be compared to pre-development results and reported annually. If water quality has not stabilized by year 3, further monitoring will be conducted in consultation with MOE. Construction-phase water quality monitoring will be determined once the detailed design and construction sequencing for the projects is completed.

4.2.1 Seasonal Sampling

In 2012, sampling was conducted once during each of the three annual open water flow periods: during the waning flow of the spring freshet (April), during the summer low-flow period (August) and during the increasing fall flow (November).

In most Ontario rivers there are notable differences in water quality associated with the three open water flow periods, as observed in the MOE's Provincial Water Quality Monitoring Network (PWQMN) dataset. A PWQMN monitoring site (PWQMN station 14002805802) was in operation on the Vermilion River at Regional Road 10 (old Highway 549) approximately 24 km east of the proposed facility from 1994 to 1996 (Figure 3). The monitoring site was sampled by the MOE between January and November each year. The PWQMN monitoring site is situated on a stretch of the Vermilion River that is similar to the one that the proposed facility will be located on - the PWQMN station is immediately downstream of a comparably sized lake to Wabageshik, on a similarly sized reach of river and is surrounded by undeveloped forested land. Data from 1994 to 1996 indicated the seasonal pattern was valid for the Vermilion River.

The sampling periods for Wabageshik Rapids were identified by examining the mean daily hydrograph for Panache Lake at Jackson's Point (02CH002) from 2005 to 2011, produced by the Water Survey of Canada online (Figure 4) so that representative samples could be collected during each flow regime. It would have been preferable to use a hydrometric station on the Vermillion River but no station exists in the vicinity of the proposed facility; the Jackson's Point Station was located in the same sub-watershed.

Figure 3. The location of the PWQMN station downstream of the proposed facility.

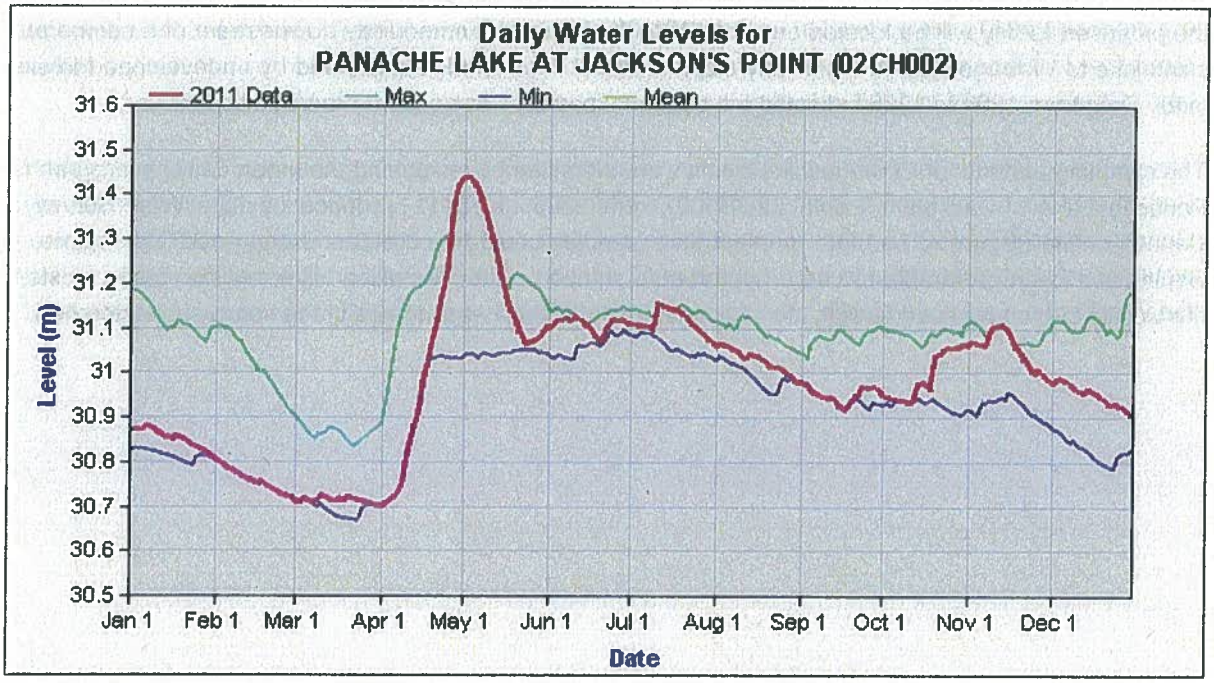


Figure 4. The 2005 to 2011 mean daily discharge hydrograph for Panache Lake.

4.2.2 Sample Locations – Pre-development

The pre-development water quality samples were collected immediately downstream of the proposed facility (Figure 5). There are no features that could differentially affect the water quality in the project area such as wetland drainage, appreciable flow changes or contaminant point sources. Therefore, only one sample location was required to define the ambient water quality flowing through the project area at baseline. The baseline results from this one location will provide a temporal reference for all post-development monitoring.

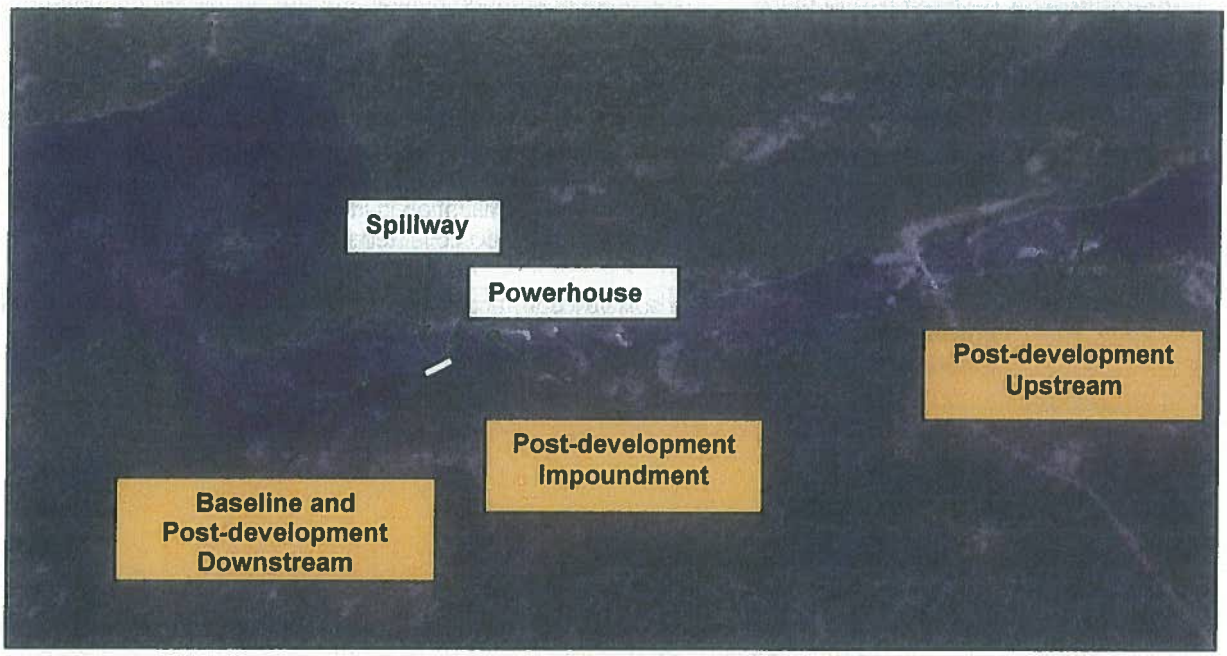


Figure 5. The pre- and post-development water sampling locations.

4.2.3 Sample Locations – Post-Development

Post-development samples will be collected upstream of the facility, within the impoundment, and downstream as shown on Figure 5 and described in Table 1 (following page).

4.2.4 Duplicate Samples

During pre-development sampling, duplicates were collected at each location approximately 10 minutes after the initial sample, to assess spatial and temporal variance of the flowing river. The duplicate sample was collected from the same location as the initial, but represented different water because the river constantly flowed past the sample location. Duplicates will also be collected during the remaining pre- and post-development sampling to assess sample representativeness and reliability.

Table 1. Post-development water sampling locations.

Sample Site	Location	Rationale
Upstream Reference	Upstream of the impoundment and downstream of Wabageshik Lake	The sample provides a reference of water entering the project area - comparing the results of this sample to the baseline samples quantifies the effects of natural variability on water quality, differentiates between project-related and naturally occurring environmental changes, and isolates project-related changes.
Impoundment	Deepest part of the impoundment	The sample measures the water quality in the impoundment where the change is likely to be the most pronounced. In addition to the water quality parameters and methods at the other sample locations, a temperature and dissolved oxygen profile will be conducted at the impoundment sample location to identify if thermal stratification is occurring in the impoundment if sufficient water depths permit such an assessment. If stratification is identified, a discrete water quality sample will be collected from each thermal layer.
Downstream	Immediately downstream of the proposed facility	The spillway dam and tailrace from the power house will both discharge to this pool and the sample from this pool will measure the combine discharge of both of these structures.

4.2.5 Sample Collection – Methods

Each water quality sample was collected as follows:

- From greater than 2 m off-shore and 0.5 m below the water's surface using a clean sampling vessel secured to a clean, contaminant-free sampling pole;
- From the flowing portion of the main channel of the river, avoiding eddies, back pools or floating debris, since water from these areas may not represent the bulk water quality in the river;
- Water samples were collected into clean, laboratory-supplied bottles containing the appropriate chemical preservative, and were stored on ice or frozen as required. Samples were field filtered, using laboratory-supplied filters as required;
- All samples, containers and instruments for field measurements were handled only by personnel wearing clean, contaminant-free nitrile gloves;
- Each sample location was logged with a GPS;
- The date, time and field conditions at the time of sampling (e.g., weather, snow and ice presence) were recorded and the sample location photographed; and,
- Samples were shipped to the analytical laboratories after each day of sampling with chain of custody documents, to record the sample shipping and handling.

4.2.6 Analysis

All water quality samples were analyzed for the following parameters as recommended by MOE (2012):

- pH, conductivity, alkalinity;
- turbidity, total suspended solids (TSS) and total dissolved solids (TDS);
- cations (Mg, Na, Ca, K);
- anions (Cl, SO_4);
- dissolved organic carbon (DOC);
- total phosphorus;
- nitrate, nitrite, ammonia and total Kjeldahl nitrogen (TKN);
- total metals;
- low level total mercury (0.1 ng/L detection limit); and,
- low level methyl mercury (0.02 ng/L detection limit).

Analyses were conducted by ALS Environmental, a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory with the following exceptions:

- Low-level phosphorus analysis was conducted by the Trent University Laboratory at Dorset, Ontario, which is not CALA accredited, but has the highest resolution phosphorus analysis in the province; and,
- Mercury and methyl mercury in water and fish were analyzed by Flett Research Ltd., Winnipeg, Manitoba, a CALA accredited laboratory.

Water temperature, dissolved oxygen (D.O.), pH and conductivity were measured in the field using a YSI model 65 TDS multi-meter and the multi-meter was calibrated daily. Turbidity was measured in the field using a LaMotte 2020WE turbidity meter. A field data sheet for recording field parameter measurements and other pertinent information at the time of sampling was developed and provided to field staff for each sampling event.

4.2.7 Dissolved Oxygen and Water Temperature Monitoring

In addition to the MOE recommended water sampling program, dissolved oxygen and water temperature are also being monitored in 2013 with HOBO Dissolved Oxygen Loggers (U26-001) to characterize diurnal pre-development dissolved oxygen and water temperature trends in the deep pool immediately downstream of the proposed facility. The information will help to evaluate potential changes in Walleye (*Sander vitreus*) spawning habitat downstream of the facility. Walleye require D.O. > 5 mg/L and water temperatures between 9 and 15°C during egg development and while later stages of development also

have specific habitat requirements, the requirements during egg development are the most precise (Kerr et al. 1997). Spawning occurs at temperatures between 5 and 10°C and peaks at approximately 8°C.

Water temperature and especially dissolved oxygen, can undergo significant diurnal fluctuation, especially during summer months when oxygen generation and demand by aquatic plants varies day-to-night. Night time oxygen deficiency can stress fish at various stages of development and is an important factor to quantify prior to development. One year of pre-development data is not sufficient to describe the natural variation in temperature and D.O. over many seasons, however, the data are valuable, provide insight into the river's diurnal cycles and supplement the existing MOE recommended program.

The loggers were installed during the spring water sampling event on May 19 and recovered on May 29, 2013. Additional monitoring data will be collected during the summer and fall 2013 sampling events. The loggers were installed in the deep pool immediately downstream of the facility in which dissolved oxygen deficiencies could stress fish populations, and at an upstream reference location, immediately downstream of Wabageshik Lake. The locations are shown on Figure 5.

4.3 Fish Sampling

The sampling program for mercury and methyl mercury in fish was developed considering:

- The modes of mercury transport from impoundments – i.e., passively by migration with water flowing downstream, and actively in fish body burdens which can move up and downstream;
- Naturally occurring mercury in the environment, and differentiating it from facility-generated mercury by providing temporal references where there is no barrier to fish migration that isolates an upstream reference fish population;
- The availability of fish for sampling, including where fish are seasonally and the sustainability of sampling a population of fish four to seven times over ten years; and,
- The dynamics of mercury uptake and accumulation in fish of different species and ages.

These factors were incorporated into the fish sampling program described below. All fish sampling was conducted as permitted by the Ontario Ministry of Natural Resources (MNR), according to the MNR "Riverine Index Netting, Manual of Instructions" (March, 2010) and in keeping with the recommendations of MOE (2012).

4.3.1 Sampling Intervals

Pre-development fish tissue sampling has been completed and mercury concentrations in fish tissue have been established from which to compare post-development mercury concentrations (Section 5.0).

Post-development, forage fish will be sampled during each of years 1, 2, 3, 6 and 9 in line with the MOE (2012) guidance. The sampling interval reflects the intent of using forage fish as an 'early warning' of mercury bioaccumulation in the food chain at their lower trophic level relative to large fish, and tendency to accumulate environmental mercury in a shorter timeframe.

Large, piscivorous fish will be sampled on years 3, 6 and 9 following development reflecting the observed accumulation rate of mercury in their trophic level following water impoundment in experimental impoundments and the Quebec hydroelectric impoundments.

If mercury concentrations in fish tissue have not stabilized within nine years of development, additional sampling may be required and a revised program will be developed in consultation with MOE. Post-development sampling results will be provided to MOE so that they can incorporate them into the "Guide to Eating Ontario Sport Fish" (MOE 2013) which is published every year.

4.3.2 Targeted Fish

The targeted fish species included larger predator fish and forage fish but considered the type and availability of fish encountered during baseline sampling, as follows:

- Large Fish: 20 individuals of at least 25 to 55 cm size; fish species common to the area that can be caught in subsequent years and piscivorous fish were preferred. In 2013, MOE requested an additional 10 Walleye samples as MOE considers Walleye to be the primary fish population that anglers target at Wabageshik Rapids; and,

- Forage Fish: five (5) composite samples of 5 to 10 individuals of either a) young of the year Yellow Perch, b) yearling yellow perch or c) another cyprinid species, were targeted to provide a composite sample of 10 grams for each sample.

4.3.3 Annual Timing of Sample Events

The relative sizes of forage fish increase quickly over the course of one year and the sampling program was conducted during the summer to coincide with the high abundance and catchability of fish before waters cooled, to prevent the need for subsequent sampling. Larger fish can be sampled over multiple visits in a single season as required to achieve the MOE recommended catch, or even over two years, provided that a comparable size and distribution of fish are submitted for each sampling event. Fish sizes are documented and a relationship is established between size and mercury content.

4.3.4 Sample Locations – Pre-development

Seventeen large fish (Smallmouth Bass - *Micropterus dolomieu*) were collected downstream of the Wabageshik Rapids in 2011 by Natural Resource Solutions Inc. (NRSI) as part of the baseline ecological studies for the project (Figure 7). HESL caught three Northern Pike (*Esox lucius*) in the same reach in 2012 to assure that 20 individuals were available for mercury analysis, and caught one Walleye (*Sander vitreus*) from the area in 2013. These fish represent the best available catch for the area.

Forage fish were collected by HESL in 2012 immediately downstream of Wabageshik Rapids as a temporal bioaccumulation reference.

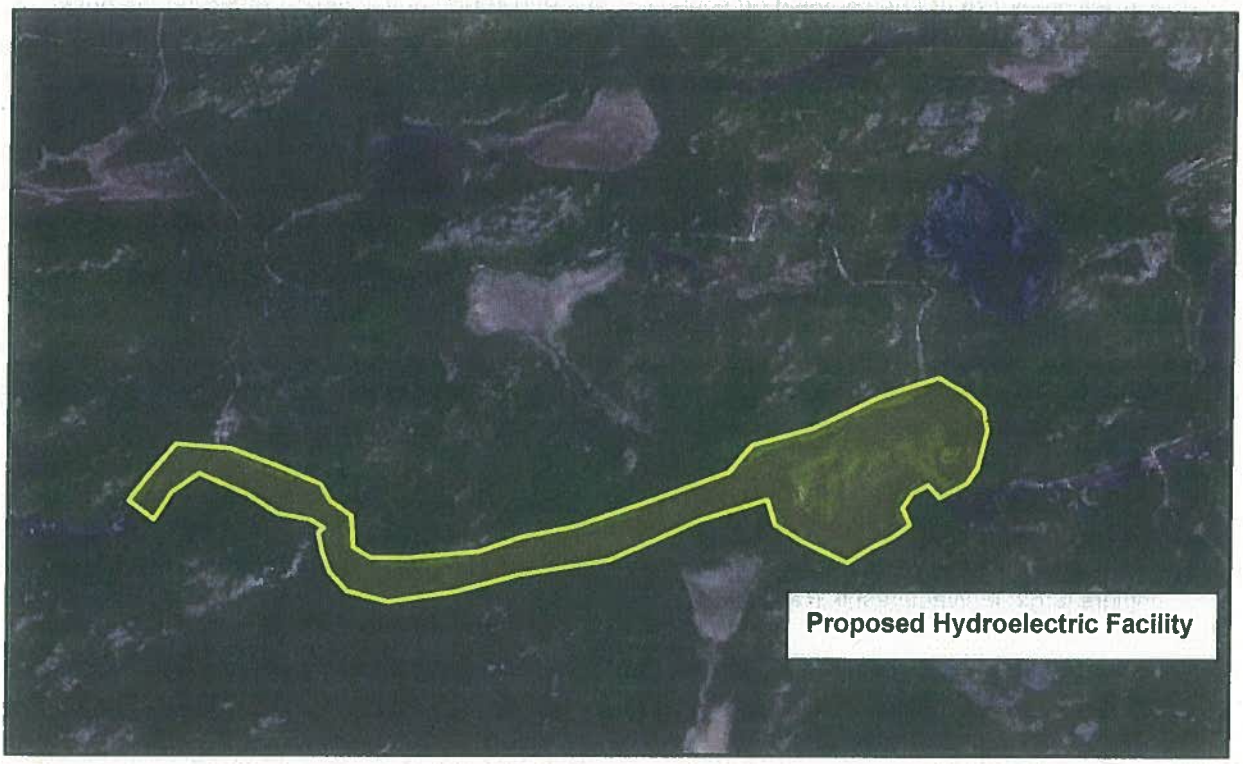


Figure 6. The reach of river which was sampled for fish during pre-development work and will be sampled again post-construction.

4.3.5 Sample Locations – Post-Development

There is no barrier to fish migration on the main branch of the Vermilion River within a reasonable distance upstream of the Wabageshik impoundment that would provide a representative sample of fish populations similar to the project area. Therefore, the pre-development data collected in 2012 will provide a temporal reference for changes in mercury. It will be more challenging to factor natural temporal variation into mercury analysis following development because there will not be a real-time upstream reference.

4.3.6 Sampling Methods

Large fish were collected by NRSI, with fish sampling results provided to us for inclusion in this report. Forage fish and four supplemental large fish were collected by HESL.

HESL's sampling plans were submitted to the MNR district office in Sudbury and the 2012 work was conducted under issued license No. 1069491. A MNR "License to Collect Fish for Scientific Purposes" report was submitted to MNR following completion of the sampling programs and is included in Appendix A.

Forage fish were collected using MNR small mesh gillnets developed for the MNR RIN protocol and "Gee" minnow traps (barrel shaped wire mesh traps available at most sporting goods retail outlets). Up to six

RIN nets and 12 minnow traps were set at each location. The nets and traps were checked periodically throughout the day and relocated if necessary.

Whole fish composites of the same species and size were compiled and packaged immediately after catch in Ziploc freezer bags as required by the analytical laboratory. Samples were stored in coolers on ice upon packaging and frozen at the end of each sample day. Samples were shipped frozen to Flett Research in Winnipeg, Manitoba for mercury analysis.

4.3.7 Analysis

The forage fish composite samples were analyzed for methyl mercury (detection limit of < 1.0 ng/g) and total mercury (detection limit < 2.0 ng/g) by Flett Research. Large fish were analyzed for total mercury only and it was conservatively assumed that all mercury in large fish was methyl mercury.

Large fish mercury analysis was conducted only on fillets as recommended by MOE (2012) to assess the portion of the fish which would be eaten by humans and preferentially eaten by other piscivores. Forage fish analysis was conducted on whole fish composites, reflecting the intent to assess foragers for total and methyl mercury accumulation in the food chain.

5 Pre-Development Results (2012)

5.1 Water Quality

5.1.1 Sampling Dates

Table 2 provides the dates that water quality samples were collected. All samples were collected during the intended open water hydrograph periods and represent the water quality in the river during the indicated flow regime.

Table 2. Water quality sampling dates.

Facility	Hydrograph Period	Sample Date
Wabageshik	- Spring freshet, following first flush	14-Apr-12
	- Summer low-flow	17-Aug-12
	- Fall flow (increasing)	02-Nov-12

5.1.2 Locations

The pre-development water quality samples were collected from the location shown on Figure 5. Photographs of the sample location are included in Appendix B.

5.1.3 Quality Assurance

The quality of the field collection and laboratory methods and the precision of the data were assessed by comparing the results of field duplicate samples. Relative percent differences between parameter

concentrations in duplicate samples were considered significant if they differed by more than 20% and were greater than 5 times the detection limit (U.S. EPA, 2012).

The following duplicate samples differed by > 20% and results were greater than 5 times the detection limit:

- April 14, 2012 - DOC and zinc;
- August 17, 2012 – TP; and,
- May 23, 2013 – TKN.

Total phosphorus samples are easily contaminated by sample water containing zooplankton or other debris. The duplicate sample value (0.0122 mg/L) was used in analyses instead of the baseline sample of 0.0312 mg/L because it was much closer to results reported by both ALS Laboratories (0.0069 to 0.0121 mg/L) and the Trent Laboratory (0.01032 to 0.0120 mg/L) on other sample dates. The analytical results indicate good quality control and sample representativeness overall except for DOC, zinc and TKN. Additional sampling in 2013 will provide more data to assess the significance of these differences.

5.1.4 Analytical Results

The 2012 annual median concentrations of all detected parameters for the project area are presented in Table 3. Some parameter concentrations were greater or less than the laboratory's reported detection limit on different dates, so for the purpose of statistical analyses, the detection limit was divided by two for parameters with 'non-detect' values. The seasonal trends of selected parameter concentrations in 2012 are presented on the plots in Figure 7. The analytical results of all analyzed parameters are presented in Tables 4 to 6.

All measured parameter concentrations were below the Ontario Provincial Water Quality Objectives (PWQOs – 1998) the regulatory guideline applicable to surface water in the project area, except for aluminum, copper and nickel. The Vermilion River drains the Sudbury basin which has been significantly impacted by erosion, acid deposition and metal contamination as a result of logging and mining activities in the last 140 years (Pearson et al. 2002). Elevated metal concentrations are likely due to the historical widespread atmospheric deposition of metallic particles from smelters in Sudbury, metal-rich runoff from tailings and waste rock, and erosion of soils destabilized by mining activities in the greater Sudbury area.

The following analytical results indicate seasonality in the river's water quality in 2012:

- Total phosphorus concentrations were relatively low and inversely related to the river's flow in 2012 (i.e., the highest concentrations occurred during the summer low flow);
- DOC was elevated during the spring freshet, decreased during the summer low flow, and increased again in the fall; increased DOC concentrations reflect wetlands flushing into the river during higher flow periods;
- Aluminum, iron, nickel, copper, TKN, and both total and methyl mercury concentrations were elevated in the spring as a result of overland inputs from the spring freshet and decreased throughout the year;

- Alkalinity and pH increased after the spring freshet because in watercourses with little buffering capacity the snowmelt can induce short-term reductions in pH. Alkalinity measurements (16 to 34 mg/L) indicate little buffering capacity at the project site which is a result of natural conditions such as the type of bedrock and anthropogenic impacts such as acid deposition; and,

- Water temperature in the project area ranged from approximately 7°C in spring to 22°C in fall. Dissolved oxygen concentrations exceeded the PWQO of 6.5 mg/L for cold water species and had an inverse relationship with temperature, (spring = 12.23 mg/L, summer = 7.26 mg/L, and fall = 9.3 mg/L), as expected.

An interpretive discussion of the river's water quality is provided in Section 6.0 – Conclusions and Discussion. Analytical certificates of analysis and field data sheets are provided in Appendices C and D, respectively.

Table 3. Median concentrations of all measurable water quality parameters in the project area.

Parameter	Units	Median
Aluminum (Al)	µg/L	90
Arsenic (As)	µg/L	0.5
Barium (Ba)	µg/L	12
Calcium (Ca)	µg/L	7,840
Chromium (Cr)	µg/L	0.3
Cobalt (Co)	µg/L	0.7
Copper (Cu)	µg/L	5.3
Iron (Fe)	µg/L	182
Magnesium (Mg)	µg/L	3,520
Manganese (Mn)	µg/L	39.5
Total Mercury (Hg)	µg/L	0.00164
Methyl Mercury ($[CH_3Hg)^+]$	µg/L	0.00001
Nickel (Ni)	µg/L	26.7
Potassium (K)	µg/L	1,550
Selenium (Se)	µg/L	0.545
Silicon (Si)	µg/L	2,150
Strontium (Sr)	µg/L	51.1
Titanium (Ti)	µg/L	2.9
Zinc (Zn)	µg/L	2.7
Conductivity	µmhos/cm	205
pH	pH	7.49
Total Suspended Solids	mg/L	1.5
Total Dissolved Solids	mg/L	137
*Dissolved Oxygen	mg/L	10.4
*Water Temperature	°C	10.8
*Conductivity	microS/cm	202
*pH	pH	7.69
*Turbidity	NTU	2.01
Alkalinity, Total (as $CaCO_3$)	mg/L	23
Chloride	mg/L	15.9
Nitrate-N	mg/L	0.325
Total Kjeldahl Nitrogen	mg/L	0.405
Total Phosphorus (ALS)	mg/L	0.00985
Total Phosphorus (Dorset)	mg/L	0.01131
Sulphate	mg/L	49.3
Dissolved Organic Carbon	mg/L	7.3

* Field measured data.

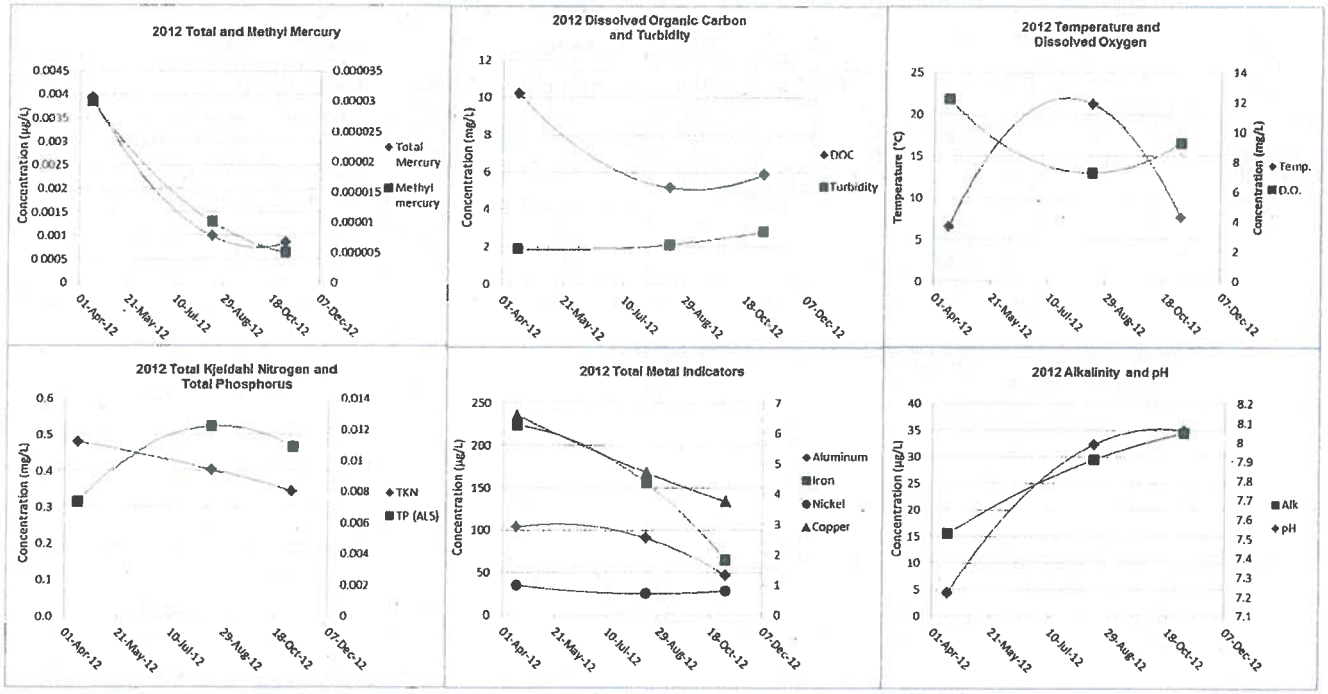


Figure 7. Seasonality of selected 2012 baseline monitoring parameters.

Table 4. 2012 water quality results: field parameters.

Parameter	Units	PWQO	Wabageshik Rapids					
			Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)
			14-Apr-12	14-Apr-12	17-Aug-12	17-Aug-12	02-Nov-12	02-Nov-12
Laboratory Results								
Conductivity	µmhos/cm	N/V	146	147	264	262	312	285
pH	pH	6.5 - 8.5	7.32	7.33	7.61	7.68	7.53	7.63
Total Suspended Solids	mg/L	N/V	<3.0	<3.0	3.2	4.0	<2.0	<2.0
Total Dissolved Solids	mg/L	N/V	88	94	180	192	216	214
Field Measurements								
Dissolved Oxygen	mg/L	> 7[1]	12.23	--	7.26	--	9.3	--
Water Temperature	°C	N/V	6.53	--	21.23	--	7.73	--
Conductivity	microS/cm	N/V	138	--	265	--	312	--
pH	pH	6.5 - 8.5	7.22	--	7.99	--	8.06	--
Turbidity	NTU	< 10% variance from background	1.89	--	2.13	--	2.8	--

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.
N/V - No value applicable to ambient surface water not influenced by a point source discharge.
-- Parameter not measured
1. PWQO for dissolved oxygen at 0°C

Table 5. 2012 water quality results: anions and nutrients.

Parameter	Units	PWQO	Wabageshik Rapids					
			Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)
			14-Apr-12	14-Apr-12	17-Aug-12	17-Aug-12	02-Nov-12	02-Nov-12
Alkalinity, Total (as $CaCO_3$)	mg/L	No decrease > 25% of background.	16	15	27	32	34	35
Ammonia, Total (as N)	mg/L	20	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride	mg/L	N/V	11.7	11.7	20.1	20.1	26.1	26.3
Nitrate-N	mg/L	N/V	0.15	0.15	<0.10	<0.10	<0.10	<0.10
Nitrite-N	mg/L	N/V	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Total Kjeldahl Nitrogen	mg/L	N/V	0.46	0.5	0.37	0.44	0.37	0.32
Total Phosphorus (ALS)	mg/L	0.03	0.0078	0.0069	0.0312[1]	0.0122	0.0121	0.0097
Total Phosphorus (Dorest)	mg/L	0.03	0.0107	0.0103	--	--	0.0119	0.0120
Sulphate	mg/L	N/V	30.1	30.1	68.4	68.4	78.8	79.9
Dissolved Organic Carbon	mg/L	N/V	11.7	8.7	5.3	5.0	5.8	5.9

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.
-- - Parameter not analyzed
N/A - Data not yet received from laboratory.
[1] - Value appeared to indicate contamination and was ignored during analyses.

Table 6. Baseline water quality results: metals.

Parameter	Units	PWQO	Wabageshik Rapids					
			Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)
			14-Apr-12	14-Apr-12	17-Aug-12	17-Aug-12	02-Nov-12	02-Nov-12
Aluminum (Al)	µg/L	75[1]	108	100	88	94	40	54
Antimony (Sb)	µg/L	20	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Arsenic (As)	µg/L	100	<1.0	<1.0	1.6	1.7	<1.0	<1.0
Barium (Ba)	µg/L	N/V	11	10	14	14	13	14
Beryllium (Be)	µg/L	11[2]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bismuth (Bi)	µg/L	N/V	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron (B)	µg/L	200	<50	<50	<50	<50	<50	<50
Cadmium (Cd)-Total	µg/L	0.2	<0.090	<0.090	<0.090	<0.090	<0.090	<0.090
Calcium (Ca)	µg/L	N/V	1,370	1,250	2,940	3,080	30,200	33,400
Chromium (Cr)	µg/L	8.9[3]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt (Co)	µg/L	0.9	0.79	0.76	0.7	0.7	<0.50	<0.50
Copper (Cu)	µg/L	5	6.7	6.6	4.7	4.7	3.5	4
Iron (Fe)	µg/L	300	232	215	154	157	62	69
Lead (Pb)	µg/L	20[4]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium (Mg)	µg/L	N/V	2,380	2,290	4,660	4,910	4,870	5,390
Manganese (Mn)	µg/L	N/V	38.8	37.1	86.9	91.9	36.6	39.6
Total Mercury (Hg)	µg/L	0.2	0.00562	0.00225	0.00095	0.00102	0.00087	0.00084
Methyl Mercury ($[CH_3Hg]^+$)	µg/L	N/V	~0.00003	~0.00003	~0.00001	~0.00001	~0.0000	~0.00001
Molybdenum (Mo)	µg/L	40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel (Ni)	µg/L	25	35.6	34.9	25.6	26.8	27.6	30.7
Potassium (K)	µg/L	N/V	1,100	1,100	2,000	2,100	2,400	2,600
Selenium (Se)-Total	µg/L	100	0.73	0.71	0.57	0.63	0.52	0.43
Silicon (Si)	µg/L	N/V	2,600	2,500	1,500	1,600	1,700	1,800
Silver (Ag)	µg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Strontium (Sr)	µg/L	N/V	33.4	32.4	65.4	66.6	74	82.7
Thallium (Tl)	µg/L	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Tin (Sn)	µg/L	N/V	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Titanium (Ti)	µg/L	N/V	3.1	2.6	3.9	4.3	2.2	2.8
Tungsten (W)	µg/L	30	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Vanadium (V)	µg/L	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc (Zn)	µg/L	30	10.1	4.3	<3.0	<3.0	<3.0	<3.0
Zirconium (Zr)	µg/L	4	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Notes:

PWQO - Ontario Ministry of the Environment. Ontario Provincial Water Quality Objectives. July, 1994.
N/V - No value applicable to ambient surface water not influenced by a point source discharge.
N/A - Data not yet received from laboratory.

1. Interim PWQO for pH >6.5 to 9 for total aluminum in clay-free samples.
2. Interim PWQO for hardness as $CaCO_3$ <75 mg/L.
3. PWQO for trivalent chromium.
4. PWQO for alkalinity as $CaCO_3$ 40 - 80 mg/L.

5.2 Dissolved Oxygen and Water Temperature Monitoring

5.2.1 Dissolved Oxygen

Dissolved oxygen concentrations ranged from 9.67 to 10.34 mg/L at the downstream site and 9.89 to 10.60 mg/L at the upstream site. Mean values (downstream = 10.08 mg/L, upstream = 10.24 mg/L) and median values (downstream = 10.06 mg/L, upstream = 10.26 mg/L) were relatively similar.

Dissolved oxygen data were not normally distributed and therefore the Mann-Whitney Rank Sum Test was utilized to determine the difference between D.O. concentrations at the downstream and upstream sites. There is a statistically significant ($p = <0.001$) difference between the sites indicating that the difference in the median values between the two groups is greater than would be expected by chance.

5.2.2 Water Temperature

Water temperature ranged from 12.84 to 14.98°C at the downstream site and 12.82 to 14.96°C at the upstream site. Mean values (downstream = 13.94°C, upstream = 13.90°C) and median values (downstream = 13.92°C, upstream = 13.89°C) were very similar. The results of a Mann-Whitney Rank Sum Test indicated that there is no significant difference between the two datasets ($p = 0.40$).

5.2.3 Trends

Dissolved oxygen concentration and water temperature displayed significant positive correlations at both the downstream ($r = 0.316$, $p < 0.001$) and upstream ($r = 0.446$, $p < 0.001$) sites. Theoretically, there should be an inverse relationship between dissolved oxygen and water temperature because cooler waters have the potential to retain more D.O. than warmer waters but since the temperature ranges were so narrow this relationship is not pronounced. It appears that the relationship was instead driven by climate. Dissolved oxygen and water temperature data are presented in Figure 8.

Dissolved oxygen and water temperature generally declined from May 20 to 24 before increasing until May 29. Cooler air temperatures resulted in cooler water temperatures, and overcast conditions that were often associated with these cooler temperatures likely reduced the rates of aquatic plant photosynthesis that in turn, lowered D.O. concentrations. Aquatic plant growth is more abundant in Wabageshik Lake than in the rapids upstream of the facility, and it is likely that water flowing from the lake strongly influences D.O. and temperature in the project area.

Dissolved oxygen and water temperature also fluctuated daily, especially between May 24 and 29 after the trend of unseasonably cold weather had ended. Changes in water temperature were driven by the differences in ambient air temperatures during the day and night while D.O. was impacted by the difference in photosynthesis, respiration and decomposition rates during the day and night.

Dissolved oxygen data were more irregular than temperature data. The D.O. sensor (0.5 mg/L) is slightly less accurate than the water temperature sensor (0.2°C), but the "noise" was more likely a result of turbulence in Wabageshik Rapids. Turbulence increases D.O. because oxygen concentrations are higher in the air than the water and turbulence mixes D.O. through the range of disturbance in the water column. This attenuates diurnal fluctuations and may also explain the significant differences in D.O. between the upstream site close to the lake, and the downstream site.

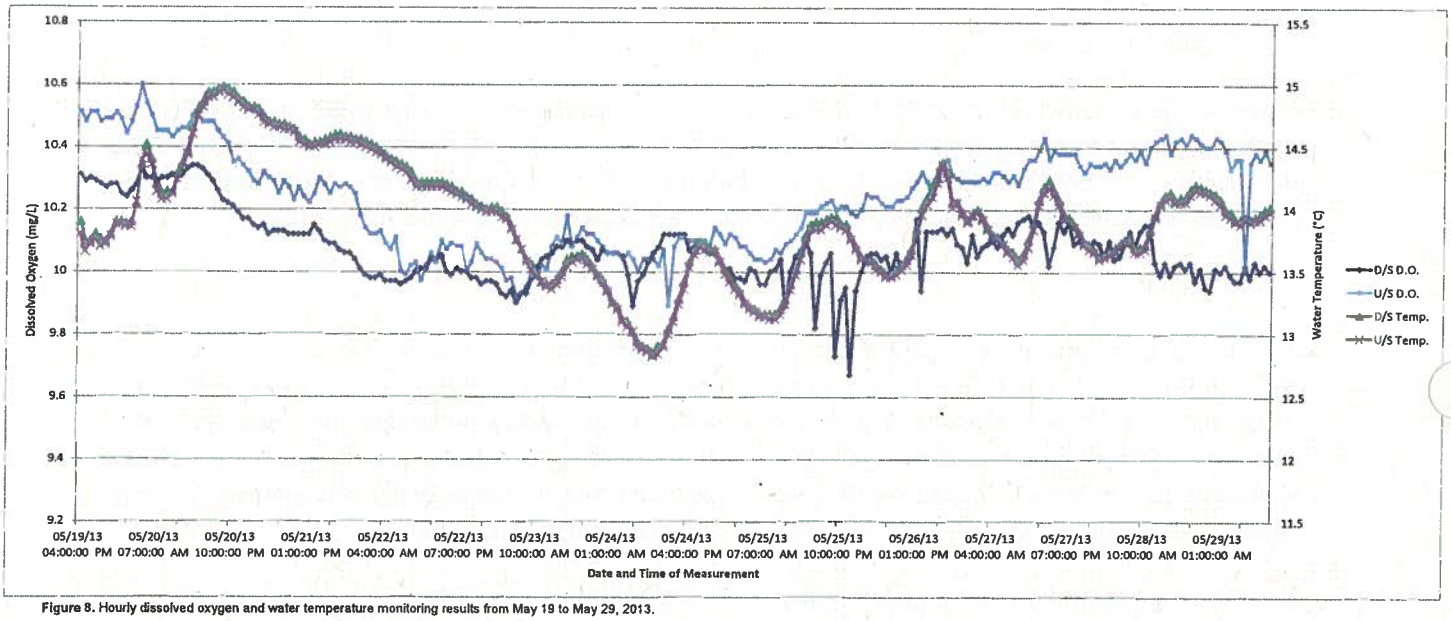


Figure 8. Hourly dissolved oxygen and water temperature monitoring results from May 19 to May 29, 2013.

5.3 Fish

5.3.1 Sampling Dates

Large fish sampling was conducted by NRSI on August 11 to 14, 2011. Three additional large fish and forage fish were collected by HESL on August 18 and 19, 2012.

On May 15, 2013 HESL attempted to collect additional Walleye but due to very high flows the site could not be safely accessed via Graveyard Rapids. The site was accessed through Wabageshik Lake on May 19 and 29, 2013 but HESL was unable to install nets in the study area because of high flows, and angled to try to capture Walleye. Many Bass (*Micropterus spp.*) were caught during the effort, but only one Walleye was captured. According to Mr. Brendan O'Farrell, Acting Project and Information Management Specialist, MNR, Walleye are difficult to catch in the study area because those that spawn migrate back downstream afterwards. The one Walleye caught was submitted for total mercury analysis to Flett Research; the results will be included in the 2013 update report.

5.3.2 Locations

The baseline large and forage fish samples were collected from the reach of the Vermilion River identified on Figure 6.

5.3.3 Description of Catch

Large Fish

NRSI submitted 17 Smallmouth Bass (*Micropterus dolomieu*) and HESL submitted 3 Northern Pike (*Esox lucius*) for total mercury analysis. The summary statistics for size and weight are presented in Table 7.

Table 7. Pre-development large fish physical summary statistics.

Sample Location	Number of Individuals Analyzed	Mean Total Length (mm)	Mean Weight (wet g)
Wabageshik	20	360	665

Summary statistics of the population are presented as means, because the population distribution was normal.

Forage Fish

HESL caught a variety of fish downstream of Wabageshik Rapids using RIN nets and Gee minnow traps in 2012. Thirty Yellow Perch from three age classes, young of the year, yearlings and adults, were collected over two days, partitioned into the composite samples described in Section 5.2.4 (below) and submitted to Flett Research for analysis. Yearling Yellow Perch were the preferred forage fish of the MOE and three of the composite samples contained exclusively yearlings. Young of the year and adults were also submitted for mercury analysis because a reasonable amount of effort was expended to

capture a sufficient number of yearlings and the dataset needed to be supplemented to ensure five composite samples were collected.

Post-development fish monitoring will utilize similar methodology so it is anticipated that Yellow Perch from similar age classes will be captured and temporal analyses will benefit from similar datasets. The relationships between age and mercury concentrations will also be compared between pre and post-development data to ensure that any disparity in ages between pre and post-construction are taken into account and impacts are accurately assessed.

5.3.4 Analytical Results

Large Fish

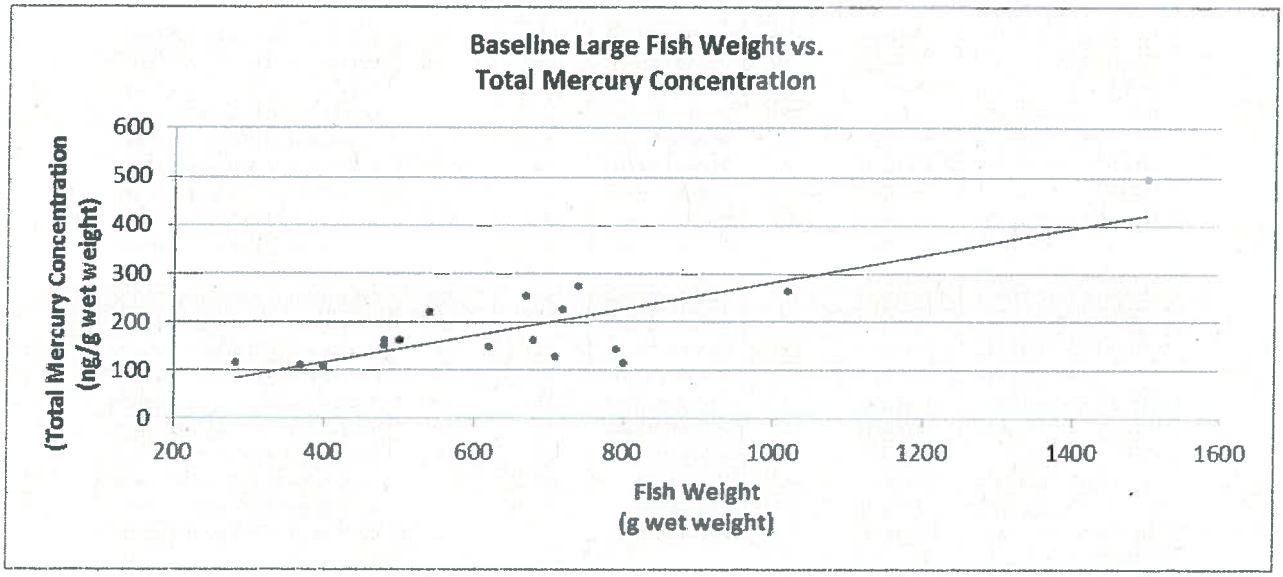
The maximum concentration of total mercury in large fish was 495 ng/g, the minimum was 28.5 ng/g and the mean was 182 ng/g within the project area in 2012 (Table 8).

Relational plots of fish weight and length to mercury concentration are presented in Figure 9. Both weight and length displayed positive relationships with mercury concentration. The relationship between fish weight and mercury contained a stronger goodness of fit (R^2 = 0.68) than the relationship between fish length and mercury (R^2 = 0.54).

The analytical results for each individual are presented in Table 9. Laboratory certificates of analysis are included in Appendix C.

Table 8. Summary of pre-development large fish analytical results.

Sample Location	No. of Samples	Total Mercury Concentrations (ng/g wet weight)		
		Max	Min	Mean
Wabageshik	20	495	28.5	182



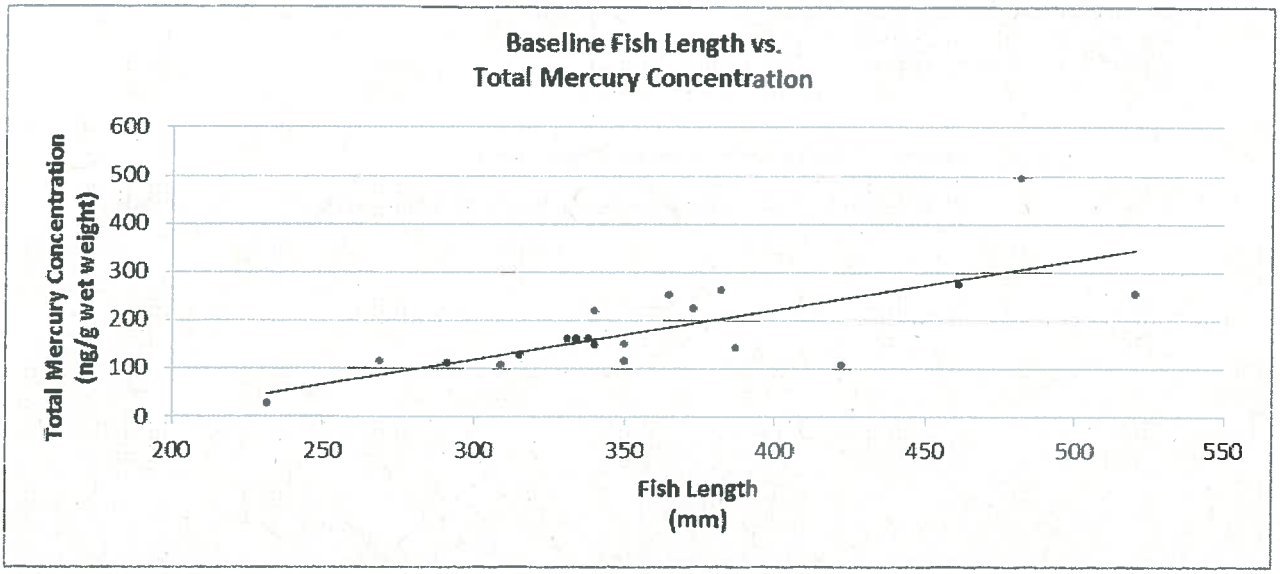


Figure 9. Relational plots of large fish weight and length vs. total mercury concentrations.

Table 9. Large fish analytical results for baseline sampling.

Wabageshik						
Sample ID	Date	Total Hg (ng/g wet wt.)	Species	Total Length (mm)	Total Weight (wet g)	Location
1050_FTS-119-DST-001	11-Aug-11	274	Smallmouth Bass	461	740	Downstream of Wabageshik Rapids
1050_FTS-120-DST-002	11-Aug-11	109	Smallmouth Bass	309	400	Downstream of Wabageshik Rapids
1050_FTS-121-DST-003	11-Aug-11	143	Smallmouth Bass	387	790	Downstream of Wabageshik Rapids
1050_FTS-122-DST-004	11-Aug-11	263	Smallmouth Bass	382	1020	Downstream of Wabageshik Rapids
1050_FTS-123-DST-005	11-Aug-11	495	Smallmouth Bass	482	1500	Downstream of Wabageshik Rapids
1050_FTS-124-DST-006	11-Aug-11	161	Smallmouth Bass	338	500	Downstream of Wabageshik Rapids
1050_FTS-125-DST-007	12-Aug-11	254	Smallmouth Bass	365	670	Downstream of Wabageshik Rapids
1050_FTS-126-DST-008	12-Aug-11	220	Smallmouth Bass	340	540	Downstream of Wabageshik Rapids
1050_FTS-127-DST-009	12-Aug-11	161	Smallmouth Bass	334	680	Downstream of Wabageshik Rapids
1050_FTS-128-DST-010	12-Aug-11	163	Smallmouth Bass	331	480	Downstream of Wabageshik Rapids
1050_FTS-129-DST-011	12-Aug-11	225	Smallmouth Bass	373	720	Downstream of Wabageshik Rapids
1050_FTS-130-DST-012	14-Aug-11	149	Smallmouth Bass	340	620	Downstream of Wabageshik Rapids
1050_FTS-131-DST-013	14-Aug-11	112	Smallmouth Bass	291	369	Downstream of Wabageshik Rapids
1050_FTS-132-DST-014	14-Aug-11	152	Smallmouth Bass	350	480	Downstream of Wabageshik Rapids
1050_FTS-133-DST-015	14-Aug-11	115	Smallmouth Bass	350	800	Downstream of Wabageshik Rapids
1050_FTS-134-DST-016	13-Aug-11	128	Smallmouth Bass	315	709	Downstream of Wabageshik Rapids
1050_FTS-135-DST-017	13-Aug-11	115	Smallmouth Bass	269	283	Downstream of Wabageshik Rapids
TMDSOL101512ZB1-001	19-Aug-12	257	Northern Pike	520	--	Downstream of Wabageshik Rapids
TMDSOL101512ZB1-002	19-Aug-12	108	Northern Pike	422	--	Downstream of Wabageshik Rapids
TMDSOL101512ZB1-004	19-Aug-12	28.3	Northern Pike	232	--	Downstream of Wabageshik Rapids
Number of samples:		20		Mean Total Length:	Mean Weight:	
Max. Total Hg concentration (ng/g wet wt.):		495				
Min. Total Hg concentration (ng/g wet wt.):		28				
Mean Total Hg concentration (ng/g wet wt.):		182		360	665	
Median Total Hg concentration (ng/g wet wt.):		157				

Notes:

1. ng/g wet wt. = nanograms of total mercury per wet gram of fish tissue
2. mm = millimeters
3. All large fish collected in 2011 by Natural Resources Solution Incorporated (NRSI) while 2012 samples collected by Hutchinson Environmental Sciences (HESL); all mercury analyses were conducted by Flett Research Ltd.

Forage Fish

Total mercury concentrations in forage fish ranged from 7.1 ng/g to 15.8 ng/g and methyl mercury concentrations ranged from 5.2 ng/g to 14 ng/g (Table 10). A comparison of mercury concentrations per age class is presented in Figure 10 and it is apparent that Yellow Perch bioaccumulate greater amounts of total and methyl mercury as they age. A statistical correlation was not calculated to assess the relationship because the limited number of composite samples (n = 6) would have restricted the power of the test.

Mercury uptake in forage fish is discussed in Section 6.0 of this report. The mercury concentrations of each composite sample are provided in Table 11 (following page). Laboratory certificates of analysis are provided in Appendix C.

Table 10. Summary of forage fish analytical results for pre-development sampling.

Sample Location	No. of Composite Samples	Total Mercury (ng/g wet weight)			Methylmercury (ng/g wet weight)			Average Methyl of Total Mercury
		Max	Min	Mean	Max	Min	Mean	
Wabageshik	6	15.8	7.1	11.3	14.0	5.2	9.3	83%

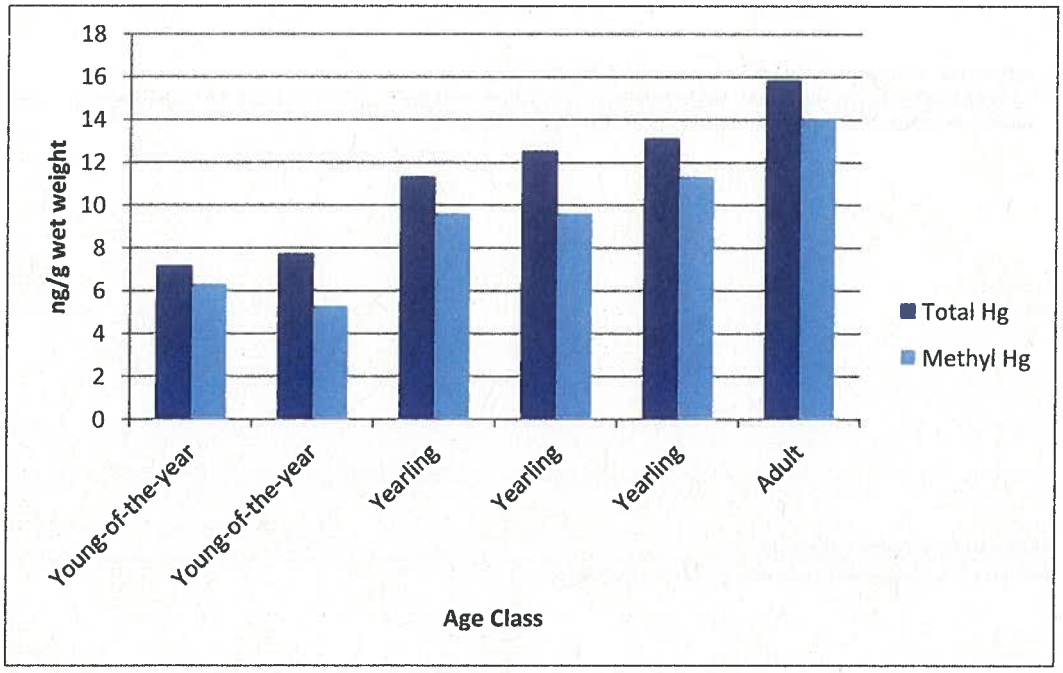


Figure 10. Total and methyl mercury concentrations in forage fish per age class.

Table 11. Forage fish analytical results for pre-development sampling.

Wabageshik Rapids							
Sample ID	**Date**	**Total Hg** (ng/g wet wt.)	**Methyl Hg** (ng/g wet wt.)	**Species**	**Age** (years)	**Number of Individuals**	**Location**
1	18-Aug-12	7.14	6.28	Yellow Perch	Young-of-the-year	5	Downstream of proposed facility
2	18-Aug-12	7.7	5.24	Yellow Perch	Young-of-the-year	4	Downstream of proposed facility
3	18-Aug-12	11.3	9.6	Yellow Perch	Yearling	5	Downstream of proposed facility
4	18-Aug-12	12.5	9.6	Yellow Perch	Yearling	5	Downstream of proposed facility
5	18-Aug-12	13.1	11.3	Yellow Perch	Yearling	5	Downstream of proposed facility
6	18-Aug-12	15.8	14	Yellow Perch	Adult	6	Downstream of proposed facility
Mean Concentration:		11.3	9.3				
Average Methyl Hg of Total:		83%					

Notes:

1. ng/g wet wt. = nanograms of total mercury per wet gram of fish tissue
2. All forage fish samples were collected by Hutchinson Environmental Sciences Ltd. (HESL); fish samples were submitted as whole fish composites for mercury analyses at Flett Research Ltd.

5.3.5 Mercury Consumption Guidelines

Mercury concentrations in large fish were compared to the consumption guidelines presented in the following documents:

- Guide to Eating Ontario Sport Fish (MOE 2013);
- Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption (Health Canada 2007), and;
- Protocol for the Derivation of Canadian Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota: Methylmercury (CCME 1999).

The baseline mercury results for large fish are presented in Table 12. The Guide to Eating Ontario Sport Fish includes four consumption guidelines based on the consumer (women of child bearing age and children under 15 or the general population) and a level of restriction (partial or complete).

No fish exceeded the MOE Guidelines for Women of Child-bearing Age and Children under 15 (Complete Restriction), General Population Partial and Complete Restrictions, or the Health Canada Fish Consumption Guideline. Mercury concentrations in three fish (15% of catch) exceeded the MOE Guidelines for Women of Child-bearing Age and Children under 15 (Partial Restriction). The mercury concentrations in 19 fish (95% of catch) exceeded CCME Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota, the most stringent of the guidelines used for comparison.

Table 12. Number and percentage of large fish with mercury concentrations that exceeded mercury consumption guidelines.

Guideline	MOE[1]	MOE[2]	MOE[3]	MOE[4]	Health Canada[5]	CCME[6]
Guideline Value	0.26	0.52	0.61	1.84	0.5	0.033
2012 Wabageshik Results	3 (15%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	19 (95%)

Notes:

1. Guide to Eating Sport Fish - Women of child-bearing age and children under 15; Partial Restrictions (MOE 2013)
2. Guide to Eating Sport Fish - Women of child-bearing age and children under 15; Complete Restriction (MOE 2013)
3. Guide to Eating Sport Fish - General population; Partial Restrictions (MOE 2013)
4. Guide to Eating Sport Fish - General Population; Complete Restriction (MOE 2013)
5. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption (Health Canada 2007)
6. Derivation of Canadian Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota: Methylmercury (CCME 1999)

6 Discussion and Conclusions

6.1 Water Quality

The 2012 pre-development results indicate that the Vermilion River in the project area has relatively good water quality, typical of a Canadian river on the Precambrian Shield with limited impacts from mining activities. The river has low turbidity (1.08 to 2.8 NTU), reflecting the low concentrations of total suspended solids (maximum 4 mg/L) and dissolved organic carbon (5 to 12 mg/L). Concentrations of aluminum, copper and nickel exceeded PWQOs, possibly as a result of upstream mining activities in the greater Sudbury area. Nutrient concentrations in the river were low, with ammonia and nitrite concentrations below the laboratory's reported detection limit and all accepted phosphorous concentrations below the PWQO of 0.03 mg/L.

The river's water quality was linked to its seasonal flows in 2012 as indicated by the following trends:

- Aluminum, iron, nickel, copper, total mercury, methyl mercury and TKN, were elevated in the spring as a result of overland runoff from the spring freshet and decreased throughout the year as these inputs decreased;
- DOC was elevated during the spring freshet, decreased during the summer low flow, and increased again in the fall, reflecting wetlands flushing into the river during higher flow periods;
- Dissolved oxygen saturation was higher in the spring and fall, reflecting cooler water temperatures and possibly increased turbulent flow during the higher river flows during these seasons;
- Total phosphorus concentrations were relatively low and inversely related to the river's flow in 2012; and,
- Alkalinity and pH increased after the spring freshet as a result of the naturally low buffering capacity of the Vermilion River on the Precambrian Shield and the spring snowmelt inducing short-term reductions in pH.

It is important to characterize natural temporal variability between the pre-development years so that post-development monitoring thresholds can be accurately set to discern between natural variability and impacts from the hydroelectric development.

Developing the Wabageshik facility should not affect the alkalinity, pH or buffering capacity of the river. However, other water quality parameters may be affected by facility operation, as follows:

- If appreciable sediment accumulates in the impoundment of the project area, turbidity and TSS could increase during peak flows as sediment flushes. The concentrations of metals and nutrients adsorbed to sediment would also increase, possibly resulting in reduced water quality;

- Mercury concentrations could increase independently of suspended sediment as a result of water impoundment alone but mercury transport out of the impoundment would be markedly higher with increased suspended sediment, as mercury – like other metals – adsorbs to sediment; and,

- Following development, the water temperature in the impoundments will warm from increased river surface area, which may result in lower dissolved oxygen concentrations as the water's capacity to retain oxygen decreases. The magnitude of dissolved oxygen decrease will depend on how much the water warms and other factors such as changes in water turbulent flow which recharges water with oxygen, changes in aquatic plant growth and oxygen demand from the conversion of inundated soil to sediment. These dynamics can be studied through the continued monitoring of dissolved oxygen and water temperature.

The river's water quality is linked to its seasonal flows and during certain times of the year, the water quality in the river would be more sensitive to the following facility-related stresses:

- Contaminant-related parameters aluminum, iron, nickel, copper, TKN and total and methyl mercury were all elevated during the 2012 spring freshet and decreased throughout the remainder of the year. Water quality is therefore most sensitive to contaminant loading from the facility during the spring freshet as it is already carrying a contaminant base load; and,

- Dissolved oxygen was lowest during the summer months when the water temperature was at its highest. Following development, water temperature increases (if any) and associated dissolved oxygen decreases are likely to the most drastic during summer months. HESL understands that the effects of dissolved oxygen on the local fishery have been assessed by others as part of the Environmental Assessment (EA) process for the facility.

In addition to the seasonal monitoring recommended by MOE, post development turbidity, suspended solids, metals and nutrient monitoring will be conducted during peak flows from the facility to establish a worst-case scenario for contaminants related to suspended sediment. Dissolved oxygen monitoring will be conducted in the early morning when it is typically lowest to account for overnight oxygen use by plant respiration.

6.2 Dissolved Oxygen and Water Temperature Monitoring

Dissolved oxygen and water temperature are important components of Walleye spawning and rearing habitat. Initial monitoring results indicate that the two parameters are closely linked, exhibit diurnal patterns and are sensitive to weather patterns. According to the data, the area contains sufficient dissolved oxygen concentrations for the development of Walleye eggs and water temperatures indicated the spawning period was long over.

6.3 Mercury in Fish

The Wabageshik Rapids hydroelectric facility will not impede fish movement through the project area so the study design to assess mercury concentrations in fish is based on a before/after approach with one

site that will be compared between years. Baseline sampling results indicate that mercury concentrations in both large fish and forage fish were dependent on size, likely because larger fish tend to include more fish in their diet and accumulate mercury at a greater rate.

The mercury concentrations of most large fish did not exceed the majority of the provincial and federal fish consumption guidelines used for comparison in this report. No fish exceeded the MOE Guidelines for Women of Child-bearing Age and Children Under 15 (Complete Restriction), General Population Partial and Complete Restrictions, or the Health Canada Fish Consumption Guideline. Mercury concentrations in three fish the exceeded the MOE Guidelines for Women of Child-bearing Age and Children Under 15 (Partial Restriction). The mercury concentrations in 19 fish exceeded CCME Tissue Residue Guidelines for the Protection of Wildlife that Consume Aquatic Biota.

All fish sampled at Wabageshik Rapids contained mercury concentrations less than the average mercury concentration in Walleye (*Sander vitreus* - 0.65 µg/g) and Northern Pike (*Esox Lucius* - 0.52 µg/g) calculated from data in 79 lakes throughout Ontario (Wren et al. 1991). Since inundation has the potential to elevate mercury concentrations it is important to note that:

1. Elevated mercury concentrations in fish tissue often occur independent of impacts associated with hydroelectric development;

2. Since there is no real-time upstream reference area (i.e., a comparable area upstream of the facility that is separated by a barrier to fish migration) it will be difficult to differentiate naturally occurring variations in mercury from facility-driven changes. Therefore, the pre-development reference will be an important temporal benchmark; and,

3. Mercury in fish should continue to be monitored following development as the mercury concentrations in some fish at Wabageshik Rapids approach or exceed fish consumption guidelines.

7 Closing

Thank you for the opportunity to conduct this work for Xeneca. If you have any questions or concerns regarding this report, please do not hesitate to contact Brent Parsons or Neil Hutchinson.

8 References

Bodaly, We A., R.E. Hecky, and W.J.P. Fudge. 1984. Increases in fish mercury levels in lakes flooded by the Churchill River diversion, northern Manitoba. Canadian Journal of Fisheries and Aquatic Sciences. 41: 682-691.

Desrosiers M, Planas D, Mucci A. 2006. Total mercury and methyl mercury accumulation in periphyton of Boreal Shield lakes: influence of watershed physiographic characteristics. Sci Tot Environ. 355: 247-58.

Hall B.D, V.L. St. Louis, K.R. Rolfhus, R.A. Bodaly, K.G. Beaty, Paterson M. 2005. The impact of reservoir creation on the biogeochemical cycling of methyl and total mercury in boreal upland forests. Ecosystems 2005; 8(3):248 – 66.

Hecky R.E., D.J. Ramsey, R.A. Bodaly, Strange N.E. 1991. Increased methyl mercury contamination in fish in newly formed freshwater reservoirs. In: Suzuki T, Imura N, Clarkson TW, editors. Advances in mercury toxicology. New York: Plenum Press, 33-52.

Hutchinson Environmental Sciences Ltd. 2012. Xeneca Power Development Surface Water Quality and Fish Sampling Program, Hydroelectric Generating Facility Monitoring for Baseline Conditions and Early Operation. June, 2012.

Jackson, T. A. 1988. The mercury problem in recently formed reservoirs of northern Manitoba (Canada): effects of impoundment and other factors on the production of methyl mercury by microorganisms in sediments. Canadian Journal of Fisheries and Aquatic Sciences 45: 97-121.

Kelly, C.A., J.W.M. Rudd, R.A. Bodaly, N.P. Roulet, V.L. St. Louis, A. Heyes, T.R . Moore, S. Schiff, R. Aravena, K.J. Scott, B. Dyck, R. Harris, B. Warner, G. Edwards 1997. Increases in fluxes of greenhouse gases and methyl mercury following flooding of an experimental reservoir. Environmental Science and Technology 31: 1334-1344.

Kerr, S.J., B.W. Corbett, N.J. Hutchinson, D. Kinsman, J.H. Leach, D. Puddister, L. Stanfield and N. Ward. 1997. Walleye habitat: A synthesis of current knowledge with guidelines for conservation. Percid Community Synthesis, Walleye Habitat Working Group, Ontario Ministry of Natural Resources, Peterborough, Ontario.

Montgomery, S., M. Lucotte, I. Rheault 2000. Temporal and spatial influences of flooding on dissolved mercury in boreal reservoirs. The Science of the Total Environment. 260: 147-157.

Ontario Ministry of the Environment. From Class EA to Permit to Take Water: A Guide to Understanding the Ministry of the Environment's Technical Requirements for Waterpower. Draft Document, January, 2012.

Pearson, D.B., J.M. Gunn and W. Keller. 2002. The Past, Present and Future of Sudbury's Lakes. In: Roussed, D.H. and K.J. Jansons (Eds). The Physical Environment of the City of Greater Sudbury, Ontario Geological Survey, Special Volume6. Queen's Printer for Ontario. ISSN 0827-181X.

Reed Harris Environmental Ltd. 2012. Potential for Increased Fish Mercury Concentrations Associated with the Proposed Kabinakagami River Hydroelectric Project.

Schetagne, R.J., J. Therrien, J. and R. Lalumiere. 2003. Environmental monitoring at the La Grande Complex. Evolution of Fish Mercury Levels. Summary Report 1978-2000. Direction Barrages et Environment, Hydro-Quebec Production and Groupe conseil GENIVAR inc.

St. Louis, V.L., J. Rudd, C. Kelly, R. Bodaly, M. Paterson, K. Beaty, R. Hesslein, A. Heyes and A. Majewski. 2004. The rise and fall of mercury methylation in an experimental reservoir. Environ. Sci. Technol. 38: 1348-1358.

U.S. EPA 2012. U/S/ EPA Test Methods for Evaluating Solid Waste (SW-846). Chapter One: Quality Control. Online at http://www.epa.gov/epawaste/hazard/testmethods/sw846/online/index/htm.

Wren, C.D, W.A. Scheider, D.L. Wales, B.W. Muncaster and I.M. Gray. 1991. Relation between mercury concentrations in walleye (*Stizostedion vitreum*) and northern pike (*Esox* Lucius) in Ontario lakes and influence of environmental factors. Can. J. Fish. Aquatic Sci. 48: 132-139.

Appendix A. Licence to Collect Fish for Scientific Purposes

Ontario

Ministry of Natural Resources

Licence to Collect Fish for Scientific Purposes Report - Part 1

Complete one copy of **Part 1** for each Sampling Program.
Complete **Part 2 - Site Collection Report** for each collection site.

Licence No: 1069491

Date of Issue: 2012-07-26

Name of Licencee: CHARLES JOSEPH BRADY

Organization/Affiliation/ Program (if applicable): HUTCHISON ENVIRONMENTAL SCIENCES LTD.

Contact: (for Program) C. BRADY

Mailing Address Street Name & No./PO Box/RR#/Gen. Del: 63 BUCKHILL ROAD

City/Town/Municipality	Province/State	Postal/Zip Code
BANCROFT	ONT.	K0L 1C0

Phone No: 613 332 4073 **Fax No:** ———

MNR District(s) where collections occurred: SUDBURY

Purpose or Objective of Collection(s): XENECA POWER BACKGROUND SAMPLING REQUIREMENT FOR MERCURY ANALYSIS

Date Report Completed: AUG 28/2012

PLEASE NOTE:
1. A **Part 2 - Site Collection Report** must be prepared for each collection site and attached to **Part 1** of the Mandatory Report.
2. A **map** must be attached to this report, showing **all** collection site locations (including sites where no fish were caught). A unique site identification # should be used on the map that corresponds to the site number on the **Site Collection Report**.
3. **Length, weight or age data**, if collected, should be attached to the appropriate **Site Collection Report**.

When complete send these forms to the District Office(s) where collections occurred. Also, for Licences issued by Fisheries Section on a province-wide basis, please forward a copy (preferably electronically) to:
Fisheries Section, Fish and Wildlife Branch, OMNR,
300 Water Street, PO Box 7000, Peterborough, ON K9J 8M5
[mailto:cheryl.goodchild@mnr.gov.on.ca]

Ontario

Licence to Collect Fish for Scientific Purposes
Part 2 - Site Collection Report

Ministry of Natural Resources

Complete one **Part 2 - Site Collection Report** for each collection site. Attach Site Collection Reports to **Part 1** of the **Report**.

MNR Office Use:
ARA Code:
File#:

Licence No: 1069491 **Report Prepared By:** C. BRADY

Waterbody Name: WABAGISHIK RAPIDS VERMILLION RIVER **Township:** FOSTER

Lot: 7 **Concession:** 6

Collection Site No.: 1 of 1 Complete a report for **each collection site** and indicate location of site on **map**. Attach copy of map to report.

Site UTM Coordinates: 17T 451101 E 5123963N

Collection Date: AUG 17-18/2012

Start Time: 13:30 AUG 17/2012 **AM** ☐ **PM** ☒ (check one)

End Time: 07:30 AUG 18/2012 **AM** ☒ **PM** ☐ (check one)

Fish Species Handled or Observed:

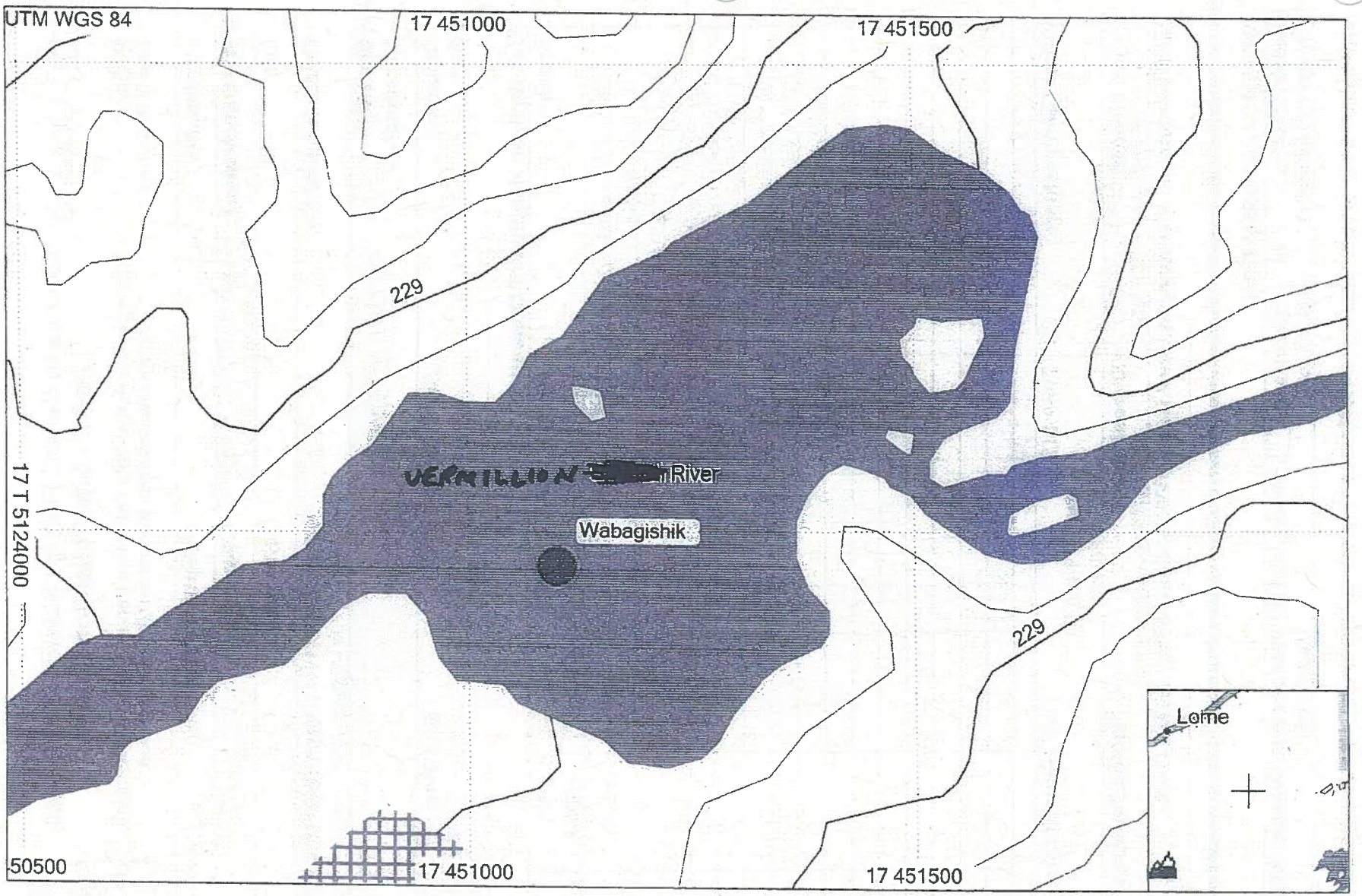
Species	Species Code	Adult	YOY (Young of Year)	No. Caught	No. Kept	No. Live Released
CYPRINIDS (VARIOUS SP)	180	☒	☐	55	25	30
YELLOW PERCH	331	☐	☒	9	9	0
YELLOW PERCH	331	☒	☐	21	21	0
NORTHERN PIKE	131	☒	☐	5	3	2
SMALLMOUTH BASS	316	☒	☐	4	2	2
ROCK BASS	311	☐	☒	7	0	7
PUMPKINSEED	313	☐	☒	3	0	3
PUMPKINSEED	313	☒	☐	3	0	3
BROWN BULLHEAD	233	☒	☐	1	0	1
ROCK BASS	311	☒	☐	10	1	9
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			
		☐	☐			

Water Temperature: °C	**Time of Day:** AM ☐ PM ☐ (check one)	**Air Temperature:** °C
Type of Gear: 6 RIN NETS 9 MINNOW TRAPS	**Dimensions:** 0.5" - 1.5" mesh 40' (Mesh Size, Length of Net, etc.)	**Fishing Duration:** 17 HRS.
MNR Provincial Inventory Standard Used (FWIN, SLIN, SPIN, ESTN, OSAP, ?): NO		

OPTIONAL INFORMATION

Secchi Depth: m For Lakes and Large Rivers	**Intermittent** ☐ **Permanent** ☒ (check one)	**Watercress Present YES** ☐ **or NO** ☐ (check one)

Additional Data - Water Quality, Condition of Fish (e.g., Spawning), Habitat Features (e.g., Bank Erosion), Presence of Fish Nests, Presence of Barriers, Other Comments:



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©DMTI Spatial 2008

0 m 100 m 200 m 300 m 400 m

MN TN
-9.7°
01/01/2010

GARMIN.

Xeneca2

Appendix B. Photographs

Photo 1. A view of the Wabageshik River immediately downstream of the proposed facility (April 14, 2012).

Photo 2. HESL staff preparing to collect water quality samples (April 14, 2012).

Photo 3. Retrieving a RIN net during fish collection at Wabageshik Rapids (August 18, 2012).

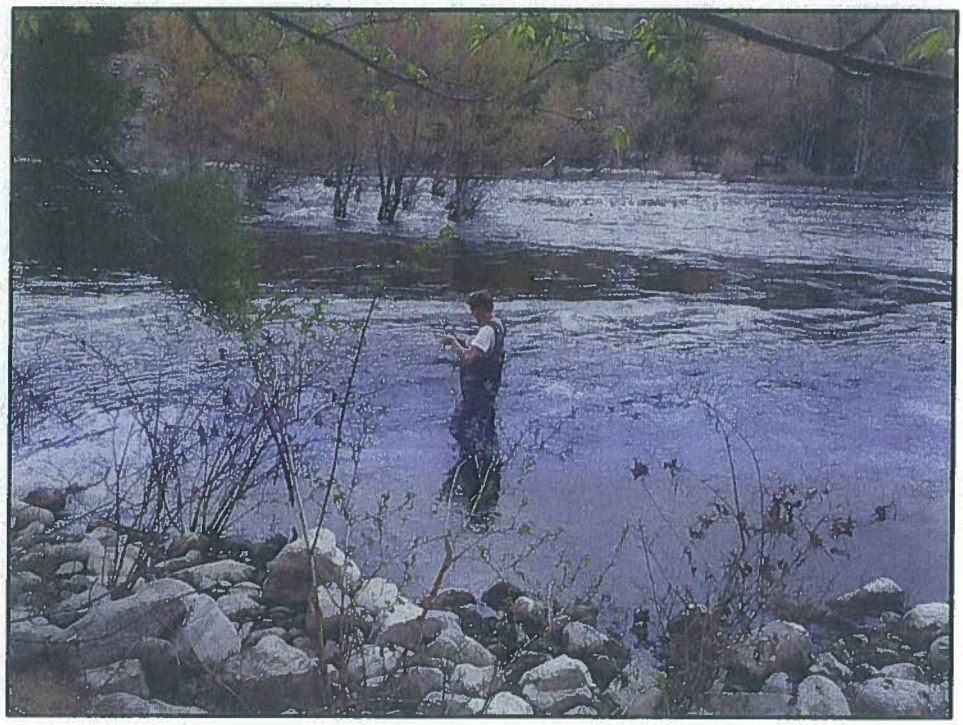

Photo 4. HESL staff collecting water samples during the spring sampling event in 2013 (May 19, 2013)

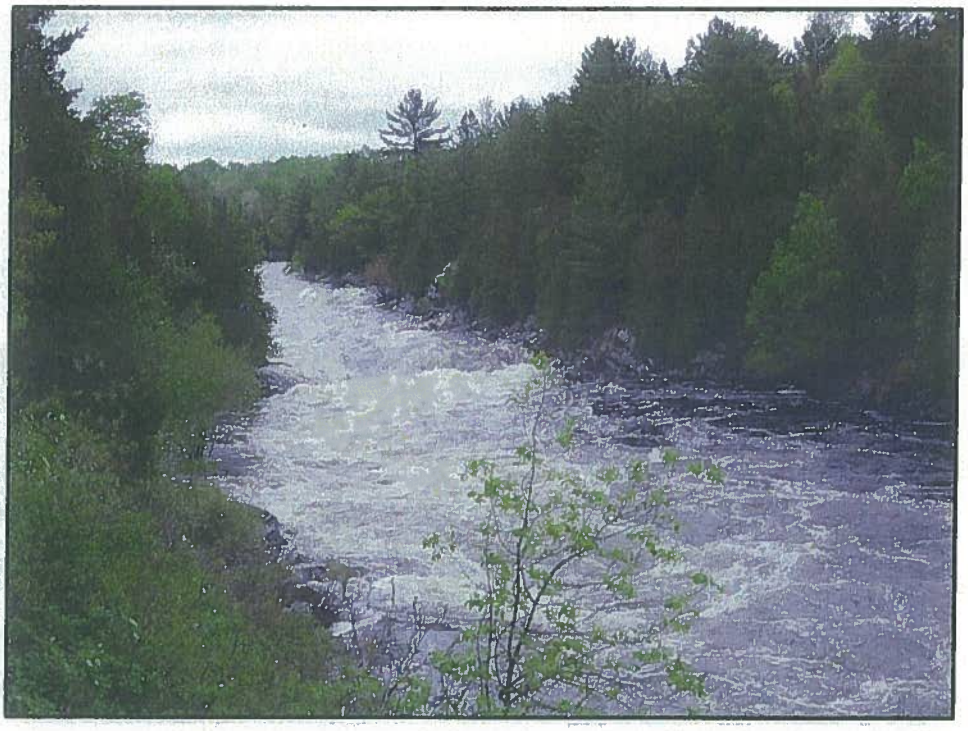

Photo 5. A view of Wabageshik Rapids at high flows (May 29, 2013).

Photo 6. A view of the HOBO Dissolved Oxygen and Temperature Logger set-up after retrieval (May 29, 2013).

Appendix C. Certificates of Analysis

HUTCHINSON ENVIRONMENTAL
SCIENCES LTD
ATTN: David Leeder
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Date Received: 19-APR-12
Report Date: 25-APR-12 14:02 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1136530
Project P.O. #: NOT SUBMITTED
Job Reference: 120022
C of C Numbers:
Legal Site Desc:

Lindsay D. Zuiker
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-1	WABAGISHIK - BASELINE						
Sampled By:	D LEEDER on 14-APR-12 @ 14:1(	***Sample Qualifiers Refer to Reference Information***					
Matrix:	WATER						#1
Physical Tests							
	Conductivity	146		3.0	umhos/cm	19-APR-12	
	pH	7.32		0.10	pH units	19-APR-12	6.5-8.5
	Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
	Total Dissolved Solids	88		20	mg/L	20-APR-12	
Anions and Nutrients							
	Alkalinity, Total (as CaCO3)	16		10	mg/L	19-APR-12	
	Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
	Chloride	11.7		2.0	mg/L	21-APR-12	
	Nitrate-N	0.15		0.10	mg/L	21-APR-12	
	Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
	Total Kjeldahl Nitrogen	0.46		0.15	mg/L	20-APR-12	
	Total Phosphorus	0.0078		0.0030	mg/L	23-APR-12	0.02
	Sulphate	30.1		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon							
	Dissolved Organic Carbon	11.7		1.0	mg/L	25-APR-12	
Total Metals							
	Aluminum (Al)	0.108		0.010	mg/L	20-APR-12	*0.015
	Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
	Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
	Barium (Ba)	0.011		0.010	mg/L	20-APR-12	
	Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
	Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
	Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
	Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
	Calcium (Ca)	13.7		0.50	mg/L	20-APR-12	
	Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
	Cobalt (Co)	0.00079		0.00050	mg/L	20-APR-12	0.0009
	Copper (Cu)	0.0067		0.0010	mg/L	20-APR-12	*0.001
	Iron (Fe)	0.232		0.050	mg/L	20-APR-12	0.3
	Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Magnesium (Mg)	2.38		0.50	mg/L	20-APR-12	
	Manganese (Mn)	0.0388		0.0010	mg/L	20-APR-12	
	Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
	Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
	Nickel (Ni)	0.0356		0.0020	mg/L	20-APR-12	*0.025
	Potassium (K)	1.1		1.0	mg/L	20-APR-12	
	Selenium (Se)-Total	0.00073		0.00040	mg/L	20-APR-12	0.1
	Silicon (Si)	2.6		1.0	mg/L	20-APR-12	
	Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
	Strontium (Sr)	0.0334		0.0010	mg/L	20-APR-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
	Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
	Titanium (Ti)	0.0031		0.0020	mg/L	20-APR-12	
	Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
	Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-1 WABAGISHIK - BASELINE Sampled By: D LEEDER on 14-APR-12 @ 14:1(Matrix: WATER	***Sample Qualifiers Refer to Reference Information***					#1
Total Metals						
Zinc (Zn)	0.0101		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-2 THE CHUTE - BASELINE Sampled By: D LEEDER on 16-APR-12 @ 10:1(Matrix: WATER						#1
Physical Tests						
Conductivity	114		3.0	umhos/cm	19-APR-12	
pH	7.76		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	3.6		3.0	mg/L	20-APR-12	
Total Dissolved Solids	90		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	49		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.40		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0086		0.0030	mg/L	23-APR-12	0.02
Sulphate	2.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	15.1		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.070		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	15.5		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.114		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.59		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0201		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.2		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-2 THE CHUTE - BASELINE Sampled By: D LEEDER on 16-APR-12 @ 10:1(Matrix: WATER						#1
Total Metals						
Strontium (Sr)	0.0230		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0023		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-3 THE CHUTE - REPLICATE Sampled By: D LEEDER on 16-APR-12 @ 10:2 Matrix: WATER						#1
Physical Tests						
Conductivity	114		3.0	umhos/cm	19-APR-12	
pH	7.80		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	4.4		3.0	mg/L	20-APR-12	
Total Dissolved Solids	94		20	mg/L	23-APR-12	
Ions and Nutrients						
Alkalinity, Total (as CaCO3)	51		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.43		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0065		0.0030	mg/L	23-APR-12	0.02
Sulphate	2.7		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	17.9		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.067		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	15.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.111		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.57		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0206		0.0010	mg/L	20-APR-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-3 THE CHUTE - REPLICATE						
Sampled By: D LEEDER on 16-APR-12 @ 10:2						
Matrix: WATER						#1
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.1		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0238		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0022		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-4 THIRD FALLS - BASELINE						
Sampled By: D LEEDER on 15-APR-12 @ 13:4						
Matrix: WATER						#1
Physical Tests						
Conductivity	117		3.0	umhos/cm	19-APR-12	
pH	7.77		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	98		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	49		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.40		0.15	mg/L	20-APR-12	
Total Phosphorus	0.182		0.0030	mg/L	23-APR-12	*0.02
Sulphate	2.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	18.8		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.044		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	15.8		0.50	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-4 THIRD FALLS - BASELINE Sampled By: D LEEDER on 15-APR-12 @ 13:45 Matrix: WATER						#1
Total Metals						
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.096		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.54		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0197		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.2		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0230		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-5 THIRD FALLS - REPLICATE Sampled By: D LEEDER on 15-APR-12 @ 13:55 Matrix: WATER						#1
Physical Tests						
Conductivity	116		3.0	umhos/cm	19-APR-12	
pH	7.78		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	94		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	52		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	<2.0		2.0	mg/L	21-APR-12	
Nitrate-N	<0.10		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0185		0.0030	mg/L	23-APR-12	0.02
Sulphate	2.7		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	14.4		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.046		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-5 THIRD FALLS - REPLICATE Sampled By: D LEEDER on 15-APR-12 @ 13:55 Matrix: WATER						#1
Total Metals						
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	16.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Iron (Fe)	0.100		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	3.81		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0206		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.4		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0244		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-6 WANATANGO FALLS - BASELINE Sampled By: D LEEDER on 16-APR-12 @ 15:10 Matrix: WATER						#1
Physical Tests						
Conductivity	164		3.0	umhos/cm	19-APR-12	
pH	7.79		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	6.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	138		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	52		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	2.4		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.67		0.15	mg/L	20-APR-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-6	WANATANGO FALLS - BASELINE						
Sampled By:	D LEEDER on 16-APR-12 @ 15:1(						
Matrix:	WATER						#1
Anions and Nutrients							
	Total Phosphorus	0.0148		0.0030	mg/L	23-APR-12	0.02
	Sulphate	21.3		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon							
	Dissolved Organic Carbon	27.2		1.0	mg/L	25-APR-12	
Total Metals							
	Aluminum (Al)	0.775		0.010	mg/L	20-APR-12	*0.015
	Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
	Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
	Barium (Ba)	0.013		0.010	mg/L	20-APR-12	
	Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
	Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
	Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
	Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
	Calcium (Ca)	22.0		0.50	mg/L	20-APR-12	
	Chromium (Cr)	0.00137		0.00050	mg/L	20-APR-12	
	Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
	Copper (Cu)	0.0031		0.0010	mg/L	20-APR-12	*0.001
	Iron (Fe)	0.783		0.050	mg/L	20-APR-12	*0.3
	Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
	Magnesium (Mg)	4.33		0.50	mg/L	20-APR-12	
	Manganese (Mn)	0.0428		0.0010	mg/L	20-APR-12	
	Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
	Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
	Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
	Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
	Selenium (Se)-Total	0.00049		0.00040	mg/L	20-APR-12	0.1
	Silicon (Si)	3.4		1.0	mg/L	20-APR-12	
	Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
	Strontium (Sr)	0.0414		0.0010	mg/L	20-APR-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
	Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
	Titanium (Ti)	0.0308		0.0020	mg/L	20-APR-12	
	Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
	Vanadium (V)	0.0016		0.0010	mg/L	20-APR-12	0.006
	Zinc (Zn)	0.0055		0.0030	mg/L	20-APR-12	0.02
	Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-7	MARTER TWP - BASELINE						
Sampled By:	D LEEDER on 17-APR-12 @ 12:0(						
Matrix:	WATER						#1
Physical Tests							
	Conductivity	151		3.0	umhos/cm	19-APR-12	
	pH	7.91		0.10	pH units	19-APR-12	6.5-8.5
	Total Suspended Solids	75.0		3.0	mg/L	20-APR-12	
	Total Dissolved Solids	116		20	mg/L	25-APR-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-7 MARTER TWP - BASELINE Sampled By: D LEEDER on 17-APR-12 @ 12:0(Matrix: WATER						#1
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	56		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	6.1		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0726		0.0030	mg/L	23-APR-12	*0.02
Sulphate	5.8		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	13.1		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	4.89		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.054		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	0.127		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	19.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.0115		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00207		0.00050	mg/L	20-APR-12	*0.0009
Copper (Cu)	0.0070		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	4.61		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	0.0020		0.0010	mg/L	20-APR-12	*0.001
Magnesium (Mg)	6.36		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0897		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	0.0032		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0070		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	2.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	11.4		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.101		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.215		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0082		0.0010	mg/L	20-APR-12	*0.006
Zinc (Zn)	0.0146		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-8 DUP-1 Sampled By: D LEEDER on 14-APR-12 @ 14:1(Matrix: WATER						#1

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-8 DUP-1						
Sampled By: D LEEDER on 14-APR-12 @ 14:1(						
Matrix: WATER						
Physical Tests						
Conductivity	147		3.0	umhos/cm	19-APR-12	
pH	7.33		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	94		20	mg/L	20-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	15		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	11.7		2.0	mg/L	21-APR-12	
Nitrate-N	0.15		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.50		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0069		0.0030	mg/L	23-APR-12	0.02
Sulphate	30.1		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	8.7		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.100		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.010		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	23-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	12.5		0.50	mg/L	20-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00076		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0065		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.215		0.050	mg/L	20-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	2.29		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0371		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0349		0.0020	mg/L	20-APR-12	*0.025
Potassium (K)	1.1		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00071		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	2.5		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0324		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0026		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	20-APR-12	0.006

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
. alytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-8 DUP-1						
Sampled By: D LEEDER on 14-APR-12 @ 14:1(						
Matrix: WATER						#1
Total Metals						
Zinc (Zn)	0.0043		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-9 DUP-2						
Sampled By: D LEEDER on 17-APR-12 @ 12:0(						
Matrix: WATER						#1
Physical Tests						
Conductivity	151		3.0	umhos/cm	19-APR-12	
pH	7.83		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	82.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	118		20	mg/L	25-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	54		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	6.1		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.46		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0889		0.0030	mg/L	24-APR-12	*0.02
Sulphate	5.9		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	15.5		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	5.06		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.052		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	20-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	18.6		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.0118		0.00050	mg/L	20-APR-12	
Cobalt (Co)	0.00206		0.00050	mg/L	20-APR-12	*0.0009
Copper (Cu)	0.0058		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	4.57		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	0.0017		0.0010	mg/L	20-APR-12	*0.001
Magnesium (Mg)	6.07		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0905		0.0010	mg/L	20-APR-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	0.0031		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	0.0069		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	1.9		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	12.0		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1136530-9 DUP-2 Sampled By: D LEEDER on 17-APR-12 @ 12:0(Matrix: WATER						#1
Total Metals						
Strontium (Sr)	0.0979		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.221		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0088		0.0010	mg/L	20-APR-12	*0.006
Zinc (Zn)	0.0129		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004
L1136530-10 DUP-3 Sampled By: D LEEDER on 16-APR-12 @ 15:1(Matrix: WATER						#1
Physical Tests						
Conductivity	165		3.0	umhos/cm	19-APR-12	
pH	7.75		0.10	pH units	19-APR-12	6.5-8.5
Total Suspended Solids	5.2		3.0	mg/L	20-APR-12	
Total Dissolved Solids	136		20	mg/L	23-APR-12	
Ions and Nutrients						
Alkalinity, Total (as CaCO3)	48		10	mg/L	19-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	20-APR-12	
Chloride	2.4		2.0	mg/L	21-APR-12	
Nitrate-N	0.19		0.10	mg/L	21-APR-12	
Nitrite-N	<0.10		0.10	mg/L	21-APR-12	
Total Kjeldahl Nitrogen	0.62		0.15	mg/L	20-APR-12	
Total Phosphorus	0.0143		0.0030	mg/L	23-APR-12	0.02
Sulphate	21.3		2.0	mg/L	21-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	22.2		1.0	mg/L	25-APR-12	
Total Metals						
Aluminum (Al)	0.800		0.010	mg/L	20-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	20-APR-12	0.02
Arsenic (As)	0.0010		0.0010	mg/L	20-APR-12	0.005
Barium (Ba)	0.013		0.010	mg/L	20-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	20-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	20-APR-12	
Boron (B)	<0.050		0.050	mg/L	20-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	20-APR-12	0.0001
Calcium (Ca)	21.9		0.50	mg/L	20-APR-12	
Chromium (Cr)	0.00134		0.00050	mg/L	20-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	20-APR-12	0.0009
Copper (Cu)	0.0031		0.0010	mg/L	20-APR-12	*0.001
Iron (Fe)	0.812		0.050	mg/L	20-APR-12	*0.3
Lead (Pb)	<0.0010		0.0010	mg/L	20-APR-12	0.001
Magnesium (Mg)	4.31		0.50	mg/L	20-APR-12	
Manganese (Mn)	0.0433		0.0010	mg/L	20-APR-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1136530-10 DUP-3						
Sampled By: D LEEDER on 16-APR-12 @ 15:1(						
Matrix: WATER						
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	19-APR-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	20-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	20-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	20-APR-12	
Selenium (Se)-Total	0.00057		0.00040	mg/L	20-APR-12	0.1
Silicon (Si)	3.5		1.0	mg/L	20-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	20-APR-12	0.0001
Strontium (Sr)	0.0420		0.0010	mg/L	20-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	20-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	20-APR-12	
Titanium (Ti)	0.0317		0.0020	mg/L	20-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	20-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	20-APR-12	0.005
Vanadium (V)	0.0016		0.0010	mg/L	20-APR-12	0.006
Zinc (Zn)	0.0055		0.0030	mg/L	20-APR-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	20-APR-12	0.004

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Reference Information

Qualifiers for Individual Samples Listed:

Sample Number	Client ID	Qualifier	Description
L1136530-1	WABAGISHIK - BASELINE	EHT	some samples were taken on 14-apr-12 - Exceeded Recommended Holding Time Prior To Analysis

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS4-WT	Water	CL,NO2,NO3,SO4	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

HG-ONT-PWQO-WT	Water	Mercury (Hg) -Total PWQO	SW846 7470A
MET-ONT-PWQO-WT	Water	Metals, Total PWQO	EPA 200.8 (ICP/MS)
NH3-WT	Water	Ammonia as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5□C overnight and then 180–10□C for 1hr.

SOLIDS-TSS-WT	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5□C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2353651								
WG1459197-4 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			85.9		%		80-120	19-APR-12
WG1459197-2 CVS								
Alkalinity, Total (as CaCO3)			96.8		%		85-115	19-APR-12
WG1459197-3 DUP		**L1136139-1**						
Alkalinity, Total (as CaCO3)		687	690		mg/L	0.45	20	19-APR-12
WG1459197-5 DUP		**L1136451-1**						
Alkalinity, Total (as CaCO3)		106	107		mg/L	1.3	20	19-APR-12
WG1459197-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-APR-12
ANIONS4-WT	Water							
Batch R2355159								
WG1460308-6 DUP		**L1136530-1**						
Chloride		11.7	11.7		mg/L	0.051	20	21-APR-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	21-APR-12
Nitrate-N		0.15	0.15		mg/L	0.0	20	21-APR-12
Sulphate		30.1	30.1		mg/L	0.030	20	21-APR-12
WG1460308-3 LCS								
Chloride			98.7		%		85-115	21-APR-12
Nitrite-N			87.7		%		85-115	21-APR-12
Nitrate-N			96.6		%		85-115	21-APR-12
Sulphate			100.9		%		85-115	21-APR-12
WG1460308-4 LCSD		**WG1460308-3**						
Chloride		98.7	98.9		%	0.16	25	21-APR-12
Nitrite-N		87.7	88.5		%	0.98	25	21-APR-12
Nitrate-N		96.6	96.7		%	0.070	25	21-APR-12
Sulphate		100.9	101.1		%	0.13	25	21-APR-12
WG1460308-1 MB								
Chloride			<2.0		mg/L		2	21-APR-12
Nitrite-N			<0.10		mg/L		0.1	21-APR-12
Nitrate-N			<0.10		mg/L		0.1	21-APR-12
Sulphate			<2.0		mg/L		2	21-APR-12
C-DIS-ORG-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2354329								
WG1460450-11 DUP		**L1137295-10**						
Dissolved Organic Carbon		1.1	1.0		mg/L	9.5	20	25-APR-12
WG1460450-5 DUP		**L1136360-14**						
Dissolved Organic Carbon		2.4	2.5		mg/L	6.5	20	25-APR-12
WG1460450-7 DUP		**L1136539-1**						
Dissolved Organic Carbon		10.7	10.7		mg/L	0.19	20	25-APR-12
WG1460450-9 DUP		**L1136539-20**						
Dissolved Organic Carbon		2.4	2.5		mg/L	4.5	20	25-APR-12
WG1460450-4 LCS								
Dissolved Organic Carbon			91.5		%		80-120	25-APR-12
WG1460450-3 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-APR-12
WG1460450-10 MS		**L1136539-20**						
Dissolved Organic Carbon			89.1		%		70-130	25-APR-12
WG1460450-6 MS		**L1136360-14**						
Dissolved Organic Carbon			86.1		%		70-130	25-APR-12
WG1460450-8 MS		**L1136539-1**						
Dissolved Organic Carbon			76.7		%		70-130	25-APR-12
EC-WT	Water							
Batch R2353394								
WG1459052-1 CVS								
Conductivity			99.4		%		90-110	19-APR-12
WG1459052-3 DUP		**L1136000-1**						
Conductivity		482	485		umhos/cm	0.62	10	19-APR-12
WG1459052-4 DUP		**L1136260-1**						
Conductivity		468	468		umhos/cm	0.0	10	19-APR-12
WG1459052-5 DUP		**L1136530-1**						
Conductivity		146	145		umhos/cm	0.69	10	19-APR-12
WG1459052-2 MB								
Conductivity			<3.0		umhos/cm		3	19-APR-12
HG-ONT-PWQO-WT	Water							
Batch R2353301								
WG1459132-6 DUP		**WG1459132-4**						
Mercury (Hg)		0.00556	0.00628		mg/L	12	20	19-APR-12
WG1459132-2 LCS								
Mercury (Hg)			90.0		%		80-120	19-APR-12
WG1459132-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	19-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-ONT-PWQO-WT	Water							
Batch R2353301								
WG1459132-5 MS		**WG1459132-3**						
Mercury (Hg)			92.4		%		70-130	19-APR-12
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459650-2 CVS								
Aluminum (Al)			99.8		%		80-120	20-APR-12
Antimony (Sb)			99.4		%		80-120	20-APR-12
Arsenic (As)			96.6		%		80-120	20-APR-12
Barium (Ba)			98.1		%		80-120	20-APR-12
Beryllium (Be)			115.1		%		80-120	20-APR-12
Bismuth (Bi)			92.4		%		80-120	20-APR-12
oron (B)			114.6		%		70-130	20-APR-12
Cadmium (Cd)-Total			101.4		%		80-120	20-APR-12
Calcium (Ca)			97.4		%		80-120	20-APR-12
Chromium (Cr)			100.9		%		80-120	20-APR-12
Cobalt (Co)			97.6		%		80-120	20-APR-12
Copper (Cu)			98.5		%		80-120	20-APR-12
Iron (Fe)			101.5		%		70-130	20-APR-12
Lead (Pb)			98.5		%		80-120	20-APR-12
Magnesium (Mg)			98.2		%		80-120	20-APR-12
Manganese (Mn)			108.6		%		80-120	20-APR-12
Molybdenum (Mo)			92.1		%		90-110	20-APR-12
Nickel (Ni)			98.3		%		80-120	20-APR-12
Potassium (K)			96.1		%		80-120	20-APR-12
Selenium (Se)-Total			99.6		%		80-120	20-APR-12
Silicon (Si)			101.9		%		70-130	20-APR-12
Silver (Ag)			102.6		%		80-120	20-APR-12
Strontium (Sr)			93.0		%		80-120	20-APR-12
Thallium (Tl)			100.8		%		80-120	20-APR-12
Tin (Sn)			97.8		%		70-130	20-APR-12
Titanium (Ti)			98.8		%		80-120	20-APR-12
Tungsten (W)			96.6		%		70-130	20-APR-12
Uranium (U)			95.1		%		80-120	20-APR-12
anadium (V)			99.7		%		80-120	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459650-2 CVS								
Zinc (Zn)			97.3		%		80-120	20-APR-12
Zirconium (Zr)			91.1		%		80-120	20-APR-12
WG1459559-4 DUP		**WG1459559-3**						
Aluminum (Al)		0.016	0.017		mg/L	6.0	20	20-APR-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Barium (Ba)		0.108	0.115		mg/L	5.4	20	20-APR-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Boron (B)		0.054	0.054		mg/L	1.1	20	20-APR-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	20-APR-12
Calcium (Ca)		83.2	87.0		mg/L	4.4	20	20-APR-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Copper (Cu)		0.0013	0.0014		mg/L	8.1	20	20-APR-12
Iron (Fe)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-APR-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Magnesium (Mg)		22.9	23.7		mg/L	3.5	20	20-APR-12
Manganese (Mn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Molybdenum (Mo)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Potassium (K)		2.1	2.2		mg/L	5.0	20	20-APR-12
Selenium (Se)-Total		0.00070	<0.00040	RPD-NA	mg/L	N/A	20	20-APR-12
Silicon (Si)		2.6	2.7		mg/L	4.9	20	20-APR-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-APR-12
Strontium (Sr)		0.513	0.540		mg/L	5.2	20	20-APR-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	20-APR-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Zinc (Zn)		0.0109	0.0116		mg/L	6.3	20	20-APR-12

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-4 DUP		**WG1459559-3**						
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	20-APR-12
WG1459561-4 DUP		**WG1459561-3**						
Aluminum (Al)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Barium (Ba)		0.025	0.025		mg/L	0.30	20	20-APR-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	20-APR-12
Cadmium (Cd)-Total		0.000133	0.000132		mg/L	0.75	20	20-APR-12
Calcium (Ca)		18.5	18.1		mg/L	1.9	20	20-APR-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-APR-12
Copper (Cu)		0.0032	0.0029		mg/L	7.3	20	20-APR-12
Iron (Fe)		0.296	0.301		mg/L	1.7	20	20-APR-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Magnesium (Mg)		5.82	5.93		mg/L	2.0	20	20-APR-12
Manganese (Mn)		0.0801	0.0828		mg/L	3.4	20	20-APR-12
Molybdenum (Mo)		0.0335	0.0315		mg/L	6.4	20	20-APR-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Potassium (K)		2.8	2.7		mg/L	1.5	20	20-APR-12
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	20-APR-12
Silicon (Si)		2.1	2.1		mg/L	2.1	20	20-APR-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-APR-12
Strontium (Sr)		0.115	0.109		mg/L	5.4	20	20-APR-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	20-APR-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	20-APR-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	20-APR-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-APR-12
Zinc (Zn)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	20-APR-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	20-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-2 LCS								
Aluminum (Al)			97.5		%		80-120	20-APR-12
Antimony (Sb)			88.2		%		70-130	20-APR-12
Arsenic (As)			94.2		%		70-130	20-APR-12
Barium (Ba)			96.6		%		70-130	20-APR-12
Beryllium (Be)			105.7		%		70-130	20-APR-12
Bismuth (Bi)			97.6		%		70-130	20-APR-12
Boron (B)			98.9		%		70-130	20-APR-12
Cadmium (Cd)-Total			92.6		%		70-130	20-APR-12
Calcium (Ca)			95.4		%		70-130	20-APR-12
Chromium (Cr)			96.9		%		70-130	20-APR-12
Cobalt (Co)			94.8		%		70-130	20-APR-12
Copper (Cu)			93.4		%		70-130	20-APR-12
Iron (Fe)			98.2		%		70-130	20-APR-12
Lead (Pb)			98.0		%		70-130	20-APR-12
Magnesium (Mg)			90.4		%		70-130	20-APR-12
Manganese (Mn)			99.0		%		70-130	20-APR-12
Molybdenum (Mo)			91.5		%		70-130	20-APR-12
Nickel (Ni)			96.1		%		70-130	20-APR-12
Potassium (K)			91.2		%		70-130	20-APR-12
Selenium (Se)-Total			93.8		%		70-130	20-APR-12
Silicon (Si)			99.1		%		70-130	20-APR-12
Silver (Ag)			96.2		%		70-130	20-APR-12
Strontium (Sr)			93.2		%		70-130	20-APR-12
Thallium (Tl)			97.9		%		70-130	20-APR-12
Tin (Sn)			93.1		%		70-130	20-APR-12
Titanium (Ti)			95.2		%		70-130	20-APR-12
Tungsten (W)			96.4		%		70-130	20-APR-12
Uranium (U)			98.8		%		70-130	20-APR-12
Vanadium (V)			97.4		%		70-130	20-APR-12
Zinc (Zn)			94.3		%		70-130	20-APR-12
Zirconium (Zr)			90.0		%		70-130	20-APR-12
WG1459561-2 LCS								
Aluminum (Al)			102.7		%		80-120	20-APR-12
Antimony (Sb)			89.7		%		70-130	20-APR-12

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-2 LCS								
Arsenic (As)			98.6		%		70-130	20-APR-12
Barium (Ba)			95.0		%		70-130	20-APR-12
Beryllium (Be)			99.0		%		70-130	20-APR-12
Bismuth (Bi)			101.0		%		70-130	20-APR-12
Boron (B)			92.7		%		70-130	20-APR-12
Cadmium (Cd)-Total			94.5		%		70-130	20-APR-12
Calcium (Ca)			96.4		%		70-130	20-APR-12
Chromium (Cr)			98.6		%		70-130	20-APR-12
Cobalt (Co)			96.7		%		70-130	20-APR-12
Copper (Cu)			94.1		%		70-130	20-APR-12
Iron (Fe)			100.3		%		70-130	20-APR-12
Lead (Pb)			99.2		%		70-130	20-APR-12
Magnesium (Mg)			95.2		%		70-130	20-APR-12
Manganese (Mn)			101.4		%		70-130	20-APR-12
Molybdenum (Mo)			95.7		%		70-130	20-APR-12
Nickel (Ni)			95.3		%		70-130	20-APR-12
Potassium (K)			94.1		%		70-130	20-APR-12
Selenium (Se)-Total			98.6		%		70-130	20-APR-12
Silicon (Si)			102.5		%		70-130	20-APR-12
Silver (Ag)			95.6		%		70-130	20-APR-12
Strontium (Sr)			95.5		%		70-130	20-APR-12
Thallium (Tl)			98.1		%		70-130	20-APR-12
Tin (Sn)			95.1		%		70-130	20-APR-12
Titanium (Ti)			97.0		%		70-130	20-APR-12
Tungsten (W)			103.3		%		70-130	20-APR-12
Uranium (U)			98.4		%		70-130	20-APR-12
Vanadium (V)			99.1		%		70-130	20-APR-12
Zinc (Zn)			99.1		%		70-130	20-APR-12
Zirconium (Zr)			92.1		%		70-130	20-APR-12
WG1459559-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	20-APR-12
Antimony (Sb)			<0.0050		mg/L		0.005	20-APR-12
Arsenic (As)			<0.0010		mg/L		0.001	20-APR-12
Barium (Ba)			<0.010		mg/L		0.01	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-1 MB								
Beryllium (Be)			<0.0010		mg/L		0.001	20-APR-12
Bismuth (Bi)			<0.0010		mg/L		0.001	20-APR-12
Boron (B)			<0.050		mg/L		0.05	20-APR-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	20-APR-12
Calcium (Ca)			<0.50		mg/L		0.5	20-APR-12
Chromium (Cr)			<0.00050		mg/L		0.0005	20-APR-12
Cobalt (Co)			<0.00050		mg/L		0.0005	20-APR-12
Copper (Cu)			<0.0010		mg/L		0.001	20-APR-12
Iron (Fe)			<0.050		mg/L		0.05	20-APR-12
Lead (Pb)			<0.0010		mg/L		0.001	20-APR-12
Magnesium (Mg)			<0.50		mg/L		0.5	20-APR-12
Manganese (Mn)			<0.0010		mg/L		0.001	20-APR-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	20-APR-12
Nickel (Ni)			<0.0020		mg/L		0.002	20-APR-12
Potassium (K)			<1.0		mg/L		1	20-APR-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	20-APR-12
Silicon (Si)			<1.0		mg/L		1	20-APR-12
Silver (Ag)			<0.00010		mg/L		0.0001	20-APR-12
Strontium (Sr)			<0.0010		mg/L		0.001	20-APR-12
Thallium (Tl)			<0.00030		mg/L		0.0003	20-APR-12
Tin (Sn)			<0.0010		mg/L		0.001	20-APR-12
Titanium (Ti)			<0.0020		mg/L		0.002	20-APR-12
Tungsten (W)			<0.010		mg/L		0.01	20-APR-12
Uranium (U)			<0.0050		mg/L		0.005	20-APR-12
Vanadium (V)			<0.0010		mg/L		0.001	20-APR-12
Zinc (Zn)			<0.0030		mg/L		0.003	20-APR-12
Zirconium (Zr)			<0.0040		mg/L		0.004	20-APR-12
WG1459561-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	20-APR-12
Antimony (Sb)			<0.0050		mg/L		0.005	20-APR-12
Arsenic (As)			<0.0010		mg/L		0.001	20-APR-12
Barium (Ba)			<0.010		mg/L		0.01	20-APR-12
Beryllium (Be)			<0.0010		mg/L		0.001	20-APR-12
Bismuth (Bi)			<0.0010		mg/L		0.001	20-APR-12

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-1 MB								
Boron (B)			<0.050		mg/L		0.05	20-APR-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	20-APR-12
Calcium (Ca)			<0.50		mg/L		0.5	20-APR-12
Chromium (Cr)			<0.00050		mg/L		0.0005	20-APR-12
Cobalt (Co)			<0.00050		mg/L		0.0005	20-APR-12
Copper (Cu)			<0.0010		mg/L		0.001	20-APR-12
Iron (Fe)			<0.050		mg/L		0.05	20-APR-12
Lead (Pb)			<0.0010		mg/L		0.001	20-APR-12
Magnesium (Mg)			<0.50		mg/L		0.5	20-APR-12
Manganese (Mn)			<0.0010		mg/L		0.001	20-APR-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	20-APR-12
Nickel (Ni)			<0.0020		mg/L		0.002	20-APR-12
Potassium (K)			<1.0		mg/L		1	20-APR-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	20-APR-12
Silicon (Si)			<1.0		mg/L		1	20-APR-12
Silver (Ag)			<0.00010		mg/L		0.0001	20-APR-12
Strontium (Sr)			<0.0010		mg/L		0.001	20-APR-12
Thallium (Tl)			<0.00030		mg/L		0.0003	20-APR-12
Tin (Sn)			<0.0010		mg/L		0.001	20-APR-12
Titanium (Ti)			<0.0020		mg/L		0.002	20-APR-12
Tungsten (W)			<0.010		mg/L		0.01	20-APR-12
Uranium (U)			<0.0050		mg/L		0.005	20-APR-12
Vanadium (V)			<0.0010		mg/L		0.001	20-APR-12
Zinc (Zn)			<0.0030		mg/L		0.003	20-APR-12
Zirconium (Zr)			<0.0040		mg/L		0.004	20-APR-12
WG1459559-5 MS		**WG1459559-3**						
Aluminum (Al)			98.0		%		70-130	20-APR-12
Antimony (Sb)			89.7		%		70-130	20-APR-12
Arsenic (As)			98.2		%		70-130	20-APR-12
Barium (Ba)			N/A	MS-B	%		-	20-APR-12
Beryllium (Be)			91.6		%		70-130	20-APR-12
Bismuth (Bi)			94.8		%		70-130	20-APR-12
Boron (B)			89.4		%		70-130	20-APR-12
Cadmium (Cd)-Total			93.5		%		70-130	20-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459559-5 MS		**WG1459559-3**						
Calcium (Ca)			N/A	MS-B	%		-	20-APR-12
Chromium (Cr)			96.5		%		70-130	20-APR-12
Cobalt (Co)			96.0		%		70-130	20-APR-12
Copper (Cu)			92.4		%		70-130	20-APR-12
Iron (Fe)			96.7		%		70-130	20-APR-12
Lead (Pb)			95.0		%		70-130	20-APR-12
Magnesium (Mg)			N/A	MS-B	%		-	20-APR-12
Manganese (Mn)			98.8		%		70-130	20-APR-12
Molybdenum (Mo)			97.2		%		70-130	20-APR-12
Nickel (Ni)			95.1		%		70-130	20-APR-12
Potassium (K)			101.4		%		70-130	20-APR-12
Selenium (Se)-Total			96.1		%		70-130	20-APR-12
Silicon (Si)			N/A	MS-B	%		-	20-APR-12
Silver (Ag)			94.7		%		70-130	20-APR-12
Strontium (Sr)			N/A	MS-B	%		-	20-APR-12
Thallium (Tl)			93.8		%		70-130	20-APR-12
Tin (Sn)			94.7		%		70-130	20-APR-12
Titanium (Ti)			97.6		%		70-130	20-APR-12
Tungsten (W)			97.5		%		70-130	20-APR-12
Uranium (U)			96.3		%		70-130	20-APR-12
Vanadium (V)			97.2		%		70-130	20-APR-12
Zinc (Zn)			96.1		%		70-130	20-APR-12
Zirconium (Zr)			95.4		%		70-130	20-APR-12
WG1459561-5 MS		**WG1459561-3**						
Aluminum (Al)			106.9		%		70-130	20-APR-12
Antimony (Sb)			90.2		%		70-130	20-APR-12
Arsenic (As)			96.6		%		70-130	20-APR-12
Barium (Ba)			97.9		%		70-130	20-APR-12
Beryllium (Be)			102.3		%		70-130	20-APR-12
Bismuth (Bi)			100.2		%		70-130	20-APR-12
Boron (B)			105.4		%		70-130	20-APR-12
Cadmium (Cd)-Total			95.6		%		70-130	20-APR-12
Calcium (Ca)			N/A	MS-B	%		-	20-APR-12
Chromium (Cr)			99.7		%		70-130	20-APR-12

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2353816								
WG1459561-5 MS		**WG1459561-3**						
Cobalt (Co)			91.7		%		70-130	20-APR-12
Copper (Cu)			88.8		%		70-130	20-APR-12
Iron (Fe)			100.4		%		70-130	20-APR-12
Lead (Pb)			96.8		%		70-130	20-APR-12
Magnesium (Mg)			100.4		%		70-130	20-APR-12
Manganese (Mn)			108.8		%		70-130	20-APR-12
Molybdenum (Mo)			89.5		%		70-130	20-APR-12
Nickel (Ni)			91.3		%		70-130	20-APR-12
Potassium (K)			N/A	MS-B	%		-	20-APR-12
Selenium (Se)-Total			91.8		%		70-130	20-APR-12
Silicon (Si)			105.9		%		70-130	20-APR-12
Silver (Ag)			96.8		%		70-130	20-APR-12
Strontium (Sr)			N/A	MS-B	%		-	20-APR-12
Thallium (Tl)			96.5		%		70-130	20-APR-12
Tin (Sn)			94.3		%		70-130	20-APR-12
Titanium (Ti)			95.9		%		70-130	20-APR-12
Tungsten (W)			103.1		%		70-130	20-APR-12
Uranium (U)			98.2		%		70-130	20-APR-12
Vanadium (V)			99.7		%		70-130	20-APR-12
Zinc (Zn)			93.4		%		70-130	20-APR-12
Zirconium (Zr)			87.5		%		70-130	20-APR-12
Batch R2354629								
WG1460567-2 CVS								
Beryllium (Be)			111.9		%		80-120	23-APR-12
NH3-WT	Water							
Batch R2353811								
WG1459635-2 CVS								
Ammonia, Total (as N)			100.7		%		85-115	20-APR-12
WG1459635-3 DUP		**L1135917-1**						
Ammonia, Total (as N)		0.420	0.420		mg/L	0.0024	20	20-APR-12
WG1459635-5 DUP		**L1136460-1**						
Ammonia, Total (as N)		0.076	0.070		mg/L	8.5	20	20-APR-12
G1459635-7 DUP		**L1136539-7**						
Ammonia, Total (as N)		0.057	0.067		mg/L	15	20	20-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2353811								
WG1459635-9 DUP		**L1136539-28**						
Ammonia, Total (as N)		0.077	0.093		mg/L	19	20	20-APR-12
WG1459635-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	20-APR-12
WG1459635-10 MS		**L1136539-28**						
Ammonia, Total (as N)			79.0		%		75-125	20-APR-12
WG1459635-4 MS		**L1135917-1**						
Ammonia, Total (as N)			86		%		75-125	20-APR-12
WG1459635-6 MS		**L1136460-1**						
Ammonia, Total (as N)			97.5		%		75-125	20-APR-12
WG1459635-8 MS		**L1136539-7**						
Ammonia, Total (as N)			109.4		%		75-125	20-APR-12
P-TOTAL-LOW-WT	Water							
Batch R2354736								
WG1460642-3 DUP		**L1136186-1**						
Total Phosphorus		0.0097	0.0088		mg/L	9.8	20	23-APR-12
WG1460642-2 LCS								
Total Phosphorus			98.7		%		80-120	23-APR-12
WG1460642-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	23-APR-12
WG1460642-4 MS		**L1136186-1**						
Total Phosphorus			106.9		%		70-130	23-APR-12
Batch R2355627								
WG1461246-3 DUP		**L1136539-16**						
Total Phosphorus		0.272	0.273		mg/L	0.59	20	24-APR-12
WG1461246-5 DUP		**L1136709-2**						
Total Phosphorus		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	24-APR-12
WG1461246-2 LCS								
Total Phosphorus			95.9		%		80-120	24-APR-12
WG1461246-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	24-APR-12
WG1461246-4 MS		**L1136539-16**						
Total Phosphorus			N/A	MS-B	%		-	24-APR-12
WG1461246-6 MS		**L1136709-2**						
Total Phosphorus			96.4		%		70-130	24-APR-12
PH-WT	Water							

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R2353353								
WG1459048-2 DUP		**L1136096-1**						
pH		7.95	8.04		pH units	1.1	20	19-APR-12
WG1459048-3 DUP		**L1136139-1**						
pH		8.26	8.31		pH units	0.60	20	19-APR-12
WG1459048-4 DUP		**L1136530-1**						
pH		7.32	7.29		pH units	0.41	20	19-APR-12
WG1459048-1 LCS								
pH			100		%		95-105	19-APR-12
SOLIDS-TDS-WT	Water							
Batch R2353760								
WG1459464-3 DUP		**L1134218-1**						
Total Dissolved Solids		362	370		mg/L	2.2	20	20-APR-12
G1459464-4 DUP		**L1134218-2**						
Total Dissolved Solids		1140	1140		mg/L	0.18	20	20-APR-12
WG1459464-1 LCS								
Total Dissolved Solids			94.0		%		70-130	20-APR-12
WG1459464-2 MB								
Total Dissolved Solids			<20		mg/L		20	20-APR-12
Batch R2354538								
WG1459890-3 DUP		**L1134715-12**						
Total Dissolved Solids		970	972		mg/L	0.21	20	23-APR-12
WG1459890-4 DUP		**L1134715-13**						
Total Dissolved Solids		316	314		mg/L	0.63	20	23-APR-12
WG1459890-1 LCS								
Total Dissolved Solids			98.7		%		70-130	23-APR-12
WG1459890-2 MB								
Total Dissolved Solids			<20		mg/L		20	23-APR-12
Batch R2355798								
WG1461298-3 DUP		**L1136000-9**						
Total Dissolved Solids		288	300		mg/L	4.1	20	25-APR-12
WG1461298-4 DUP		**L1136000-10**						
Total Dissolved Solids		286	288		mg/L	0.70	20	25-APR-12
WG1461298-1 LCS								
Total Dissolved Solids			91.3		%		70-130	25-APR-12
WG1461298-2 MB								
Total Dissolved Solids			<20		mg/L		20	25-APR-12
DS-TSS-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R2353740								
WG1459107-3 DUP		**L1134507-2**						
Total Suspended Solids		4150	4150		mg/L	0.000000000	20	20-APR-12
WG1459107-4 DUP		**L1134678-4**						
Total Suspended Solids		3870	3870		mg/L	0.0	20	20-APR-12
WG1459107-5 DUP		**L1134678-13**						
Total Suspended Solids		1240	1160		mg/L	6.7	20	20-APR-12
WG1459107-6 DUP		**L1134556-2**						
Total Suspended Solids		2280	2020		mg/L	12	20	20-APR-12
WG1459107-7 DUP		**L1135041-1**						
Total Suspended Solids		1570	1470		mg/L	6.6	20	20-APR-12
WG1459107-8 DUP		**L1135041-2**						
Total Suspended Solids		1630	1600		mg/L	2.1	20	20-APR-12
WG1459107-1 LCS								
Total Suspended Solids			100.8		%		80-120	20-APR-12
WG1459107-2 MB								
Total Suspended Solids			<3.0		mg/L		3	20-APR-12
TKN-WT	Water							
Batch R2353780								
WG1459616-2 CVS								
Total Kjeldahl Nitrogen			92.5		%		80-120	20-APR-12
WG1459558-3 DUP		**L1136495-1**						
Total Kjeldahl Nitrogen		0.56	0.54		mg/L	3.2	20	20-APR-12
WG1459558-4 DUP		**L1135917-3**						
Total Kjeldahl Nitrogen		81.1	79.5		mg/L	2.0	20	20-APR-12
WG1459558-2 LCS								
Total Kjeldahl Nitrogen			100.5		%		80-120	20-APR-12
WG1459558-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-APR-12

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1136530 Report Date: 25-APR-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	14-APR-12 14:10	19-APR-12 16:09	4	5	days	EHTR
	8	14-APR-12 14:10	19-APR-12 16:17	4	5	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1136530 were received on 19-APR-12 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

C of C # XXXXX

PAGE 1 OF 1

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: HESL
Account # 20126
PROJECT MANAGER: David Leeder
Address:
Job # 120022
Phone: 705-645-0021
Fax:
QUOTATION # Q33580 PO#

CRITERIA: Criteria on report (y/n) y
Reg 153/04
Table 1
TCLP ____ MISA ____ PWQO ✓
OTHER ____
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X ____ FAX ____
EMAIL1 David.Leeder@environmentalsciences.ca
EMAIL2 ____
SELECT: pdf ____ digital ____ both ____

INDICATE BOTTLES FIELD FILTERED/PRESERVED (F/P)
SUBMISSION #: L1136530
ENTERED BY: RH
DATE/TIME ENTERED: 19-APR-12
BIN #: 3BC1

SAMPLING INFORMATION / ANALYSIS REQUEST

Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	Anions4	Alk, EC, pH, TDS, TSS	DOC	Metals (PWQO)	NH3, TKN, TP(LL)	COMMENTS	LAB ID
14 Apr·'12	14:10			X			Wabagishik – Baseline	5	X	X	X	X	X		1
16 Apr·'12	10:10			X			The Chute – Baseline	5	X	X	X	X	X		2
16 Apr·'12	10:25			X			The Chute – Replicate	5	X	X	X	X	X		3
15 Apr·'12	13:45			X			Third Falls – Baseline	5	X	X	X	X	X		4
15 Apr·'12	13:55			X			Third Falls – Replicate	5	X	X	X	X	X		5
16 Apr·'12	15:10			X			Wanatango Falls – Baseline	5	X	X	X	X	X		6
17 Apr·'12	12:00			X			Marter Twp. – Baseline	5	X	X	X	X	X		7
14 Apr·'12	14:10			X			Dup-1	5	X	X	X	X	X		8
17 Apr·'12	12:00			X			Dup-2	5	X	X	X	X	X		9
16 Apr·'12	15:10			X			Dup-3	6	X	X	X	X	X		10

L1136530-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLE CONDITION: FROZEN / COLD / AMBIENT — MEAN TEMP 10.1
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) — INIT. RH

SAMPLED BY: D. Leeder
RELINQUISHED BY: D Leeder — DATE & TIME: 11:00, 18 Apr·'12
RECEIVED BY:
RECEIVED AT LAB BY: RH — DATE & TIME: 19-APR-12 0900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy | YELLOW - File copy | PINK - Customer Copy

Methyl Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental
3 - 1 Taylor Road
Bracebridge, ON P1L 1S6
Date Received: April 19, 2012
Sampling Date: April 14, 2012 to April 17, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: April 30, 2012
Analyst(s): Jason S.

Analytical Method: M10210: Methyl Mercury in Water by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS with Automated Instruments (Version 2)

Detection Limit: 0.08 ng/L (ML), MDL=0.03 ng/L (based on 7 replicates of method blanks with 98% confidence level). For reporting purpose samples will be flagged below a ML of 0.08ng/L which is considered a practical detection limit.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 10 % at methyl mercury concentrations of 0.5 and 2.5 ng/L (95 % confidence). Uncertainty at 0.1 ng/L is 13% (95% confidence).

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

Blanks		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)
	Ethylation blank (H_2O+Reagent)	0.54	1871	
	Mean Eth. Blank (last 30 runs)	0.63		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.01	1902	0.00
	Method Blank 2	-0.06	t652	0.00
	Method Blank 3	0.16	2446	0.01
	Mean Method Blank	0.04		0.00

Standards		MeHg Standard Added to Ethylation EPA Vial (pg CH_3Hg)	Gross Peak Area	Net Corrected MeHg Std Calibration Factor (units / pg)	RSD of MeHg Standard
	Mean Value			5931	t.0

Sample Spike Recovery	Sample Identification	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L)	CH_3Hg Recovery (%)
	Blanche River (Marter Twp Baseline)	MS1	332079	100%	46.6	4.01	91.5
	Blanche River (Marter Twp Baseline)	MS1D	320103	100%	47.2	4.09	94.4
	Mean of Recoveries						92.9
QC Samples	MeOPR ID0801 (1000ng/L)		114337	100%	0.2	832	83.2
	MeOPR ID0801 (1000ng/L)	Repeat Aliquot	t40459	100%	0.2	787	78.7
	Mean of MeOPR					810	81.0
	A.S.S.-Alfa ID0702 (1000 ng/L)		353615	100%		1008	100.8

LAB ID	Sampling Details	Sample ID	Date Sampled	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L) [recovery corrected]
57399	Vermilion River	Wabagisnik Baseline	April 14, 2012		4588	92.9	48.56	~0.03
57400	Ivanhoe River	The Chute Baseline	April 16, 2012		9367	92.9	47.04	0.09
57400	Ivanhoe River	The Chute Baseline	April 16, 2012	Duplicate	8881	92.9	47.54	0.09
57401	Ivanhoe River	The Chute Baseline Replicate	April 16, 2012		6680	92.9	46.86	~0.06
57402	Ivanhoe River	Third Falls Baseline	April 15, 2012		6317	92.9	46.74	~0.06
57403	Ivanhoe River	Third Falls Baseline Replicate	April 15, 2012		6189	92.9	47.32	~0.06
57404	Frederickhouse R.	Wanatango Falls Baseline	April 16, 2012		8370	92.9	47.55	0.08
57405	Blanche River	Marter Twp Baseline	April 17, 2012		9222	92.9	47.38	0.09
57406	Vermilion River	Dup-1	April 14, 2012		4266	92.9	47.03	~0.03
57407	Blanche River	Dup-2	April 17, 2012		8364	92.9	46.97	0.09
57408	Frederickhouse R.	Dup-3	April 16, 2012		8153	92.9	47.00	0.09

* See 'Comments' section above for discussion.

\\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-04 Sampling\Northeastern Ontario\MTWATR043012JS1.xls

~ Below the minimum level of detection for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

Total Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phona (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Enveronmental:
3-1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Received: April 19, 2012
Date Analysed: April 26, 2012
Sampling Date(s): April 14, 2012 to April 17, 2012
Analyst(s): Zorica B.

Analytical Method: Total Mercury in Water by Oxidation, Purge and Trap, and CVAFS (T00120 version 5)

Comments: Sample bottles for 'The Chute Baseline' , 'The Chute Baseline Replicate' and 'Wanatango Falls Baseline' broke during transit to the laboratory and all sample lost. A subsample was removed from the methyl mercury bottle for total mercury analysis.

Detection Limit: MDL = 0.04 ng Hg/L (based on 7 replicates of analytical blanks (98% confidence level)). The ML of 0.5 ng/L, as stated in Method 1631e, has been adopted for our laboratory to reflect occasional elevated bottle blanks (< 0.5 ng/L) observed in reused acid-cleaned Teflon bottles.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 13 % @ 95 % confidence at a concentration level of 0.5-1000 ng/L.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

			Mean of 3 Bubblers	Bubbler 1	Bubbler 2	Bubbler 3
Bubbler Blanks	Bubbler Blank Mean		730	931	535	725
	Bubbler Blank (pg)		0.22	0.28	0.16	0.22
Standards			Gross Peak Area	Net Peak Area	Area Units/ ng	
	Hg STD Mean				3364162	

			Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)	Percent Recovery
QC Samples	OPR mean (5.12 ng/L)		549997		4.97	0.03	97
	Baker QCS (1000 ng/L)	QCS-3	339144	0.10	1005.93	0.00	100.6
Method/Bottle Blanks	125ml glass bottle #1	MBlk-1	14767	31.21	0.08	0.02	
	125ml glass bottle #2	MBlk-2	t1296	32.56	0.04	0.02	
	t25ml glass bottle #3	MBlk-3	6190	30.06	0.00	0.02	

Sample Details	Sample ID/Bottle Number	Date Sampled	Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)
Vermilion River	Wabagisnik Baseline	April 14, 2012		649451	34.35	5.62	0.03
Vermilion River	Wabagisnik Baseline	April 14, 2012	Repeat Aliquot	736628	38.49	5.69	0.03
Ivanhoe River	The Chute Baseline*	April 16, 2012		385565	32.94	3.46	0.03
Ivanhoe River	The Chute Baseline Replicate*	April 16, 2012		367427	32.26	3.37	0.03
Ivanhoe River	Third Falls Baseline	April 15, 2012		355279	31.41	3.34	0.03
Ivanhoe River	Third Falls Baseline	April 15, 2012	Repeat Aliquot	341517	31.40	3.21	0.03
Ivanhoe River	Third Falls Baseline Replicate	April 15, 2012		398245	35.68	3.30	0.03
Frederickhouse R.	Wanetango Falls Baseline*	April 16, 2012		574849	30.94	5.52	0.03
Blanche River	Marter Twp Baseline	April 17, 2012		800242	30.41	7.83	0.03
Vermilion River	Dup-1	April 14, 2012		260945	34.12	2.25	0.03
Vermilion River	Dup-1	April 14, 2012	Repeat Aliquot	277792	36.39	2.25	0.03
Blanche River	Dup-2	April 17, 2012		963672	36.36	7.89	0.03
Frederickhouse R.	Dup-3	April 16, 2012		699928	37.10	5.61	0.03

\\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-04 Sampling\Northeastern Ontario\TMWATR042612ZB1.xls ; See 'Comments' section above for discussion.

~ : Below our official detection limit for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

Lab Number	Description	TP1 ug/L	TP2 ug/L	Mean
T100747-0001	Half Mile Baseline upstream	4.87	5.27	5.07
T100747-0002	Half Mile Baseline downstream	5.07	5.17	5.12
T100747-0003	Big Eddy Baseline	5.17	5.37	5.27
T100747-0004	Wanatango Falls Baseline	22.47	23.47	22.97
T100747-0005	Third Falls Baseline	9.77	8.77	9.27
T100747-0006	Third Falls Baseline replicate	9.17	9.07	9.12
T100747-0007	Marter Township Baseline	190.27	191.07	190.67
T100747-0008	Wabagishik Rapids Baseline	10.47	10.97	10.72
T100747-0009	Third Chute Baseline	10.07	10.57	10.32
T100747-0010	Third Chute Baseline Replicate	11.57	10.37	10.97
T100747-0011	McGraw Falls Baseline Impoundment	10.67	11.17	10.92
T100747-0012	McGraw Falls Baseline Downstream	11.17	11.47	11.32
T100747-0013	McGraw Falls Baseline Upstream 1	7.17	7.77	7.47
T100747-0014	McGraw Falls Baseline Upstream 2	9.77	11.67	10.72
T100747-0015	McGraw Falls Baseline Replicate 1	11.47	10.97	11.22
T100747-0016	McGraw Falls Baseline Replicate 2	12.27	10.97	11.62
T100747-0017	McGraw Falls Baseline Replicate 3	7.87	7.27	7.57
T100747-0018	McGraw Falls Baseline Replicate 4	9.87	10.67	10.27
T100747-0019	Dup1	11.27	9.37	10.32
T100747-0020	Dup2	193.27	194.07	193.67
T100747-0021	Dup3	23.57	19.27	21.42

HUTCHINSON ENVIRONMENTAL
SCIENCES LTD
ATTN: David Leeder
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Date Received: 23-AUG-12
Report Date: 31-AUG-12 13:37 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1198369
Project P.O. #: NOT SUBMITTED
Job Reference: 120022
C of C Numbers:
Legal Site Desc:

Mary-Lynn Pires
Account Manager

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Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1198369-1 WABAGISHIK- BASELINE						
Sampled By: Clarke Hertman on 17-AUG-12 @						
Matrix: Water						
Physical Tests						
Conductivity	264		3.0	umhos/cm	23-AUG-12	
pH	7.61		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	3.2		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	180		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	27		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	20.1		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.37		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0312		0.0030	mg/L	27-AUG-12	*0.02
Sulphate	68.4		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.3		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.088		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	0.0016		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.014		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	29.4		0.50	mg/L	29-AUG-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	30-AUG-12	
Cobalt (Co)	0.00070		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	0.0047		0.0010	mg/L	29-AUG-12	*0.001
Iron (Fe)	0.154		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	4.66		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0869		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	0.0256		0.0020	mg/L	29-AUG-12	*0.025
Potassium (K)	2.0		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	0.00057		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	1.5		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0654		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	0.0039		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-1 WABAGISHIK- BASELINE Sampled By: Clarke Hertman on 17-AUG-12 @ Matrix: Water						#1
Total Metals						
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-2 THE CHUTE- BASELINE Sampled By: Clarke Hertman on 20-AUG-12 @ Matrix: Water						#1
Physical Tests						
Conductivity	160		3.0	umhos/cm	23-AUG-12	
pH	8.02		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	114		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	78		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.43		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0082		0.0030	mg/L	27-AUG-12	0.02
Sulphate	2.7		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	10.5		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.017		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.013		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	25.3		0.50	mg/L	29-AUG-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Iron (Fe)	0.086		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	5.46		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0199		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	<1.0		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	2.1		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-2 THE CHUTE- BASELINE						
Sampled By: Clarke Hertman on 20-AUG-12 @						
Matrix: Water						#1
Total Metals						
Strontium (Sr)	0.0408		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-3 THE CHUTE- REPLICATE						
Sampled By: Clarke Hertman on 22-AUG-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	159		3.0	umhos/cm	23-AUG-12	
pH	8.05		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	29-AUG-12	
Total Dissolved Solids	122		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	82		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.41		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0084		0.0030	mg/L	27-AUG-12	0.02
Sulphate	2.6		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	10.8		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.017		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.013		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	25.2		0.50	mg/L	29-AUG-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Iron (Fe)	0.082		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	5.37		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0192		0.0010	mg/L	29-AUG-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-3 THE CHUTE- REPLICATE						
Sampled By: Clarke Hertman on 22-AUG-12 @						
Matrix: Water						#1
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	<1.0		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	2.0		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0393		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-4 THIRD FALLS- BASELINE						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	169		3.0	umhos/cm	23-AUG-12	
pH	7.86		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	114		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	82		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0161		0.0030	mg/L	27-AUG-12	0.02
Sulphate	2.4		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	12.8		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.024		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.012		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	26.1		0.50	mg/L	29-AUG-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-4 THIRD FALLS- BASELINE						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						#1
Total Metals						
Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Iron (Fe)	0.075		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	5.59		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0160		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	<1.0		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	2.3		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0377		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-5 THIRD FALLS- REPLICATE						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	163		3.0	umhos/cm	23-AUG-12	
pH	7.94		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	118		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	84		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.53		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0077		0.0030	mg/L	27-AUG-12	0.02
Sulphate	2.4		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	12.9		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.029		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-5	THIRD FALLS- REPLICATE						
Sampled By:	Clarke Hertman on 18-AUG-12 @						
Matrix:	Water						#1
Total Metals							
	Arsenic (As)	<0.0010		0.0010	mg/L	29-AUG-12	0.005
	Barium (Ba)	0.012		0.010	mg/L	29-AUG-12	
	Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
	Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
	Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
	Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
	Calcium (Ca)	25.8		0.50	mg/L	29-AUG-12	
	Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
	Cobalt (Co)	<0.00050		0.00050	mg/L	29-AUG-12	0.0009
	Copper (Cu)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
	Iron (Fe)	0.083		0.050	mg/L	29-AUG-12	0.3
	Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
	Magnesium (Mg)	5.65		0.50	mg/L	29-AUG-12	
	Manganese (Mn)	0.0184		0.0010	mg/L	29-AUG-12	
	Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
	Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
	Nickel (Ni)	<0.0020		0.0020	mg/L	29-AUG-12	0.025
	Potassium (K)	<1.0		1.0	mg/L	29-AUG-12	
	Selenium (Se)-Total	<0.00040		0.00040	mg/L	29-AUG-12	0.1
	Silicon (Si)	2.4		1.0	mg/L	29-AUG-12	
	Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
	Strontium (Sr)	0.0375		0.0010	mg/L	29-AUG-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
	Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
	Titanium (Ti)	<0.0020		0.0020	mg/L	29-AUG-12	
	Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
	Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006
	Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
	Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-6	WANATANGO FALLS- BASELINE						
Sampled By:	Clarke Hertman on 21-AUG-12 @						
Matrix:	Water						#1
Physical Tests							
	Conductivity	204		3.0	umhos/cm	23-AUG-12	
	pH	8.07		0.10	pH units	23-AUG-12	6.5-8.5
	Total Suspended Solids	<3.0		3.0	mg/L	29-AUG-12	
	Total Dissolved Solids	172		20	mg/L	25-AUG-12	
Anions and Nutrients							
	Alkalinity, Total (as CaCO3)	81		10	mg/L	28-AUG-12	
	Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
	Chloride	3.0		2.0	mg/L	24-AUG-12	
	Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
	Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
	Total Kjeldahl Nitrogen	0.59		0.15	mg/L	24-AUG-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-6 WANATANGO FALLS- BASELINE Sampled By: Clarke Hertman on 21-AUG-12 @ Matrix: Water						#1
Anions and Nutrients						
Total Phosphorus	0.0427		0.0030	mg/L	27-AUG-12	*0.02
Sulphate	21.2		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	23.2		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	2.46		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	0.0017		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.029		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	32.5		0.50	mg/L	29-AUG-12	
Chromium (Cr)	0.00524		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	0.00109		0.00050	mg/L	29-AUG-12	*0.0009
Copper (Cu)	0.0059		0.0010	mg/L	29-AUG-12	*0.001
Iron (Fe)	2.39		0.050	mg/L	29-AUG-12	*0.3
Lead (Pb)	0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	6.42		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0488		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	0.0036		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	1.6		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	0.00078		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	6.8		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0607		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	0.102		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	0.0050		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	0.0090		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-7 DUP-1 Sampled By: Clarke Hertman on 17-AUG-12 @ Matrix: Water						#1
Physical Tests						
Conductivity	262		3.0	umhos/cm	23-AUG-12	
pH	7.68		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	4.0		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	192		20	mg/L	25-AUG-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-7 DUP-1						
Sampled By: Clarke Hertman on 17-AUG-12 @						
Matrix: Water						#1
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	32		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	20.1		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.44		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0122		0.0030	mg/L	27-AUG-12	0.02
Sulphate	68.4		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.0		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.094		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	0.0017		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.014		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	30.8		0.50	mg/L	29-AUG-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	0.00070		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	0.0047		0.0010	mg/L	29-AUG-12	*0.001
Iron (Fe)	0.157		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	4.91		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0919		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	0.0258		0.0020	mg/L	29-AUG-12	*0.025
Potassium (K)	2.1		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	0.00068		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	1.6		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0666		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	0.0043		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-8 DUP-2						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						#1

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1198369-8 DUP-2						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						
Physical Tests						
Conductivity	162		3.0	umhos/cm	23-AUG-12	
pH	7.95		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	25-AUG-12	
Total Dissolved Solids	118		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	84		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.59		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0103		0.0030	mg/L	27-AUG-12	0.02
Sulphate	2.4		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	12.6		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	0.024		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.013		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	26.8		0.50	mg/L	29-AUG-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	29-AUG-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Iron (Fe)	0.069		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	5.76		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0160		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	<1.0		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	2.3		1.0	mg/L	29-AUG-12	
Silver (Ag)	<0.00010		0.00010	mg/L	29-AUG-12	0.0001
Strontium (Sr)	0.0387		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	29-AUG-12	0.006

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1198369-8 DUP-2						
Sampled By: Clarke Hertman on 18-AUG-12 @						
Matrix: Water						#1
Total Metals						
Zinc (Zn)	<0.0030		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	29-AUG-12	0.004
L1198369-9 DUP-3						
Sampled By: Clarke Hertman on 21-AUG-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	203		3.0	umhos/cm	23-AUG-12	
pH	8.08		0.10	pH units	23-AUG-12	6.5-8.5
Total Suspended Solids	3.2		3.0	mg/L	29-AUG-12	
Total Dissolved Solids	184		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	83		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	24-AUG-12	
Chloride	<2.0		2.0	mg/L	24-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	24-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	24-AUG-12	
Total Kjeldahl Nitrogen	0.58		0.15	mg/L	24-AUG-12	
Total Phosphorus	0.0413		0.0030	mg/L	27-AUG-12	*0.02
Sulphate	21.3		2.0	mg/L	24-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	13.3		1.0	mg/L	25-AUG-12	
Total Metals						
Aluminum (Al)	2.13		0.010	mg/L	29-AUG-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	29-AUG-12	0.02
Arsenic (As)	0.0016		0.0010	mg/L	29-AUG-12	0.005
Barium (Ba)	0.026		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	29-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	29-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	32.9		0.50	mg/L	29-AUG-12	
Chromium (Cr)	0.00452		0.00050	mg/L	29-AUG-12	
Cobalt (Co)	0.00099		0.00050	mg/L	29-AUG-12	*0.0009
Copper (Cu)	0.0059		0.0010	mg/L	29-AUG-12	*0.001
Iron (Fe)	2.03		0.050	mg/L	29-AUG-12	*0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	6.36		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0461		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-AUG-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	29-AUG-12	0.04
Nickel (Ni)	0.0033		0.0020	mg/L	29-AUG-12	0.025
Potassium (K)	1.5		1.0	mg/L	29-AUG-12	
Selenium (Se)-Total	0.00079		0.00040	mg/L	29-AUG-12	0.1
Silicon (Si)	5.9		1.0	mg/L	29-AUG-12	
Silver (Ag)	0.00013		0.00010	mg/L	29-AUG-12	*0.0001

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1198369-9 DUP-3						
Sampled By: Clarke Hertman on 21-AUG-12 @						
Matrix: Water						
Total Metals						
Strontium (Sr)	0.0602		0.0010	mg/L	29-AUG-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	29-AUG-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	29-AUG-12	
Titanium (Ti)	0.0884		0.0020	mg/L	29-AUG-12	
Tungsten (W)	<0.010		0.010	mg/L	29-AUG-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	29-AUG-12	0.005
Vanadium (V)	0.0045		0.0010	mg/L	29-AUG-12	0.006
Zinc (Zn)	0.0083		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	0.0254		0.0040	mg/L	29-AUG-12	*0.004

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Reference Information

Methods Listed (If applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS4-WT	Water	CL,NO2,NO3,SO4	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

HG-ONT-PWQO-WT	Water	Mercury (Hg) -Total PWQO	SW846 7470A
MET-ONT-PWQO-WT	Water	Metals, Total PWQO	EPA 6020A
NH3-WT	Water	Ammonia as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5□C overnight and then 180–10□C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5□C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

ALS Environmental

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2425049								
WG1535173-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			103.7		%		80-120	28-AUG-12
WG1535173-2 CVS								
Alkalinity, Total (as CaCO3)			101.5		%		70-130	28-AUG-12
WG1535173-3 DUP		**L1197532-4**						
Alkalinity, Total (as CaCO3)		85	85		mg/L	0.5	20	28-AUG-12
WG1535173-4 DUP		**L1198674-1**						
Alkalinity, Total (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	20	28-AUG-12
WG1535173-5 DUP		**L1199136-1**						
Alkalinity, Total (as CaCO3)		237	241		mg/L	1.5	20	28-AUG-12
WG1535173-6 DUP		**L1199844-5**						
Alkalinity, Total (as CaCO3)		22	24		mg/L	8.0	20	28-AUG-12
'G1535173-1 MB								
.lkalinity, Total (as CaCO3)			<10		mg/L		10	28-AUG-12
ANIONS4-WT	Water							
Batch R2423941								
WG1533295-5 DUP		**L1198369-1**						
Chloride		20.1	20.1		mg/L	0.0	20	24-AUG-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	24-AUG-12
Nitrate-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	24-AUG-12
Sulphate		68.4	68.4		mg/L	0.0	20	24-AUG-12
WG1533295-3 LCS								
Chloride			101.3		%		85-115	24-AUG-12
Nitrite-N			95.6		%		85-115	24-AUG-12
Nitrate-N			99.6		%		85-115	24-AUG-12
Sulphate			103.3		%		85-115	24-AUG-12
WG1533295-4 LCSD		**WG1533295-3**						
Chloride		101.3	101.4		%	0.1	25	24-AUG-12
Nitrite-N		95.6	95.4		%	0.2	25	24-AUG-12
Nitrate-N		99.6	99.6		%	0.1	25	24-AUG-12
Sulphate		103.3	103.4		%	0.1	25	24-AUG-12
WG1533295-1 MB								
Chloride			<2.0		mg/L		2	24-AUG-12
Nitrite-N			<0.10		mg/L		0.1	24-AUG-12
Nitrate-N			<0.10		mg/L		0.1	24-AUG-12
ulphate			<2.0		mg/L		2	24-AUG-12

ALS Environmental

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2425298								
WG1534057-3 DUP		**L1198369-7**						
Dissolved Organic Carbon		5.0	5.0		mg/L	0.4	20	25-AUG-12
WG1534057-2 LCS								
Dissolved Organic Carbon			94.0		%		80-120	25-AUG-12
WG1534057-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-AUG-12
WG1534057-4 MS		**L1198369-7**						
Dissolved Organic Carbon			85.1		%		70-130	25-AUG-12
EC-WT	Water							
Batch R2422950								
WG1532692-1 CVS								
Conductivity			99.6		%		90-110	23-AUG-12
WG1532692-3 DUP		**L1198194-1**						
Conductivity		297	294		umhos/cm	1.0	10	23-AUG-12
WG1532692-2 MB								
Conductivity			<3.0		umhos/cm		3	23-AUG-12
HG-ONT-PWQO-WT	Water							
Batch R2422793								
WG1532665-4 DUP		**WG1532665-3**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-AUG-12
WG1532665-2 LCS								
Mercury (Hg)			99.0		%		80-120	23-AUG-12
WG1532665-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	23-AUG-12
WG1532665-6 MS		**WG1532665-5**						
Mercury (Hg)			98.3		%		70-130	23-AUG-12
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1535211-2 CVS								
Aluminum (Al)			103.5		%		80-120	29-AUG-12
Antimony (Sb)			103.0		%		80-120	29-AUG-12
Arsenic (As)			99.1		%		80-120	29-AUG-12
Barium (Ba)			105.4		%		80-120	29-AUG-12
Beryllium (Be)			114.4		%		80-120	29-AUG-12
Bismuth (Bi)			108.0		%		80-120	29-AUG-12
Boron (B)			109.9		%		70-130	29-AUG-12
Cadmium (Cd)-Total			107.9				80-120	

ALS Environmental

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1535211-2 CVS								
Cadmium (Cd)-Total			107.9		%		80-120	29-AUG-12
Calcium (Ca)			100.5		%		80-120	29-AUG-12
Chromium (Cr)			100.8		%		80-120	29-AUG-12
Cobalt (Co)			99.2		%		80-120	29-AUG-12
Copper (Cu)			102.3		%		80-120	29-AUG-12
Iron (Fe)			90.2		%		70-130	29-AUG-12
Lead (Pb)			103.9		%		80-120	29-AUG-12
Magnesium (Mg)			104.1		%		80-120	29-AUG-12
Manganese (Mn)			104.9		%		80-120	29-AUG-12
Molybdenum (Mo)			99.6		%		90-110	29-AUG-12
Nickel (Ni)			99.2		%		80-120	29-AUG-12
Potassium (K)			99.2		%		80-120	29-AUG-12
Selenium (Se)-Total			98.2		%		80-120	29-AUG-12
Silicon (Si)			107.7		%		70-130	29-AUG-12
Silver (Ag)			108.6		%		80-120	29-AUG-12
Strontium (Sr)			104.1		%		80-120	29-AUG-12
Thallium (Tl)			113.9		%		80-120	29-AUG-12
Tin (Sn)			100.6		%		70-130	29-AUG-12
Titanium (Ti)			93.6		%		80-120	29-AUG-12
Tungsten (W)			99.6		%		70-130	29-AUG-12
Uranium (U)			113.3		%		80-120	29-AUG-12
Vanadium (V)			94.3		%		80-120	29-AUG-12
Zinc (Zn)			96.0		%		80-120	29-AUG-12
Zirconium (Zr)			98.6		%		80-120	29-AUG-12
WG1534335-4 DUP		**WG1534335-3**						
Aluminum (Al)		0.304	0.296		mg/L	2.5	20	29-AUG-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	29-AUG-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Barium (Ba)		0.026	0.027		mg/L	2.4	20	29-AUG-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Boron (B)		0.053	<0.050	RPD-NA	mg/L	N/A	20	29-AUG-12
Cadmium (Cd)-Total		0.000135	0.000157		mg/L	15	20	29-AUG-12

ALS Environmental

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1534335-4 DUP		**WG1534335-3**						
Calcium (Ca)		35.8	36.8		mg/L	3.0	20	29-AUG-12
Chromium (Cr)		0.00351	0.00340		mg/L	3.0	20	29-AUG-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	29-AUG-12
Copper (Cu)		0.0677	0.0686		mg/L	1.3	20	29-AUG-12
Iron (Fe)		1.23	1.23		mg/L	0.5	20	29-AUG-12
Lead (Pb)		0.0052	0.0054		mg/L	3.2	20	29-AUG-12
Magnesium (Mg)		9.41	9.50		mg/L	0.9	20	29-AUG-12
Manganese (Mn)		0.0293	0.0301		mg/L	2.6	20	29-AUG-12
Molybdenum (Mo)		0.0019	0.0021		mg/L	6.5	20	29-AUG-12
Nickel (Ni)		0.0036	0.0036		mg/L	0.6	20	29-AUG-12
Potassium (K)		9.1	9.2		mg/L	0.9	20	29-AUG-12
Selenium (Se)-Total		0.00060	0.00071		mg/L	17	20	29-AUG-12
Silicon (Si)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	29-AUG-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	29-AUG-12
Strontium (Sr)		0.177	0.181		mg/L	2.6	20	29-AUG-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	29-AUG-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Titanium (Ti)		0.0053	0.0054		mg/L	1.2	20	29-AUG-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-AUG-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	29-AUG-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Zinc (Zn)		0.100	0.109		mg/L	8.2	20	29-AUG-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	29-AUG-12
WG1534335-2 LCS								
Aluminum (Al)			106.2		%		80-120	29-AUG-12
Antimony (Sb)			92.2		%		70-130	29-AUG-12
Arsenic (As)			103.5		%		70-130	29-AUG-12
Barium (Ba)			95.4		%		70-130	29-AUG-12
Beryllium (Be)			91.3		%		70-130	29-AUG-12
Bismuth (Bi)			99.3		%		70-130	29-AUG-12
Boron (B)			88.3		%		70-130	29-AUG-12
Cadmium (Cd)-Total			96.3		%		70-130	29-AUG-12
Calcium (Ca)			105.4		%		70-130	29-AUG-12

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1534335-2 LCS								
Chromium (Cr)			101.7		%		70-130	29-AUG-12
Cobalt (Co)			99.9		%		70-130	29-AUG-12
Copper (Cu)			101.0		%		70-130	29-AUG-12
Iron (Fe)			99.7		%		70-130	29-AUG-12
Lead (Pb)			99.4		%		70-130	29-AUG-12
Magnesium (Mg)			99.1		%		70-130	29-AUG-12
Manganese (Mn)			104.4		%		70-130	29-AUG-12
Molybdenum (Mo)			100.5		%		70-130	29-AUG-12
Nickel (Ni)			100.4		%		70-130	29-AUG-12
Potassium (K)			99.6		%		70-130	29-AUG-12
Selenium (Se)-Total			102.9		%		70-130	29-AUG-12
Silicon (Si)			100.3		%		70-130	29-AUG-12
Silver (Ag)			92.6		%		70-130	29-AUG-12
Strontium (Sr)			101.6		%		70-130	29-AUG-12
Thallium (Tl)			97.8		%		70-130	29-AUG-12
Tin (Sn)			89.1		%		70-130	29-AUG-12
Titanium (Ti)			101.1		%		70-130	29-AUG-12
Tungsten (W)			96.5		%		70-130	29-AUG-12
Uranium (U)			99.6		%		70-130	29-AUG-12
Vanadium (V)			101.5		%		70-130	29-AUG-12
Zinc (Zn)			91.8		%		70-130	29-AUG-12
Zirconium (Zr)			91.8		%		70-130	29-AUG-12
WG1534335-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	29-AUG-12
Antimony (Sb)			<0.0050		mg/L		0.005	29-AUG-12
Arsenic (As)			<0.0010		mg/L		0.001	29-AUG-12
Barium (Ba)			<0.010		mg/L		0.01	29-AUG-12
Beryllium (Be)			<0.0010		mg/L		0.001	29-AUG-12
Bismuth (Bi)			<0.0010		mg/L		0.001	29-AUG-12
Boron (B)			<0.050		mg/L		0.05	29-AUG-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	29-AUG-12
Calcium (Ca)			<0.50		mg/L		0.5	29-AUG-12
Chromium (Cr)			<0.00050		mg/L		0.0005	29-AUG-12
Cobalt (Co)			<0.00050		mg/L		0.0005	29-AUG-12

ALS Environmental

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1534335-1 MB								
Copper (Cu)			<0.0010		mg/L		0.001	29-AUG-12
Iron (Fe)			<0.050		mg/L		0.05	29-AUG-12
Lead (Pb)			<0.0010		mg/L		0.001	29-AUG-12
Magnesium (Mg)			<0.50		mg/L		0.5	29-AUG-12
Manganese (Mn)			<0.0010		mg/L		0.001	29-AUG-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	29-AUG-12
Nickel (Ni)			<0.0020		mg/L		0.002	29-AUG-12
Potassium (K)			<1.0		mg/L		1	29-AUG-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	29-AUG-12
Silicon (Si)			<1.0		mg/L		1	29-AUG-12
Silver (Ag)			<0.00010		mg/L		0.0001	29-AUG-12
Strontium (Sr)			<0.0010		mg/L		0.001	29-AUG-12
Thallium (Tl)			<0.00030		mg/L		0.0003	29-AUG-12
Tin (Sn)			<0.0010		mg/L		0.001	29-AUG-12
Titanium (Ti)			<0.0020		mg/L		0.002	29-AUG-12
Tungsten (W)			<0.010		mg/L		0.01	29-AUG-12
Uranium (U)			<0.0050		mg/L		0.005	29-AUG-12
Vanadium (V)			<0.0010		mg/L		0.001	29-AUG-12
Zinc (Zn)			<0.0030		mg/L		0.003	29-AUG-12
Zirconium (Zr)			<0.0040		mg/L		0.004	29-AUG-12
WG1534335-5 MS		**WG1534335-3**						
Aluminum (Al)			N/A	MS-B	%		-	29-AUG-12
Antimony (Sb)			90.1		%		70-130	29-AUG-12
Arsenic (As)			104.6		%		70-130	29-AUG-12
Barium (Ba)			86.1		%		70-130	29-AUG-12
Beryllium (Be)			88.8		%		70-130	29-AUG-12
Bismuth (Bi)			94.2		%		70-130	29-AUG-12
Boron (B)			76.0		%		70-130	29-AUG-12
Cadmium (Cd)-Total			92.5		%		70-130	29-AUG-12
Calcium (Ca)			N/A	MS-B	%		-	29-AUG-12
Chromium (Cr)			102.5		%		70-130	29-AUG-12
Cobalt (Co)			102.0		%		70-130	29-AUG-12
Iron (Fe)			101.8		%		70-130	29-AUG-12
Lead (Pb)			96.0		%		70-130	29-AUG-12

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2426023								
WG1534335-5 MS		**WG1534335-3**						
Magnesium (Mg)			98.5		%		70-130	29-AUG-12
Manganese (Mn)			101.5		%		70-130	29-AUG-12
Molybdenum (Mo)			99.8		%		70-130	29-AUG-12
Nickel (Ni)			100.0		%		70-130	29-AUG-12
Potassium (K)			N/A	MS-B	%		-	29-AUG-12
Selenium (Se)-Total			95.7		%		70-130	29-AUG-12
Silver (Ag)			90.8		%		70-130	29-AUG-12
Strontium (Sr)			N/A	MS-B	%		-	29-AUG-12
Thallium (Tl)			95.9		%		70-130	29-AUG-12
Titanium (Ti)			102.8		%		70-130	29-AUG-12
Tungsten (W)			92.9		%		70-130	29-AUG-12
Uranium (U)			95.1		%		70-130	29-AUG-12
Vanadium (V)			104.5		%		70-130	29-AUG-12
Zinc (Zn)			N/A	MS-B	%		-	29-AUG-12
Batch R2427064								
WG1537269-2 CVS								
Chromium (Cr)			104.0		%		80-120	30-AUG-12
NH3-WT	Water							
Batch R2423547								
WG1533648-2 CVS								
Ammonia, Total (as N)			93.6		%		85-115	24-AUG-12
WG1533648-3 DUP		**L1193430-1**						
Ammonia, Total (as N)		0.119	0.118		mg/L	0.6	20	24-AUG-12
WG1533648-4 DUP		**L1197613-1**						
Ammonia, Total (as N)		8.47	8.80		mg/L	3.9	20	24-AUG-12
WG1533648-5 DUP		**L1198266-7**						
Ammonia, Total (as N)		0.059	0.058		mg/L	1.6	20	24-AUG-12
WG1533648-6 DUP		**L1198369-2**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-AUG-12
WG1533648-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	24-AUG-12
P-TOTAL-LOW-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-LOW-WT	Water							
Batch R2424522								
WG1534382-3 DUP		**L1197214-1**						
Total Phosphorus		0.0085	0.0077		mg/L	10	20	27-AUG-12
WG1534382-5 DUP		**L1198487-4**						
Total Phosphorus		0.0401	0.0425		mg/L	5.7	20	27-AUG-12
WG1534382-2 LCS								
Total Phosphorus			102.3		%		80-120	27-AUG-12
WG1534382-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	27-AUG-12
WG1534382-4 MS		**L1197214-1**						
Total Phosphorus			86.7		%		70-130	27-AUG-12
WG1534382-6 MS		**L1198487-4**						
Total Phosphorus			N/A	MS-B	%		-	27-AUG-12
PH-WT	Water							
Batch R2422946								
WG1532679-2 DUP		**L1197907-1**						
pH		7.51	7.50		pH units	0.1	20	23-AUG-12
WG1532679-3 DUP		**L1198487-2**						
pH		8.27	8.28		pH units	0.1	20	23-AUG-12
WG1532679-1 LCS								
pH			7.03		pH units		6.9-7.1	23-AUG-12
SOLIDS-TDS-WT	Water							
Batch R2424543								
WG1533254-3 DUP		**L1196210-1**						
Total Dissolved Solids		184	184		mg/L	0.0	20	25-AUG-12
WG1533254-4 DUP		**L1196210-2**						
Total Dissolved Solids		256	244		mg/L	4.8	20	25-AUG-12
WG1533254-2 LCS								
Total Dissolved Solids			99.3		%		85-115	25-AUG-12
WG1533254-1 MB								
Total Dissolved Solids			<20		mg/L		20	25-AUG-12
SOLIDS-TSS-WT	Water							
Batch R2423835								
WG1533203-3 DUP		**L1197289-5**						
Total Suspended Solids		2470	2230		mg/L	9.9	20	25-AUG-12
WG1533203-4 DUP		**L1197289-6**						
Total Suspended Solids		3230	3470		mg/L	7.0	20	25-AUG-12
WG1533203-5 DUP		**L1197331-1**						

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R2423835								
WG1533203-5 DUP		**L1197331-1**						
Total Suspended Solids		3600	3900		mg/L	8.0	20	25-AUG-12
WG1533203-6 DUP		**L1197360-3**						
Total Suspended Solids		2600	2500		mg/L	3.9	20	25-AUG-12
WG1533203-1 LCS								
Total Suspended Solids			99.2		%		80-120	25-AUG-12
WG1533203-2 MB								
Total Suspended Solids			<3.0		mg/L		3	25-AUG-12
Batch R2425815								
WG1535317-3 DUP		**L1198875-3**						
Total Suspended Solids		2730	2770		mg/L	1.2	20	29-AUG-12
WG1535317-4 DUP		**L1198875-5**						
Total Suspended Solids		4100	4030		mg/L	1.6	20	29-AUG-12
WG1535317-5 DUP		**L1199055-2**						
Total Suspended Solids		2600	2500		mg/L	3.9	20	29-AUG-12
WG1535317-6 DUP		**L1199694-3**						
Total Suspended Solids		3030	2970		mg/L	2.2	20	29-AUG-12
WG1535317-1 LCS								
Total Suspended Solids			101.2		%		80-120	29-AUG-12
WG1535317-2 MB								
Total Suspended Solids			<3.0		mg/L		3	29-AUG-12
TKN-WT	Water							
Batch R2423544								
WG1533113-4 CRM		**ERA525**						
Total Kjeldahl Nitrogen			102.2		%		80-120	24-AUG-12
WG1533399-1 CVS								
Total Kjeldahl Nitrogen			99.0		%		75-125	24-AUG-12
WG1533113-3 DUP		**L1198478-1**						
Total Kjeldahl Nitrogen		0.72	0.63		mg/L	14	20	24-AUG-12
WG1533113-5 DUP		**L1198410-1**						
Total Kjeldahl Nitrogen		44.0	41.4		mg/L	6.1	20	24-AUG-12
WG1533113-2 LCS								
Total Kjeldahl Nitrogen			102.1		%		80-120	24-AUG-12
WG1533113-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	24-AUG-12

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1198369 Report Date: 31-AUG-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	17-AUG-12 14:40	23-AUG-12 09:29	4	6	days	EHTR
	4	18-AUG-12 16:30	23-AUG-12 09:32	4	5	days	EHTR
	5	18-AUG-12 16:30	23-AUG-12 09:33	4	5	days	EHTR
	7	17-AUG-12 14:40	23-AUG-12 09:35	4	6	days	EHTR
	8	18-AUG-12 16:30	23-AUG-12 09:36	4	5	days	EHTR

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1198369 were received on 23-AUG-12 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Shipment 1

ALS Environmental	60 NORTHLAND ROAD, UNIT 1 WATERLOO, ON N2V 2B8 Phone: (519) 886-6910 Fax: (519) 886-9047 CANADA TOLL FREE: 1-800-668-9878	C of C # XXXXX PAGE 1 OF 1

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME	HESL
Account # 20126	
PROJECT MANAGER	David Leeder
Address:	
Job # 120022	
Phone:	705-645-0021
Fax:	
QUOTATION # Q33580	PC#

CRITERIA	Criteria on report (y/n) _y_
Reg 153/04	
Table____	
TCLP ____ MISA ____ PWQO ____	
OTHER ____	
REPORT DISTRIBUTION	ALL FINAL RESULTS WILL BE MAILED
EMAIL_X_ FAX____	
EMAIL1 David.Leeder@environmentalsciences.ca	
EMAIL2 ____	
SELECT: pdf____ digital____ both____	

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION #: L1198369

ENTERED BY: AM

DATE/TIME ENTERED: Aug 23/12 11:10

BIN #: BS62

SAMPLING INFORMATION — ANALYSIS REQUEST

Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	Anions4	Alk, EC, pH, TDS, TSS	DOC	Metals (PWQO)	NH3, TKN, TP(LL)	COMMENTS	LAB ID
12-8-[illegible]	[illegible]			X			Wabagishik – Baseline	5	X	X	X	X	X		1
12-8-[illegible]	[illegible]			X			The Chute – Baseline	5	X	X	X	X	X		2
[illegible]	[illegible]			X			The Chute – Replicate	5	X	X	X	X	X		3
12-8-[illegible]	1630			X			Third Falls – Baseline	5	X	X	X	X	X		4
[illegible]	16[illegible]			X			Third Falls – Replicate	5	X	X	X	X	X		5
[illegible]	[illegible]			X			Wanatango Falls – Baseline	5	X	X	X	X	X		6
[illegible]				X			Dup - 1	5	X	X	X	X	X		7
[illegible]	[illegible]			X			Dup - 2	5	X	X	X	X	X		8
[illegible]				X			Dup 3	5	X	X	X	X	X		9

L1198369-COFC

SPECIAL INSTRUCTIONS/COMMENTS

FROZEN	MEAN TEMP
COLD ✓	9.3 C
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT KS

SAMPLED BY	DATE & TIME	RECEIVED BY:	DATE & TIME
[illegible]	[illegible]		
RELINQUISHED BY:	**DATE & TIME**	**RECEIVED AT LAB BY:**	**DATE & TIME**
[illegible]	[illegible]	KS	AUG 23/12 9:00

NOTES AND CONDITIONS:

1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy   YELLOW - File copy   PINK - Customer Copy

Methyl Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental
3 - 1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Fish
Transaction ID: 592
PO/Contract No.:
Date Received: August 24, 2012
Date Analysed: October 23, 2012
Sampling Date: August 18, 2012 to August 22, 2012
Analyst(s): Xiang W.

Analytical Method: M10220: Methyl Mercury in Tissue by Digestion, Aqueous Ethylation, Purge & Trap, and CVAFS with an Automated System (Version 3)
P:\Methyl Mercury\Method and SOPs\M10220 MeHg in Tissue by Digestion - Automated System.doc

Comments: Samples comprised of one or more individual fish were freeze dried and ground prior to analysis.

Detection Limit: 16 ng/g (ML) MDL=4 ng/g The MDL was determined based on 7 replicates of analytical blanks (99% confidence level) and a 20 mg dry sample size.
For reporting purposes results will be flagged below the ML which is considered a practical quantitation limit.

Estimated Uncertainty: The estimated uncertainty of this method has been determined to be ± 13%

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

	Blanks		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)						
		Ethylation blank (H_2O+Reagent)	0.31	936	0.01						
		Mean Eth. Blank (last 30 runs)	0.61		0.01						
			Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Equiv. CH3Hg Conc. - based on current batch mean weight (0.02g) of dry sample, ng/g (Biota)						
		Method Blank 1	-0.04	825	-0.152						
		Method Blank 2	0.02	992	0.080						
		Method Blank 3	0.09	1190	0.337						
		Mean Method Blank	0.02		0.088						
	Standards		MeHg Standard Added to Ethylation EPA Vial (pg CH_3Hg)	Gross Peak Area	Net Corrected MeHg Std Calibration Factor (units / pg)	RSD of MeHg Standard					
		Mean Value			5079	3.8					
	Sample Spike Recovery	Sample Identification	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Wet Sample Mass (g)	% Wt. Loss On Drying	Dry Sample Mass (g)	Net CH3Hg as Hg (ng/g-Wet-Wt)	Net CH3Hg as Hg (ng/g-Dry-Wt)	CH_3Hg Recovery (%)
		Wabagishik Rapids (1)	MS1	182338	100%	0.087	79.6	0.018	58	276	88.7
		Wabagishik Rapids (1)	MS1O	179684	100%	0.101	79.6	0.021	49	239	87.2
		The Chutes (11)	MS2	286097	100%	0.090	79.5	0.018	84	408	88.7
		The Chutes (11)	MS2O	322587	100%	0.135	79.5	0.028	67	328	90.1
		Mean of Recoveries									88.7
	QC Samples	Dorm-2 ID0601 (4470 ± 320 ng/g)		790729	100%	0.005	2.8	0.005		4412	98.7
		Dorm-2 ID0601 (4470 ± 320 ng/g)	Repeat Aliquot	729096	100%	0.005	2.8	0.005		4068	91.0
		Mean of Dorm-2								4240	94.9
		A.S.S. - Alfa ID0702 (1000 ng/L)		530157	100%				888	<- Net CH_3Hg as Hg (ng/L)	98.6

LAB ID	Sampling Details	Sample ID	Date Sampled	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Calculated Wet Sample Mass (g)	% Wt. Loss On Drying	Weighed Dry Sample Mass (g)	Net CH_3Hg as Hg (ng/g) Wet Wt. (recovery corrected)	Net CH_3Hg as Hg (ng/g) Dry Wt. (recovery corrected)	
59621	Wabagishik Rapids	1	August 18, 2012		16347	88.7	0.0752	79.6	0.0153	6.28	30.8	
59622	Wabagishik Rapids	2	August 18, 2012		16839	88.7	0.0922	80.9	0.0176	5.24	27.4	
59623	Wabagishik Rapids	3	August 18, 2012		29082	88.7	0.0850	75.7	0.0207	9.58	39.4	
59624	Wabagishik Rapids	4	August 18, 2012		27551	88.7	0.0832	78.6	0.0195	9.57	45.9	
59625	Wabagishik Rapids	5	August 18, 2012		33508	88.7	0.0904	76.9	0.0209	11.3	49.9	
59626	Wabagishik Rapids	6	August 18, 2012		35134	88.7	0.0799	74.6	0.0203	14.0	54.9	
59627	Third Falls	7	August 19, 2012		295117	88.7	0.0870	77.7	0.0194	106	475	
59628	Third Falls	8	August 19, 2012		412926	88.7	0.1050	76.6	0.0246	122	521	
59629	Third Falls	9	August 19, 2012		248724	88.7	0.0752	74.0	0.0195	103	399	
59630	Third Falls	10	August 19, 2012		470080	88.7	0.0916	72.8	0.0249	163	598	
59630	Third Falls	10	August 19, 2012	Duplicate	493628	88.7	0.0922	72.8	0.0251	169	620	
59631	The Chutes	11	August 21, 2012		153621	88.7	0.1251	*79.5	0.0256	38.3	187	
59632	The Chutes	12	August 21, 2012		75166	88.7	0.0931	78.6	0.0200	25.2	118	
59633	The Chutes	13	August 21, 2012		97849	88.7	0.0717	77.1	0.0164	42.3	185	
59634	The Chutes	14	August 21, 2012		153097	88.7	0.0854	75.1	0.0213	55.7	224	
59635	Fredericktouse R.	15	August 22, 2012		90380	88.7	0.0740	77.3	0.0168	37.8	167	
59636	Fredericktouse R.	16	August 22, 2012		75186	88.7	0.0782	79.4	0.0161	30.0	146	
59637	Fredericktouse R.	17	August 22, 2012		86923	88.7	0.0594	78.5	0.0128	45.5	211	
59638	Fredericktouse R.	18	August 22, 2012		103207	88.7	0.1030	77.8	0.0229	31.4	141	
59639	Fredericktouse R.	19	August 22, 2012		74807	88.7	0.0698	78.0	0.0153	33.4	152	
59640	Fredericktouse R.	20	August 22, 2012		84578	88.7	0.0722	78.4	0.0156	36.5	168	
59641	Fredericktouse R.	21	August 22, 2012		121682	88.7	0.1057	80.9	0.0201	35.9	188	
59641	Fredericktouse R.	21	August 22, 2012	Duplicate	123215	88.7	0.1031	80.9	0.0197	37.7	198	

W:\Projects\2013\130003-Xstrata-2012Reports\JobReports\Ons\tsWabagashik Rapids\Appendices\Appendix C Lab C of AUNorth-eastern Ontario - Augu

* : See 'Comments' section above for discussion.

~ : Below the minimum level of detection for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.

Note: Results relate only to the items tested.

ISO/IEC 17025:2005 Accredited by the Canadian Association for Laboratory Accreditation

Total Mercury Results

Flett Research Ltd.

440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7

Fax/Phone (204) 667-2505

E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Enveronmental:

3-1 Taylor Road

Bracebridge, ON P1L 1S6

Matrix: Fish(wet)
Transaction ID: 592
PO/Contract No.:

Date Received: August 24, 2012
Sampling Dates: August 18, 2012

Date Analysed: October 15, 2012
Analyst(s): Zorica B.

Analytical Method: Determination of Total Mercury in Solids using EPA Method 7473 for DMA-80 Total Mercury Analyser as performed by Flett Research Ltd. (Version 3)

Detection Limit: 1.3 ng/g ML

MDL=0.4 ng/g based on 7 replicates of analytical blanks (98% confidence). This limit assumes 50 mg wet samples. Lower detection limits are possible if greater sample weights are used. For reporting purposes results will be flagged below the ML which is considered a practical quantitation limit.

Estimated Uncertainty: Uncertainty has been estimated at ± 17 % (95 % confidence)at total mercury concentrations between 4 and 3000 ng/g. This uncertainty increases to 32% for defatted hepatopancreas (TORT-2) due to the consisteritly higher recovery for this CRM.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

Sample Spike Recovery	SAMPLE IDENTIFICATION	Sample Type				Hg Recovery (%)
	WP-1 (Wabagishik Rapids)		8.81			
	Mean of spiked duplicates for WP-1 (Wabagishik Rapids)					97.7
	Mean of Spike Recoveries					97.7
QC Samples	DORM- 3 (382 ng/g)		4.30	0.01090		107.3
	DORM- 3 (382 ng/g)		4.96	0.01274		106.1
	DORM-3 (382 ng/g) Mean					106.7

Sampling Details	Sample ID	Date Sampled	Sample Type	Hg (ng)	Sample wet weight added to boat (g)	Net Total Hg conc. (ng/g wet wt.) [recovery corrected]	
Wabagishik Rapids	WP-1	August 18, 2012	Sample 1-US	8.81	0.03505	257	
Wabagishik Rapids	WP-2	August 18, 2012	DupA1	5.23	0.04953	108	
Wabagishik Rapids	WP-2	August 18, 2012	DupA2	5.45	0.0508	110	
Wabagishik Rapids	WP-3	August 18, 2012		1.21	0.04385	28.3	

* : See 'Comments' section above for discussion.

W:\Projects\2013\130003-Xeneca-2012Reports\Job\Reports\Drafts\Wabageshik Rapids\Appendices\Appendix C Lab C of A\Northeastern Ontario - August\TMDSOL101512ZB1 Below our official detection limit for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

CALA Testing Accreditation No. 3806

ISO/IEC/17025:2005 Accredited with the Canadian Association for Laboratory Accreditation

Total Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental:
3-1 Taylor Road
Bracebridge, ON P1L 1S6
Date Received: August 24, 2012
Sampling Dates: August 18, 2012 to August 22, 2012

Matrix: Fish(dry)
Transaction ID: 592
PO/Contract No.:
Date Analysed: October 22, 2012
Analyst(s): Zorica B.

Analytical Method: Determination of Total Mercury in Solids using EPA Method 7473 for DMA-80 Total Mercury Analyser as performed by Flett Research Ltd. (Version 3)

Comments: Samples comprised of one or more individual fish were freeze dried and ground prior to analysis

Detection Limit: 6 ng/g ML

MDL=2 ng/g based on 7 replicates of analytical blanks (98% confidence). This limit assumes 10 mg dry samples. Lower detection limits are possible if greater sample weights are used. For reporting purposes results will be flagged below the ML which is considered a practical quantitation limit.

Estimated Uncertainty: Uncertainty has been estimated at ± 17 % (95 % confidence)at total mercury concentrations between 4 and 3000 ng/g. This uncertainty increases to 32% for defatted hepatopancreas (TORT-2) due to the consistently higher recovery for this CRM.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA									
	Sample Spike Recovery	SAMPLE IDENTIFICATION	Sample Type						Hg Recovery (%)
		7 (Third Falls)		15.86					
		Mean of spiked duplicates for 7 (Third Falls)				RPD=	-1.0		100.8
		17 (Frederickhouse R.)		7.64					
		Mean of spiked duplicates for 17 (Frederickhouse R.)				RPD=	-3.6		99.2
		Mean of Spike Recoveries							100.0
	QC Samples	DORM-3 (382 ng/g) Mean				RPD=	4.1		107.8

Sampling Details	Sample ID	Date Sampled	Sample Type	Hg (ng)	Sample dry weight added to boat (g)	% wt. loss on drying	Net Total Hg conc. (ng/g dry wt.) [recovery corrected]	Net Total Hg conc. (ng/g wet wt.) [recovery corrected]	
Wabagishik Rapids	1	August 18, 2012		0.98	0.02801	79.6	35.0	7.14	
Wabagishik Rapids	2	August 18, 2012		0.58	0.01439	80.9	40.3	7.70	
Wabagishik Rapids	3	August 18, 2012		1.61	0.03464	75.7	46.6	11.3	
Wabagishik Rapids	4	August 18, 2012		1.69	0.03164	76.6	53.5	12.5	
Wabagishik Rapids	5	August 18, 2012		1.85	0.03252	76.9	56.8	13.1	
Wabagishik Rapids	6	August 18, 2012	DupA1	1.94	0.03118	74.6	62.1	15.8	
Wabagishik Rapids	6	August 18, 2012	DupA2	1.95	0.03213	74.6	60.6	15.4	
Third Falls	7	August 19, 2012	Sample 1-US	15.86	0.03289	77.7	482	107	
Third Falls	8	August 19, 2012		19.51	0.03738	76.6	522	122	
Third Falls	9	August 19, 2012		17.55	0.0407	74.0	431	112	
Third Falls	10	August 19, 2012		35.58	0.04524	72.8	786	214	
The Chutes	11	August 21, 2012		4.58	0.02174	79.5	211	43.2	
The Chutes	12	August 21, 2012		3.71	0.02321	78.6	160	34.3	
The Chutes	13	August 21, 2012	DupB1	5.31	0.0237	77.1	224	51.3	
The Chutes	13	August 21, 2012	DupB2	5.04	0.02271	77.1	222	50.8	
The Chutes	14	August 21, 2012		6.42	0.02501	75.1	256	63.8	
Frederickhouse R.	15	August 22, 2012		4.49	0.02188	77.3	205	46.5	
Frederickhouse R.	16	August 22, 2012		6.1	0.03384	79.4	180	37.1	
Frederickhouse R.	17	August 22, 2012	Sample 2-US	7.64	0.03032	78.5	252	54.3	
Frederickhouse R.	18	August 22, 2012		5.81	0.03217	77.8	181	40.3	
Frederickhouse R.	19	August 22, 2012		5.16	0.03016	78.0	171	37.6	
Frederickhouse R.	20	August 22, 2012		5.99	0.03174	78.4	189	40.9	
Frederickhouse R.	21	August 22, 2012		6.28	0.03095	80.9	203	38.7	

W:\Projects\2013\130003-Xeneca-2012Reports\Job\Reports\Drafts\Wabageshik Rapids\Appendices\Appendix C Lab C of AWorthesstern Ontario - AugustTMDSOL102212ZB1.xls

* : See 'Comments' section above for discussion.
~ : Below our official detection limit for this analyte in this matrix.

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Note: Results relate only to the items tested.

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Methyl Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental
3 - 1 Taylor Road
Bracebridge, ON P1L 1S6

Date Received: August 24, 2012
Sampling Date: August 17, 2012 to August 21, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: October 9, 2012
Analyst(s): Jason S.

Analytical Method: M10210: Methyl Mercury in Water by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS with Automated Instruments (Version 2)

Detection Limit: 0.08 ng/L (ML), MDL=0.03 ng/L (based on 7 replicates of method blanks with 98% confidence level). For reporting purpose samples will be flagged below a ML of 0.08ng/L which is considered a practical detection limit.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 10 % at methyl mercury concentrations of 0.5 and 2.5 ng/L (95 % confidence). Uncertainty at 0.1 ng/L is 13% (95% confidence).

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

Blanks		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)
	Ethylation blank (H_20+Reagent)	0.51	1655	
	Mean Eth. Blank (last 30 runs)	0.73		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.14	2094	0.01
	Method Blank 2	-0.02	1586	0.00
	Method Blank 3	-0.09	1356	0.00
	Mean Method Blank	0.01		0.00

Standards		MeHg Standard Added to Ethylation EPA Vial (pg CH_3Hg)	Gross Peak Area	Net Corrected MeHg Std Calibration Factor (units / pg)	RSD of MeHg Standard
	Mean Value			5468	2.5

Sample Spike Recovery	Sample Identification	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L)	CH_3Hg Recovery (%)
	Wanatango Falls Baseline (BERL106)	MS2	305445	100%	47.5	4.10	94.9
	Wanatango Falls Baseline (BERL106)	MS2D	286398	100%	47.2	4.08	94.0
	Mean of Recoveries						94.5
QC Samples	MeOPR ID1201 (1000ng/L)		149398	100%	0.2	946	94.6
	MeOPR ID1201 (1000ng/L)	Repeat Aliquot	130708	100%	0.2	894	89.4
	Mean of MeOPR					920	92.0
	A.S.S.-Alfa ID0702 (1000 ng/L)		317477	100%		982	98.2

LAB ID	Sampling Details	Sample ID	Date Sampled	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L) [recovery corrected]
58946	Wanatango Falls Baseline	BERL106	August 21, 2012		9113	94.5	47.96	0.11
58947	The Chute Baseline	Trish26	August 20, 2012		6163	94.5	47.19	~0.07
58947	The Chute Baseline	Trish26	August 20, 2012	Duplicate	6686	94.5	47.16	~0.07
58948	The Chute Replicate	M64	August 20, 2012		6566	94.5	48.05	~0.07
58949	Third Falls	BOD88	August 18, 2012		7300	94.5	47.57	0.09
58950	Third Falls Replicate	Trish27	August 18, 2012		9329	94.5	47.86	0.11
58951	Wabagishik Baseline	VSTL8	August 17, 2012		2382	94.5	47.07	~0.01
58952	Wabagishik DUP-1	FR118	August 17, 2012		2084	94.5	47.29	~0.01
58953	Third Falls DUP-2	BOD161	August 18, 2012		8645	94.5	46.77	0.10
58954	Wanatango Falls DUP-3	FR136	August 21, 2012		7221	94.5	46.96	0.08

* : See 'Comments' section above for discussion.

\\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-08 Sampling\Northeastern Ontario\MTWATR100912JS1.xls

~ : Below the minimum level of detection for this analyte in this matrix.

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Note: Results relate only to the items tested.

CALA
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Total Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Enveronmental:
3-1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Received: August 24, 2012
Date Analysed: September 11, 2012
Sampling Date(s): August 17, 2012 to August 21, 2012
Analyst(s): Zorica B.

Analytical Method: Total Mercury in Water by Oxidation, Purge and Trap, and CVAFS (T00120 version 5)

Detection Limit: MDL = 0.04 ng Hg/L (based on 7 replicates of analytical blanks (98% confidence level)). The ML of 0.5 ng/L, as stated in Method 163 1e, has been adopted for our laboratory to reflect occasional elevated bottle blanks (< 0.5 ng/L) observed in reused acid-cleaned Teflon bottles.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± t3 % @ 95 % confidence at a concentration level of 0.5-1000 ng/L.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

				Mean of 3 Bubblers	Bubbler 1	Bubbler 2	Bubbler 3	
Bubbler Blanks	Bubbler Blank Mean			1591	1380	1856	1537	
	Bubbler Blank (pg)			0.54	0.47	0.64	0.53	
Standards				Gross Peak Area	Net Peak Area	Area Units/ ng		
	Hg STD Mean					2919650		
			Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)	Percent Recovery
QC Samples	OPR mean (5.12 ng/L)			529200		5.07	0.04	99
	Baker QCS (1000 ng/L)		QCS-3	291484	0.10	992.90	0.00	99.3
Method/Bottle Blanks	F190(washed Aug28/12[		MBlk-1	7949	37.36	0.00	0.03	
	F205(washed Aug28/12)		MBlk-2	7192	31.75	0.00	0.03	
	Rudd203(washed Sept 5/12)		MBlk-3	9860	40.76	0.01	0.02	
Sample Spike Recovery	Third Falls DUP-2 [Roulet40)		Sample-2-US	142587	32.33	1.47	0.02	
	Mean of Recoveries					96. t0		96.1

Sample Details	Sample ID/Bottle Number	Date Sampled	Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)
Wenatango Falls Baseline	FGB725	August 21, 2012		452522	41.91	3.68	0.02
Third Falls Replicate	FR207	August 18, 2012		170032	40.47	1.41	0.02
Third Falls Baseline	Roulet13	August 18, 2012		t76377	40.84	1.45	0.02
Webagishik Baseline	M56	August 17, 2012		89664	31.16	0.95	0.02
Chutes Baseline	M52	August 20, 2012		119109	41.07	0.96	0.02
Chutes Replicate	M-2	August 20, 2012		93464	30.90	1.00	0.02
Wabagishik DUP-1	RUDD46	August t7, 2012		123190	40.11	1.02	0.02
Third Falls DUP-2	Roulet40	August 18, 2012		142587	32.33	1.47	0.02
Wanatango Falls DUP-3	RUDD07A	August 21, 2012		481334	46.01	3.56	0.02

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* See 'Comments' section above for discussion.
~ Below our official detection limit for this analyte in this matrix.

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HUTCHINSON ENVIRONMENTAL
SCIENCES LTD
ATTN: David Leeder
3-1 Taylor Rd.
Bracebridge ON P1L 1S6

Date Received: 06-NOV-12
Report Date: 13-NOV-12 08:12 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1233517
Project P.O. #: NOT SUBMITTED
Job Reference: 120022
C of C Numbers:
Legal Site Desc:

Lindsay Zuiker

Lindsay D. Zuiker
Account Manager

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Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1233517-1 WABAGISHIK- BASELINE						
Sampled By: Clarke Heitman on 02-NOV-12 @						
Matrix: Water						
Physical Tests						
Conductivity	312		3.0	umhos/cm	06-NOV-12	
pH	7.53		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	216		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	34		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	26.1		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.37		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0121		0.0030	mg/L	07-NOV-12	0.02
Sulphate	78.8		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.8		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.040		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	0.013		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	30.2		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	0.0035		0.0010	mg/L	10-NOV-12	*0.001
Iron (Fe)	0.062		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	4.87		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0366		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	0.0276		0.0020	mg/L	10-NOV-12	*0.025
Potassium (K)	2.4		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	0.00052		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	1.7		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0740		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	0.0022		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
alytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

ANALYTICAL GUIDELINE REPORT

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-1 WABAGISHIK- BASELINE Sampled By: Clarke Heitman on 02-NOV-12 @ Matrix: Water						#1
Total Metals						
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-2 THE CHUTE- BASELINE Sampled By: Clarke Heitman on 03-NOV-12 @ Matrix: Water						#1
Physical Tests						
Conductivity	128		3.0	umhos/cm	06-NOV-12	
pH	7.82		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	108		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	67		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	<2.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.45		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0142		0.0030	mg/L	07-NOV-12	0.02
Sulphate	2.9		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	12.4		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.030		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	19.1		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Iron (Fe)	0.078		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	4.41		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0105		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	2.0		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-2 THE CHUTE- BASELINE						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Total Metals						
Strontium (Sr)	0.0299		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-3 THE CHUTE- REPLICATE						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	126		3.0	umhos/cm	06-NOV-12	
pH	7.85		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	08-NOV-12	
Total Dissolved Solids	106		20	mg/L	08-NOV-12	
Ions and Nutrients						
Alkalinity, Total (as CaCO3)	66		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	<2.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.44		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0093		0.0030	mg/L	07-NOV-12	0.02
Sulphate	2.8		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	12.5		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.031		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	19.7		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Iron (Fe)	0.075		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	4.43		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0109		0.0010	mg/L	10-NOV-12	

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-3 THE CHUTE- REPLICATE						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Total Metals						
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	2.0		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0304		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	0.0045		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-4 THIRD FALLS- BASELINE						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	130		3.0	umhos/cm	06-NOV-12	
pH	7.82		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	120		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	68		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	<2.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.49		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0106		0.0030	mg/L	07-NOV-12	0.02
Sulphate	2.5		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	14.2		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.038		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	0.010		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	21.6		0.50	mg/L	10-NOV-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-4 THIRD FALLS- BASELINE Sampled By: Clarke Heitman on 03-NOV-12 @ Matrix: Water						#1
Total Metals						
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Iron (Fe)	0.116		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	5.05		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0122		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	2.4		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0304		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-5 THIRD FALLS- REPLICATE Sampled By: Clarke Heitman on 03-NOV-12 @ Matrix: Water						#1
Physical Tests						
Conductivity	130		3.0	umhos/cm	06-NOV-12	
pH	7.82		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	114		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	68		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	<2.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.54		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0085		0.0030	mg/L	07-NOV-12	0.02
Sulphate	2.4		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	14.7		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.034		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-5 THIRD FALLS- REPLICATE						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Total Metals						
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	20.1		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Iron (Fe)	0.107		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	4.69		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0113		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	2.2		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0280		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-6 WANATANGO FALLS- BASELINE						
Sampled By: Clarke Heitman on 04-NOV-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	192		3.0	umhos/cm	06-NOV-12	
pH	7.95		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	8.0		2.0	mg/L	08-NOV-12	
Total Dissolved Solids	182		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	78		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	3.1		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.77		0.15	mg/L	07-NOV-12	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-6 WANATANGO FALLS- BASELINE						
Sampled By: Clarke Heitman on 04-NOV-12 @ (						
Matrix: Water						#1
Anions and Nutrients						
Total Phosphorus	0.0499		0.0030	mg/L	07-NOV-12	*0.02
Sulphate	26.5		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	23.0		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	2.74		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	0.0013		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	0.028		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	0.084		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	32.2		0.50	mg/L	10-NOV-12	
Chromium (Cr)	0.00503		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	0.00131		0.00050	mg/L	10-NOV-12	*0.0009
Copper (Cu)	0.0083		0.0010	mg/L	10-NOV-12	*0.001
Iron (Fe)	2.47		0.050	mg/L	10-NOV-12	*0.3
Lead (Pb)	0.0013		0.0010	mg/L	10-NOV-12	*0.001
Magnesium (Mg)	6.63		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0414		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	0.0039		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	1.6		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	0.00073		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	6.6		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0603		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	0.109		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	0.0047		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	0.0161		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-7 DUP-1						
Sampled By: Clarke Heitman on 02-NOV-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	285		3.0	umhos/cm	06-NOV-12	
pH	7.63		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	214		20	mg/L	08-NOV-12	

ction Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-7 DUP-1						
Sampled By: Clarke Heitman on 02-NOV-12 @						
Matrix: Water						#1
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	35		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	26.3		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.32		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0097		0.0030	mg/L	07-NOV-12	0.02
Sulphate	79.9		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.9		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.054		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	0.014		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	33.4		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	0.0040		0.0010	mg/L	10-NOV-12	*0.001
Iron (Fe)	0.069		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	5.39		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0396		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	0.0307		0.0020	mg/L	10-NOV-12	*0.025
Potassium (K)	2.6		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	0.00043		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	1.8		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0827		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	0.0028		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-8 DUP-2						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1233517-8 DUP-2						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						
Physical Tests						
Conductivity	131		3.0	umhos/cm	06-NOV-12	
pH	7.89		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	07-NOV-12	
Total Dissolved Solids	114		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	69		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	<2.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.56		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0088		0.0030	mg/L	07-NOV-12	0.02
Sulphate	2.5		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	14.6		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	0.035		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	<0.010		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	<0.050		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	20.6		0.50	mg/L	10-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	10-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Iron (Fe)	0.107		0.050	mg/L	10-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	10-NOV-12	0.001
Magnesium (Mg)	4.77		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0116		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	2.3		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001
Strontium (Sr)	0.0286		0.0010	mg/L	10-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	10-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	10-NOV-12	0.006

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits
L1233517-8 DUP-2						
Sampled By: Clarke Heitman on 03-NOV-12 @						
Matrix: Water						#1
Total Metals						
Zinc (Zn)	<0.0030		0.0030	mg/L	10-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004
L1233517-9 DUP-3						
Sampled By: Clarke Heitman on 04-NOV-12 @						
Matrix: Water						#1
Physical Tests						
Conductivity	192		3.0	umhos/cm	06-NOV-12	
pH	7.98		0.10	pH units	06-NOV-12	6.5-8.5
Total Suspended Solids	8.8		2.0	mg/L	08-NOV-12	
Total Dissolved Solids	184		20	mg/L	08-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	75		10	mg/L	06-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	06-NOV-12	
Chloride	3.0		2.0	mg/L	07-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	07-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	07-NOV-12	
Total Kjeldahl Nitrogen	0.45		0.15	mg/L	07-NOV-12	
Total Phosphorus	0.0493		0.0030	mg/L	07-NOV-12	*0.02
Sulphate	26.4		2.0	mg/L	07-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	20.1		1.0	mg/L	10-NOV-12	
Total Metals						
Aluminum (Al)	2.32		0.010	mg/L	10-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	10-NOV-12	0.02
Arsenic (As)	0.0013		0.0010	mg/L	10-NOV-12	0.005
Barium (Ba)	0.026		0.010	mg/L	10-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	10-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	10-NOV-12	
Boron (B)	0.087		0.050	mg/L	10-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	10-NOV-12	0.0001
Calcium (Ca)	32.0		0.50	mg/L	10-NOV-12	
Chromium (Cr)	0.00424		0.00050	mg/L	10-NOV-12	
Cobalt (Co)	0.00117		0.00050	mg/L	10-NOV-12	*0.0009
Copper (Cu)	0.0078		0.0010	mg/L	10-NOV-12	*0.001
Iron (Fe)	2.09		0.050	mg/L	10-NOV-12	*0.3
Lead (Pb)	0.0012		0.0010	mg/L	10-NOV-12	*0.001
Magnesium (Mg)	6.52		0.50	mg/L	10-NOV-12	
Manganese (Mn)	0.0374		0.0010	mg/L	10-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	06-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	10-NOV-12	0.04
Nickel (Ni)	0.0036		0.0020	mg/L	10-NOV-12	0.025
Potassium (K)	1.5		1.0	mg/L	10-NOV-12	
Selenium (Se)-Total	0.00081		0.00040	mg/L	10-NOV-12	0.1
Silicon (Si)	5.7		1.0	mg/L	10-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	10-NOV-12	0.0001

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1233517-9	DUP-3						
Sampled By:	Clarke Heitman on 04-NOV-12 @ (						
Matrix:	Water						
Total Metals							
	Strontium (Sr)	0.0593		0.0010	mg/L	10-NOV-12	
	Thallium (Tl)	<0.00030		0.00030	mg/L	10-NOV-12	0.0003
	Tin (Sn)	<0.0050		0.0050	mg/L	10-NOV-12	
	Titanium (Ti)	0.0910		0.0020	mg/L	10-NOV-12	
	Tungsten (W)	<0.010		0.010	mg/L	10-NOV-12	0.03
	Uranium (U)	<0.0050		0.0050	mg/L	10-NOV-12	0.005
	Vanadium (V)	0.0041		0.0010	mg/L	10-NOV-12	0.006
	Zinc (Zn)	0.0116		0.0030	mg/L	10-NOV-12	0.02
	Zirconium (Zr)	<0.0040		0.0040	mg/L	10-NOV-12	0.004

ection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
nalytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Surface Water PWQO

#1: Surface Water PWQO

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
ANIONS4-WT	Water	CL,NO2,NO3,SO4	EPA 300.0 (IC)
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

HG-ONT-PWQO-WT	Water	Mercury (Hg) -Total PWQO	SW846 7470A
MET-ONT-PWQO-WT	Water	Metals, Total PWQO	EPA 6020A
NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5□C overnight and then 180–10□C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5□C for a minimum of four hours or until a constant weight is achieved.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

ALS Environmental

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2469967								
WG1580735-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			107.1		%		80-120	06-NOV-12
WG1580735-2 CVS								
Alkalinity, Total (as CaCO3)			98.3		%		70-130	06-NOV-12
WG1580735-3 DUP		**L1232020-1**						
Alkalinity, Total (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	20	06-NOV-12
WG1580735-4 DUP		**L1232812-1**						
Alkalinity, Total (as CaCO3)		341	342		mg/L	0.4	20	06-NOV-12
WG1580735-5 DUP		**L1233534-1**						
Alkalinity, Total (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	20	06-NOV-12
WG1580735-6 DUP		**L1233568-1**						
Alkalinity, Total (as CaCO3)		43	41		mg/L	5.5	20	06-NOV-12
WG1580735-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	06-NOV-12
ANIONS4-WT	Water							
Batch R2470831								
WG1582289-6 DUP		**L1233517-1**						
Chloride		26.1	26.3		mg/L	0.7	20	07-NOV-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	07-NOV-12
Nitrate-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	07-NOV-12
Sulphate		78.8	79.6		mg/L	1.0	20	07-NOV-12
WG1582289-3 LCS								
Chloride			99.6		%		85-115	07-NOV-12
Nitrite-N			94.6		%		85-115	07-NOV-12
Nitrate-N			97.6		%		85-115	07-NOV-12
Sulphate			101.2		%		85-115	07-NOV-12
WG1582289-4 LCSD		**WG1582289-3**						
Chloride		99.6	100.3		%	0.7	25	07-NOV-12
Nitrite-N		94.6	95.0		%	0.4	25	07-NOV-12
Nitrate-N		97.6	98.4		%	0.9	25	07-NOV-12
Sulphate		101.2	102.0		%	0.8	25	07-NOV-12
WG1582289-1 MB								
Chloride			<2.0		mg/L		2	07-NOV-12
Nitrite-N			<0.10		mg/L		0.1	07-NOV-12
Nitrate-N			<0.10		mg/L		0.1	07-NOV-12
Sulphate			<2.0		mg/L		2	07-NOV-12

ALS Environmental

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2472415								
WG1583976-3 DUP		**L1234224-1**						
Dissolved Organic Carbon		3.2	3.2		mg/L	1.2	20	10-NOV-12
WG1583976-5 DUP		**L1233517-7**						
Dissolved Organic Carbon		5.9	5.9		mg/L	0.7	20	10-NOV-12
WG1583976-2 LCS								
Dissolved Organic Carbon			104.3		%		80-120	10-NOV-12
WG1583976-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	10-NOV-12
WG1583976-4 MS		**L1234224-1**						
Dissolved Organic Carbon			92.9		%		70-130	10-NOV-12
EC-WT	Water							
Batch R2470201								
WG1581029-1 CVS								
Conductivity			100.7		%		90-110	06-NOV-12
WG1581029-3 DUP		**L1233428-1**						
Conductivity		2100	2070		umhos/cm	1.4	10	06-NOV-12
WG1581029-4 DUP		**L1233543-3**						
Conductivity		406	400		umhos/cm	1.5	10	06-NOV-12
WG1581029-2 MB								
Conductivity			<3.0		umhos/cm		3	06-NOV-12
HG-ONT-PWQO-WT	Water							
Batch R2469582								
WG1580979-4 DUP		**WG1580979-3**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-NOV-12
WG1580979-2 LCS								
Mercury (Hg)			90.5		%		80-120	06-NOV-12
WG1580979-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	06-NOV-12
WG1580979-5 MS		**WG1580979-3**						
Mercury (Hg)			92.0		%		70-130	06-NOV-12
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1583917-2 CVS								
Aluminum (Al)			97.6		%		80-120	10-NOV-12
Antimony (Sb)			98.4		%		80-120	10-NOV-12
Arsenic (As)			96.5		%		80-120	10-NOV-12
Barium (Ba)			96.8		%		80-120	10-NOV-12

ALS Environmental

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1583917-2 CVS								
Beryllium (Be)			99.3		%		80-120	10-NOV-12
Bismuth (Bi)			98.5		%		80-120	10-NOV-12
Boron (B)			95.8		%		70-130	10-NOV-12
Cadmium (Cd)-Total			102.3		%		80-120	10-NOV-12
Calcium (Ca)			97.0		%		80-120	10-NOV-12
Chromium (Cr)			97.8		%		80-120	10-NOV-12
Cobalt (Co)			98.2		%		80-120	10-NOV-12
Copper (Cu)			99.7		%		80-120	10-NOV-12
Iron (Fe)			95.8		%		80-120	10-NOV-12
Lead (Pb)			97.5		%		80-120	10-NOV-12
Magnesium (Mg)			98.5		%		80-120	10-NOV-12
Manganese (Mn)			101.5		%		80-120	10-NOV-12
Molybdenum (Mo)			96.2		%		90-110	10-NOV-12
Nickel (Ni)			99.5		%		80-120	10-NOV-12
Potassium (K)			96.5		%		80-120	10-NOV-12
Selenium (Se)-Total			98.6		%		80-120	10-NOV-12
Silicon (Si)			97.7		%		70-130	10-NOV-12
Silver (Ag)			115.5		%		80-120	10-NOV-12
Strontium (Sr)			96.9		%		80-120	10-NOV-12
Thallium (Tl)			101.2		%		80-120	10-NOV-12
Tin (Sn)			99.1		%		70-130	10-NOV-12
Titanium (Ti)			101.0		%		80-120	10-NOV-12
Tungsten (W)			96.2		%		70-130	10-NOV-12
Uranium (U)			96.4		%		80-120	10-NOV-12
Vanadium (V)			98.5		%		80-120	10-NOV-12
Zinc (Zn)			97.9		%		80-120	10-NOV-12
Zirconium (Zr)			96.9		%		80-120	10-NOV-12
WG1581930-4 DUP		**WG1581930-3**						
Aluminum (Al)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	10-NOV-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	10-NOV-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Barium (Ba)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	10-NOV-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12

ALS Environmental

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1581930-4 DUP		**WG1581930-3**						
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	10-NOV-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	10-NOV-12
Calcium (Ca)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	10-NOV-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-NOV-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-NOV-12
Copper (Cu)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Iron (Fe)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	10-NOV-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Magnesium (Mg)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	10-NOV-12
Manganese (Mn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Molybdenum (Mo)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	10-NOV-12
Potassium (K)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	10-NOV-12
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	10-NOV-12
Silicon (Si)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	10-NOV-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	10-NOV-12
Strontium (Sr)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	10-NOV-12
Tin (Sn)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	10-NOV-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	10-NOV-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	10-NOV-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	10-NOV-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-NOV-12
Zinc (Zn)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	10-NOV-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	10-NOV-12
WG1581930-2 LCS								
Aluminum (Al)			113.5		%		80-120	10-NOV-12
Antimony (Sb)			102.7		%		70-130	10-NOV-12
Arsenic (As)			105.8		%		70-130	10-NOV-12
Barium (Ba)			105.1		%		70-130	10-NOV-12
Beryllium (Be)			110.4		%		70-130	10-NOV-12
Bismuth (Bi)			105.2		%		70-130	10-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1581930-2 LCS								
Boron (B)			106.8		%		70-130	10-NOV-12
Cadmium (Cd)-Total			104.8		%		70-130	10-NOV-12
Calcium (Ca)			109.2		%		70-130	10-NOV-12
Chromium (Cr)			105.6		%		70-130	10-NOV-12
Cobalt (Co)			113.7		%		70-130	10-NOV-12
Copper (Cu)			110.7		%		70-130	10-NOV-12
Iron (Fe)			108.0		%		70-130	10-NOV-12
Lead (Pb)			104.9		%		70-130	10-NOV-12
Magnesium (Mg)			109.8		%		70-130	10-NOV-12
Manganese (Mn)			109.0		%		70-130	10-NOV-12
Molybdenum (Mo)			109.4		%		70-130	10-NOV-12
Nickel (Ni)			111.7		%		70-130	10-NOV-12
Potassium (K)			105.3		%		70-130	10-NOV-12
Selenium (Se)-Total			103.1		%		70-130	10-NOV-12
Silicon (Si)			112.3		%		70-130	10-NOV-12
Silver (Ag)			121.2		%		70-130	10-NOV-12
Strontium (Sr)			110.1		%		70-130	10-NOV-12
Thallium (Tl)			104.2		%		70-130	10-NOV-12
Tin (Sn)			108.4		%		70-130	10-NOV-12
Titanium (Ti)			105.2		%		70-130	10-NOV-12
Tungsten (W)			106.5		%		70-130	10-NOV-12
Uranium (U)			106.9		%		70-130	10-NOV-12
Vanadium (V)			106.1		%		70-130	10-NOV-12
Zinc (Zn)			106.8		%		70-130	10-NOV-12
Zirconium (Zr)			107.5		%		70-130	10-NOV-12
WG1581930-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	10-NOV-12
Antimony (Sb)			<0.0050		mg/L		0.005	10-NOV-12
Arsenic (As)			<0.0010		mg/L		0.001	10-NOV-12
Barium (Ba)			<0.010		mg/L		0.01	10-NOV-12
Beryllium (Be)			<0.0010		mg/L		0.001	10-NOV-12
Bismuth (Bi)			<0.0010		mg/L		0.001	10-NOV-12
Boron (B)			<0.050		mg/L		0.05	10-NOV-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	10-NOV-12

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1581930-1 MB								
Calcium (Ca)			<0.50		mg/L		0.5	10-NOV-12
Chromium (Cr)			<0.00050		mg/L		0.0005	10-NOV-12
Cobalt (Co)			<0.00050		mg/L		0.0005	10-NOV-12
Copper (Cu)			<0.0010		mg/L		0.001	10-NOV-12
Iron (Fe)			<0.050		mg/L		0.05	10-NOV-12
Lead (Pb)			<0.0010		mg/L		0.001	10-NOV-12
Magnesium (Mg)			<0.50		mg/L		0.5	10-NOV-12
Manganese (Mn)			<0.0010		mg/L		0.001	10-NOV-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	10-NOV-12
Nickel (Ni)			<0.0020		mg/L		0.002	10-NOV-12
Potassium (K)			<1.0		mg/L		1	10-NOV-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	10-NOV-12
Silicon (Si)			<1.0		mg/L		1	10-NOV-12
Silver (Ag)			<0.00010		mg/L		0.0001	10-NOV-12
Strontium (Sr)			<0.0010		mg/L		0.001	10-NOV-12
Thallium (Tl)			<0.00030		mg/L		0.0003	10-NOV-12
Tin (Sn)			<0.0050		mg/L		0.005	10-NOV-12
Titanium (Ti)			<0.0020		mg/L		0.002	10-NOV-12
Tungsten (W)			<0.010		mg/L		0.01	10-NOV-12
Uranium (U)			<0.0050		mg/L		0.005	10-NOV-12
Vanadium (V)			<0.0010		mg/L		0.001	10-NOV-12
Zinc (Zn)			<0.0030		mg/L		0.003	10-NOV-12
Zirconium (Zr)			<0.0040		mg/L		0.004	10-NOV-12
WG1581930-5 MS		**WG1581930-3**						
Aluminum (Al)			104.8		%		70-130	10-NOV-12
Antimony (Sb)			97.7		%		70-130	10-NOV-12
Arsenic (As)			98.6		%		70-130	10-NOV-12
Barium (Ba)			99.1		%		70-130	10-NOV-12
Beryllium (Be)			101.3		%		70-130	10-NOV-12
Bismuth (Bi)			98.8		%		70-130	10-NOV-12
Boron (B)			98.5		%		70-130	10-NOV-12
Cadmium (Cd)-Total			97.8		%		70-130	10-NOV-12
Calcium (Ca)			101.7		%		70-130	10-NOV-12
Chromium (Cr)			98.5		%		70-130	10-NOV-12

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-PWQO-WT	Water							
Batch R2472317								
WG1581930-5 MS		**WG1581930-3**						
Cobalt (Co)			105.1		%		70-130	10-NOV-12
Copper (Cu)			102.7		%		70-130	10-NOV-12
Iron (Fe)			101.2		%		70-130	10-NOV-12
Lead (Pb)			98.8		%		70-130	10-NOV-12
Magnesium (Mg)			101.7		%		70-130	10-NOV-12
Manganese (Mn)			101.6		%		70-130	10-NOV-12
Molybdenum (Mo)			101.8		%		70-130	10-NOV-12
Nickel (Ni)			104.4		%		70-130	10-NOV-12
Potassium (K)			98.0		%		70-130	10-NOV-12
Selenium (Se)-Total			94.5		%		70-130	10-NOV-12
Silicon (Si)			104.8		%		70-130	10-NOV-12
Silver (Ag)			114.3		%		70-130	10-NOV-12
Strontium (Sr)			102.5		%		70-130	10-NOV-12
Thallium (Tl)			98.3		%		70-130	10-NOV-12
Tin (Sn)			101.4		%		70-130	10-NOV-12
Titanium (Ti)			99.9		%		70-130	10-NOV-12
Tungsten (W)			100.5		%		70-130	10-NOV-12
Uranium (U)			101.1		%		70-130	10-NOV-12
Vanadium (V)			98.9		%		70-130	10-NOV-12
Zinc (Zn)			98.2		%		70-130	10-NOV-12
Zirconium (Zr)			101.2		%		70-130	10-NOV-12
NH3-WT	Water							
Batch R2469945								
WG1580798-2 CVS								
Ammonia, Total (as N)			92.9		%		85-115	06-NOV-12
WG1580798-3 DUP		**L1233428-1**						
Ammonia, Total (as N)		0.117	0.114		mg/L	2.1	20	06-NOV-12
WG1580798-5 DUP		**L1233517-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	06-NOV-12
WG1580798-7 DUP		**L1233543-7**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	06-NOV-12
WG1580798-9 DUP		**L1233660-1**						
Ammonia, Total (as N)		0.140	0.138		mg/L	1.2	20	06-NOV-12
WG1580798-1 MB								
Ammonia, Total (as N)			<0.050				0.05	

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2469945								
WG1580798-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	06-NOV-12
WG1580798-4 MS		**L1233428-1**						
Ammonia, Total (as N)			94.1		%		75-125	06-NOV-12
WG1580798-6 MS		**L1233517-1**						
Ammonia, Total (as N)			92.2		%		75-125	06-NOV-12
WG1580798-8 MS		**L1233543-7**						
Ammonia, Total (as N)			88.7		%		75-125	06-NOV-12
P-TOTAL-LOW-WT	Water							
Batch R2470249								
WG1581598-3 DUP		**L1233426-1**						
Total Phosphorus		0.588	0.581		mg/L	1.2	20	07-NOV-12
G1581598-5 DUP		**L1234221-1**						
Total Phosphorus		0.0629	0.0636		mg/L	1.0	20	07-NOV-12
WG1581598-2 LCS								
Total Phosphorus			104.9		%		80-120	07-NOV-12
WG1581598-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	07-NOV-12
WG1581598-4 MS		**L1233426-1**						
Total Phosphorus			N/A	MS-B	%		-	07-NOV-12
WG1581598-6 MS		**L1234221-1**						
Total Phosphorus			N/A	MS-B	%		-	07-NOV-12
PH-WT	Water							
Batch R2470078								
WG1581025-3 DUP		**WG1581025-2**						
pH		7.71	7.97		pH units	3.4	20	06-NOV-12
WG1581025-5 DUP		**L1233543-3**						
pH		7.95	7.92		pH units	0.4	20	06-NOV-12
WG1581025-6 DUP		**L1233751-4**						
pH		6.94	6.94		pH units	0.1	20	06-NOV-12
WG1581025-1 LCS								
pH			6.98		pH units		6.9-7.1	06-NOV-12
SOLIDS-TDS-WT	Water							
Batch R2470899								
WG1581317-3 DUP		**L1232812-2**						
Total Dissolved Solids		386	398		mg/L	3.1	20	08-NOV-12
G1581317-4 DUP		**L1232812-1**						

ALS Environmental

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R2470899								
WG1581317-4 DUP		**L1232812-1**						
Total Dissolved Solids		464	466		mg/L	0.4	20	08-NOV-12
WG1581317-2 LCS								
Total Dissolved Solids			98.7		%		85-115	08-NOV-12
WG1581317-1 MB								
Total Dissolved Solids			<20		mg/L		20	08-NOV-12
SOLIDS-TSS-WT	Water							
Batch R2469972								
WG1580880-3 DUP		**L1232666-2**						
Total Suspended Solids		1470	1400		mg/L	4.7	20	07-NOV-12
WG1580880-4 DUP		**L1232666-3**						
Total Suspended Solids		1730	1730		mg/L	0.0	20	07-NOV-12
WG1580880-5 DUP		**L1232703-7**						
Total Suspended Solids		3000	3070		mg/L	2.2	20	07-NOV-12
WG1580880-6 DUP		**L1232740-2**						
Total Suspended Solids		2830	2770		mg/L	2.4	20	07-NOV-12
WG1580880-1 LCS								
Total Suspended Solids			98.8		%		85-115	07-NOV-12
WG1580880-2 MB								
Total Suspended Solids			<2.0		mg/L		2	07-NOV-12
Batch R2470644								
WG1581614-3 DUP		**L1233323-5**						
Total Suspended Solids		1470	1400		mg/L	4.7	20	08-NOV-12
WG1581614-4 DUP		**L1233323-6**						
Total Suspended Solids		1800	1770		mg/L	1.9	20	08-NOV-12
WG1581614-5 DUP		**L1233323-8**						
Total Suspended Solids		3270	3230		mg/L	1.0	20	08-NOV-12
WG1581614-6 DUP		**L1233323-10**						
Total Suspended Solids		3070	3170		mg/L	3.2	20	08-NOV-12
WG1581614-7 DUP		**L1234012-2**						
Total Suspended Solids		3130	3330		mg/L	6.2	20	08-NOV-12
WG1581614-1 LCS								
Total Suspended Solids			99.2		%		85-115	08-NOV-12
WG1581614-2 MB								
Total Suspended Solids			<2.0		mg/L		2	08-NOV-12
TKN-WT	Water							

Quality Control Report

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R2470120								
WG1581509-4 CRM		**ERA525**						
Total Kjeldahl Nitrogen			100.0		%		80-120	07-NOV-12
WG1581542-1 CVS								
Total Kjeldahl Nitrogen			95.1		%		75-125	07-NOV-12
WG1581509-3 DUP		**L1233672-1**						
Total Kjeldahl Nitrogen		45.8	44.3		mg/L	3.3	20	07-NOV-12
WG1581509-5 DUP		**L1233143-5**						
Total Kjeldahl Nitrogen		20.8	20.4		mg/L	1.8	20	07-NOV-12
WG1581509-2 LCS								
Total Kjeldahl Nitrogen			97.3		%		80-120	07-NOV-12
WG1581509-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-NOV-12

Quality Control Report

Workorder: L1233517 Report Date: 13-NOV-12

Client: HUTCHINSON ENVIRONMENTAL SCIENCES LTD
3-1 Taylor Rd.
Bracebridge ON P1L 1S6
Contact: David Leeder

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # XXXXX
PAGE 1 OF 1

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME	HESL
Account # 20126	
PROJECT MANAGER	David Leeder
Address:	
Job # 120022	
Phone	705-645-0021
Fax:	
QUOTATION # Q33580	PO#

CRITERIA	Criteria on report (y/n) _y_
Reg 153/04	
Table___	
TCLP ____ MISA ____ PWQO ____	
OTHER ____	
REPORT DISTRIBUTION	ALL FINAL RESULTS WILL BE MAILED
EMAIL_X___ FAX______	
EMAIL1 _David.Leeder@environmentalsciences.ca_	
EMAIL2 ______	
SELECT: pdf____ digital____ both____	

INDICATE BOTTLES FIELD FILTERED/PRESERVED (F/P)

SUBMISSION # L1233517
ENTERED BY: [illegible]
DATE/TIME ENTERED: Nov.6/12 10:23
BIN # B857

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	TYPE: GRAD	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	Anions4	Alk, EC, pH, TDS, TSS	DOC	Metals (PWQO)	NH3, TKN, TP(LL)							COMMENTS	LAB ID
[illegible]	[illegible]			X			Wabagishik – Baseline	5	X	X	X	X	X								1
[illegible]	[illegible]			X			The Chute – Baseline	5	X	X	X	X	X								2
[illegible]	[illegible]			X			The Chute – Replicate	5	X	X	X	X	X								3
[illegible]	[illegible]			X			Third Falls – Baseline	5	X	X	X	X	X								4
[illegible]	[illegible]			X			Third Falls – Replicate	5	X	X	X	X	X								5
[illegible]	[illegible]			X			Wanatango Falls – Baseline	5	X	X	X	X	X								6
[illegible]	[illegible]			X			[illegible]	5	✓	✓	✓	✓	✓								7
[illegible]	10:45			X			[illegible]	5	✓	✓	✓	✓	✓								8
[illegible]	[illegible]			X			[illegible]	5	✓	✓	✓	✓	✓								9
[illegible]	[illegible]																				

L1233517-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLED BY	DATE & TIME	RECEIVED BY	DATE & TIME
[illegible]	[illegible]		
RELINQUISHED BY	DATE & TIME	RECEIVED AT LAB BY	DATE & TIME
		Austin	06/11/12 09:30

SAMPLE CONDITION	
FROZEN	MEAN TEMP
COLD	8.3
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT AP

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy   YELLOW - File copy   PINK - Customer Copy

Methyl Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone (204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental
3 - 1 Taylor Road
Bracebridge, ON P1L 1S6

Date Received: November 6, 2012
Sampling Date: November 2, 2012 to November 4, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: November 12, 2012
Analyst(s): Jason S.

Analytical Method: M10210: Methyl Mercury in Water by Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS with Automated Instruments (Version 2)

Detection Limit: 0.08 ng/L (ML), MDL=0.03 ng/L (based on 7 replicates of method blanks with 98% confidence level). For reporting purpose samples will be flagged below a ML of 0.08ng/L which is considered a practical detection limit.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 10 % at methyl mercury concentrations of 0.5 and 2.5 ng/L (95 % confidence). Uncertainty at 0.1 ng/L is 13% (95% confidence).

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA

Blanks		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)
	Ethylation blank (H_2O+Reagent)	0.49	1442	
	Mean Eth. Blank (last 30 runs)	0.52		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.01	1480	0.00
	Method Blank 2	0.09	1717	0.00
	Method Blank 3	0.16	1910	0.01
	Mean Method Blank	0.09		0.00

Standards		MeHg Standard Added to Ethylation EPA Vial (pg CH_3Hg)	Gross Peak Area	Net Corrected MeHg Std Calibration Factor (units / pg)	RSD of MeHg Standard
	Mean Value			5019	3.0

Sample Spike Recovery	Sample Identification	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L)	CH_3Hg Recovery (%)
	Wabagishik (M97)	MS1	288065	100%	47.4	3.91	92.5
	Wabagishik (M97)	MS1D	266514	100%	47.5	3.95	93.5
	Mean of Recoveries						93.0
QC Samples	MeOPR ID1201 (1000ng/L)		133754	100%	0.2	920	92.0
	MeOPR ID1201 (1000ng/L)	Repeat Aliquot	140779	100%	0.2	867	86.7
	MeOPR ID1201 (1000ng/L)		158733	100%	0.2	924	92.4
	MeOPR ID1201 (1000ng/L)	Repeat Aliquot	110381	100%	0.2	853	85.3
	Mean of MeOPR					891	89.1
	A.S.S.-Alfa ID0702 (1000 ng/L)		288971	100%		974	97.4

LAB ID	Sampling Details	Sample ID	Date Sampled	Sample Type	Gross Peak Area	% CH_3Hg Recovery Used for Calculations	Volume of Water Sample (ml)	Net CH_3Hg as Hg (ng/L) [recovery corrected]
60708	Wabagishik	FR258	November 2, 2012		1906	93.0	47.44	~0.00
60709	Wabagishik	M97	November 2, 2012		2378	93.0	47.43	~0.01
60710	Third Falls	BOD74	November 3, 2012		6199	93.0	47.16	~0.07
60711	Third Falls	Trish35	November 3, 2012		7322	93.0	47.41	0.08
60712	Third Falls	FR214	November 3, 2012		6821	93.0	47.23	~0.08
60713	The Chute	BOD103	November 3, 2012		3699	93.0	48.03	~0.03
60714	The Chute	BOD200	November 3, 2012		5735	93.0	47.05	~0.06
60714	The Chute	BOD200	November 3, 2012	Duplicate	5811	93.0	46.93	~0.08
60715	Wanatango	FR252	November 4, 2012		5446	93.0	48.43	~0.06
60716	Wanatango	FR244	November 4, 2012		5985	93.0	47.60	~0.07

*: See 'Comments' section above for discussion.

\\HESLSERVER\HESLData\Projects\2012\120022 - 2012 Xeneca Water Sampling\Job\Data-analysis\2012-11 Sampling\Northeastern Ontario\MTWATR111212JS1.xls

~: Below the minimum level of detection for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

Total Mercury Results

Flett Research Ltd.
440 DeSalaberry Ave. Winnipeg, MB R2L 0Y7
Fax/Phone /204) 667-2505
E-mail: flett@flettresearch.ca Webpage: http://www.flettresearch.ca

CLIENT: Leeder, David - Hutchinson Environmental:
3-1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Received: November 6, 2012
Date Analysed: November 8, 2012
Sampling Date(s): November 2, 2012 to November 4, 2012
Analyst(s): Zorica B.

Analytical Method: Total Mercury in Water by Oxidation, Purge and Trap, and CVAFS (T00120 version 5)

Detection Limit: MDL = 0.04 ng Hg/L (based on 7 replicates of analytical blanks (98% confidence level)). The ML of 0.5 ng/L, as stated in Method 1631e, has been adopted for our laboratory to reflect occasional elevated bottle blanks (< 0.5 ng/L) observed in reused acid-cleaned Teflon bottles.

Estimated Uncertainty: The estimated uncertainty of this method has preliminarily been determined to be ± 13 % @ 95 % confidence at a concentration level of 0.5-1000 ng/L.

Results authorized by Dr. Robert J. Flett, Chief Scientist

QUALITY DATA				Mean of 3 Bubblers	Bubbler 1	Bubbler 2	Bubbler 3	
	Bubbler Blanks	Bubbler Blank Mean		1641	1556	1467	1901	
		Bubbler Blank (pg)		0.58	0.55	0.52	0.68	
	Standards			Gross Peak Area	Net Peak Area	Area Units/ ng		
		Hg STD Mean				2806396		
			Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)	Percent Recovery
	QC Samples	OPR mean (5.12 ng/L)		537107		5.15	0.03	101
		Baker QCS (1000 ng/L)	QCS-3	279794	0.10	991.14	0.00	99.1
	Method/Bottle Blanks	F90(washed Oct 29/12)	MBlk-1	7876	39.07	0.00	0.02	
		F95(washed Oct 29/12)	MBlk-2	12599	40.20	0.04	0.02	
		125mL glass bottle	MBlk-3	9711	39.79	0.01	0.02	
	Sample Spike Recovery	The Chute (RUDD171)	Sample-2-US	150872	31.17	1.70	0.02	
		Mean of Recoveries				99.08		99.1

Sample Details	Sample ID/Bottle Number	Date Sampled	Sample Type	Gross Peak Area	Sample vol. (ml)	Net Total Hg conc. (ng/L)	Reagent Hg added (ng/L)
Wabagishik	RUDD178	November 2, 2012		90481	35.97	0.87	0.02
Wabagishik	TVA27	November 2, 2012		85092	35.04	0.84	0.02
Third Falls	FR40	November 3, 2012		286977	42.70	2.38	0.01
Third Falls	FR102	November 3, 2012		236671	36.92	2.26	0.01
Third Falls	Flett7	November 3, 2012		271919	41.18	2.33	0.02
The Chute	FR226	November 3, 2012		153886	33.71	1.60	0.01
The Chute	RUDD171	November 3, 2012		150872	31.17	1.70	0.02
Wanatango	FR210	November 4, 2012		387062	32.06	4.29	0.01
Wanatango	Kelly34	November 4, 2012		395942	32.41	4.34	0.02

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* : See 'Comments' section above for discussion.
~ : Below our official detection limit for this analyte in this matrix.

This test report shall not be reproduced, except in full, without written approval of the laboratory.
Note: Results relate only to the items tested.

ISO/IEC 17025:2005 Accredited with the Canadian Association for Laboratory Accreditation

Lab Number	Sample Description	Sample Date	TP1 ug/L
T100885-0001	Marina Basin	26-Oct-12	24.5
T100885-0002	Marina Basin	31-Oct-12	27.1
T100885-0003	Chutes	03-Nov-12	8.5
T100885-0004	Wabagishik	02-Nov-12	11.9
T100885-0005	3rd Falls	03-Nov-12	8.9
T100885-0006	Wanatango	04-Nov-12	48.5
T100885-0007	LW1 4m	06-Nov-12	48.2
T100885-0008	LW2A 4m	06-Nov-12	57.9
T100885-0009	LW2B 1m off bottom	06-Nov-12	55.4
T100885-0010	LW3 4m	06-Nov-12	54.6
T100890-0001	Marter twp baseline	22-Nov-12	20.4
T100890-0002	Marter twp baseline	22-Nov-12	21.2
T100890-0003	Marter twp baseline dup 2	22-Nov-12	21
T100890-0004	Marter twp baseline dup 2	22-Nov-12	20.1
T100890-0005	McGraw Falls baseline upstream	22-Nov-12	8.1
T100890-0006	McGraw Falls baseline upstream	22-Nov-12	8
T100890-0007	McGraw Falls baseline downstream	22-Nov-12	15.2
T100890-0008	McGraw Falls replicate 1	22-Nov-12	8
T100890-0009	McGraw Falls Impoundment	22-Nov-12	15.1
T100890-0010	McGraw Falls Upstream 2	22-Nov-12	13.5

TP2 ug/L
23.7
28.9
8.1
12
8.9
46.9
50.4
54.5
57.4
52.4

Appendix D. Field Sheets

Field Data Sheet

Xeneca Power Developments - Baseline Water Quality Sampling Program

Facility Information

Facility Name: Wabagishik Rapids Date: 14 Apr. '12 Time: 14:10

Sample ID: Baseline Downstream Sample Co-ordinates: 17U 0451524, 5124082

Sampling Location (brief description): ~100 m upstream of Bay

Sampling Personnel

Company: HESL

Personnel: David Leeder, Clarke Heitman

Weather Conditions

Precipitation in the last 24 hours (mm rain): 0

Current conditions (e.g., snow, rain, overcast, sunny): Overcast

Wind direction and velocity: Westerly, < 5 km/hr

Field Measurements

Water depth at sample location (m): 1.5 m

Sample depth (m): 1.0 m

Dissolved Oxygen (mg/L): 12.23

Water Temp. (°C): 6.53

Conductivity (microS/cm): 138

pH: 7.22

Turbidity (NTU): 1.89

Equipment calibrated (date): 14 Apr. '12

Samples Collected

TSS and Dissolved Solids: ☑ Cations/Anions: ☑ Nutrients: ☑

Dissolved Organic Carbon: ☑ pH, Cond., Alk.: ☑ Metals (total): ☑

Low-level Mercury (total): ☑ Low-level Mercury (methyl): ☑ Frozen? (Y) / N

Low-level Phosphorus: ☑ Filtered? Y / (N) All samples in cooler less than 5°C? (Y) / N

Additional Comment / Observations

- Dup-1 collected @ same location.

Field Data Sheet

Xeneca Power Developments - Baseline Water Quality Sampling Program

Facility Information

Facility Name: WABAGISHIK Date: Aug 17 2012 Time: 14:40

Sample ID: DUP-1 / WABAGISHIK BASELINE Sample Co-ordinates: (16) 177 0451524 - 5124082

Sampling Location (brief description): upstream of river mouth of middle open into shallow bay

Sampling Personnel

Company: HESL

Personnel: Clarke Heatman Chuck Brady

Weather Conditions

Precipitation in the last 24 hours (mm rain):

Current conditions (e.g., snow, rain, overcast, sunny): overcast ~~light rain~~

Wind direction and velocity: ~~North East~~ South West

Field Measurements

Water depth at sample location (m): 0.25 Sample depth (m): 0.10

Dissolved Oxygen (mg/L): 7.26 Water Temp. (°C): 21.23

Conductivity (microS/cm): 265 pH: 7.99

Turbidity (NTU): 2.13 Equipment calibrated (date):

Samples Collected

TSS and Dissolved Solids: ☐ Cations/Anions: ☑ Nutrients: ☑

Dissolved Organic Carbon: ☑ pH, Cond., Alk.: ☐ Metals (total): ☑

Low-level Mercury (total): ☑ Low-level Mercury (methyl): ☐ Frozen? (Y)/N

Low-level Phosphorus: ☑ Filtered? (Y) N All samples in cooler less than 5°C? (Y) N

Additional Comment / Observations

Field Data Sheet

Xeneca Power Developments - Baseline Water Quality Sampling Program

Facility Information

Facility Name: WABAGISHIK Date: Nov 2 2012 Time: 14:17

Sample ID: WABAGISHIK — DUP-1 Sample Co-ordinates: 17T 0451535 5124074

Sampling Location (brief description): down mouth of river

Sampling Personnel

Company: Hesl

Personnel: Charles Hartman Chuck Brad

Weather Conditions

Precipitation in the last 24 hours (mm rain): Trace

Current conditions (e.g., snow, rain, overcast, sunny): overcast

Wind direction and velocity: [illegible]

Field Measurements

Water depth at sample location (m): 30 cm Sample depth (m): 30 cm

Dissolved Oxygen (mg/L): 9.30 Water Temp. (°C): 7.73

Conductivity (microS/cm): 312 pH: 8.06

Turbidity (NTU): 2.8 Equipment calibrated (date): Nov 2 2012

Samples Collected

TSS and Dissolved Solids: ☑ Cations/Anions: ☑ Nutrients: ☑

Dissolved Organic Carbon: ☑ pH, Cond., Alk.: ☑ Metals (total): ☑

Low-level Mercury (total): ☑ Low-level Mercury (methyl): ☑ Frozen? Y / N

Low-level Phosphorus: ☑ Filtered? Y / N All samples in cooler less than 5°C? (Y) N

Additional Comment / Observations

PARISH geomorphic

2500, Meadowpine Blvd. Suite 200 Address
Mississauga, Ontario, L5N 6C4
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(905) 877-9531 Telephone
(905) 877-4143 Fax
www.parishgeomorphic.com Internet

To: Xeneca Power Development Inc.

Date: 21/5/2013

From: Mark Wojda, EIT **Ref:** 01-12-72

Subject: Northern Rivers Hydroelectric Projects – TSS Results

As part of the geomorphic assessments of the hydroelectric development sites proposed by Xeneca Power Development Inc., water samples were obtained by Parish Geomorphic Limited (PGL) during the 2012 field season in order to improve understanding of sediment dynamics in the river systems. The samples have been tested by Maxxam Laboratories for total suspended solids (TSS) and the results are as follows:

Blanche River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
Upstream of Falls (PGL XS2)	26/10/2012	12
Downstream of Falls (Xeneca XX1)	25/10/2012	14

Frederick House River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
Upstream of Wanatango Falls (PGL XS-4)	20/10/2012	41
Downstream of Wanatango Falls (PGL XS3)	22/10/2012	50

Ivanhoe River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
The Chute (Xeneca XS-0)	29/09/2012	ND
Downstream of The Chute (PGL XS4)	01/10/2012	ND
Upstream of Third Falls (PGL XS-3)	17/10/2012	ND
Downstream of Third Falls (Xeneca XS3)	19/10/2012	ND

Kapuskasing River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
Upstream of Lapinigam Rapids (PGL XS-2)	22/09/2012	ND
Buchan Falls (Xeneca XS0)	22/09/2012	ND
Between Buchan Falls and Clouston Rapids (PGL XS-3)	25/09/2012	ND

Petawawa River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
Upstream of Big Eddy (PGL XS5)	15/11/2012	2

Vermillion River:

Sampling Location	Date Obtained	TSS Reading (mg/L)
Proposed dam site (Xeneca XS0)	29/11/2012	3
Downstream of Rapids (XS125)	28/11/2012	4

ND = Not detected
Note: Please refer to individual reports for cross-section positioning at each site