Annex IV

Surface Water Quality Studies

Contents

WESA
A Better Environment For Business

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February 25, 2011
Project No. CB8944-07

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
Petawawa (Big Eddy), Ontario

Dear Mr. Laratta:

This letter report summarizes the surface water monitoring program completed on May 31 and August 16, 2010 at Petawawa's Big Eddy site. 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 31 and August 16, 2010. As requested by Xeneca the onsite monitoring was conducted by Ontario Resources Management Group (ORMG) 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 (spring and summer) were conducted at four different surface water sampling locations (SW1 to SW4) at the Big Eddy site in 2010. 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: Petawawa (Big Eddy) Surface Water Locations and General Observations below. Field parameters (pH, conductivity, temperature, and dissolved oxygen) were measured and recorded at each sampling location using the 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. All coordinates for each sample location were recorded using a Garmin GPS 76 instrument.

ORMG collected surface water samples using clean laboratory-supplied bottles and submitted all samples to Paracel Laboratories (Paracel) of Ottawa, Ontario for analysis. A total of 47 chemical parameters were analyzed for each sample (please note that sulfide and mercury were only analyzed in the summer event). All samples were maintained at < 4°C from the time of sampling until delivery to Paracel. Full 'chain of custody' documentation accompanied the samples from each site to Paracel and is enclosed with this document.

All field parameters and analytical laboratory results can be found in Table 2: Petawawa (Big Eddy) Surface Water Chemistry enclosed with this document. Analytical results are compared to the Ontario Provincial Water Quality Objectives (PWQO, 1994), where available.

RESULTS

The GPS coordinates and general observations made by ORMG 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 moderate, the water colour was clear, and there were no odours associated with the samples.

Table 1: Petawawa (Big Eddy) Surface Water Locations and General Observations:

Surface Water Locations	UTM coordinates (Zone 18N)	General Observations			
		Water Level	Water Current	Water Colour	Water Odour
Spring – May 31, 2010					
SW1	E324738 N5085835	low	moderate	clear	none
SW2	E322600 N5085786	low	strong	clear	none
SW3	E320923 N5084229	low	strong	clear	none
Summer – August 16, 2010					
SW1	E324755 N5085844	low	moderate	clear	none
SW2	E322613 N5085787	low	moderate	clear	none
SW3	E320515 N5084048	low	moderate	clear	none

Surface water analytical results can be found in Table 2: Petawawa (Big Eddy) Surface Water Chemistry in comparison to the PWQO. Of the 47 parameters that were analyzed, a total of 28 parameters had concentrations equal to or less than the laboratory method detection limit (MDL) for the spring and summer sampling events. The parameters that had concentrations below the laboratory MDL included metals (e.g., arsenic, cadmium, chromium, mercury, nickel, zinc, etc), phosphorus (dissolved and total), phosphate, total suspended solids, sulphide, nitrate, nitrite, and carbonate alkalinity. In general, there was little variation in the concentrations between the spring and summer sampling event at each location. The sodium, calcium, magnesium, and potassium concentrations were each higher in the summer event compared to the spring event.

The lower concentration of these metal salt parameters in the spring compared to the summer is likely due to a higher level of dilution from snow melt water in the spring event.

Of the 47 parameters analyzed for the surface water samples, a total of 24 have PWQO values associated with them. Of these, no parameters analyzed from Petawawa's Big Eddy site exceeded their respective PWQO values. Laboratory certificates of analysis for surface water samples collected in 2010 are enclosed with this document.

CONCLUSION

A total of four surface water samples were collected in the spring and summer of 2010 and analyzed for 47 parameters at the Petawawa Big Eddy site. The parameter concentrations were generally low, especially those associated with potential anthropogenic sources (i.e., metals). All parameter concentrations were below their associated PWQO values.

The observations and results obtained by ORMG are representative of the conditions during the site visits made on May 31 and August 16, 2010 at Petawawa's Big Eddy 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

Julia LaRonde
Occupational Hygiene /
Environmental Technologist

Reviewed by:

Darryl Roberts

Darryl Roberts, Ph.D
Project Manager

Encl.

- Table 2: Petawawa (Big Eddy) Surface Water Chemistry
- Lab Report Reference No. 1023084 dated June 07, 2010
- Lab Report Reference No. 1023084 dated July 28, 2010
- Lab Report Reference No. 1034078 dated August 23, 2010
- Lab Report Reference No. 1035081 dated August 27, 2010

Ref: CB8944-07 February 25-2011 Big Eddy LetRept.doc

Table 2: Petawawa (Big Eddy) Surface Water Chemistry
CB8944-00-07

Sample Location	Sample Date	Total Alkalinity mg/L	Bicarbonate Alkalinity mg/L	Carbonate Alkalinity mg/L	pH	Total Phos. mg/L	Total Dissolved 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	Sulphur mg/L	Ferric Iron mg/L	Al µg/L	Sb ug/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	nv	75	20	100
MDL		5	5	5	0.05	0.01	0.01	10	2	0.02	0.1	1	0.1	0.05	1	1	0.1	0.2	1	0.5	1
SW1	31-May-10	11	11	<5	6.77	<0.01	<0.01	48	3	--	0.3	2	<0.1	<0.05	<1	4	--	<0.1	13	<0.5	<1
	16-Aug-10	12	12	<5	6.58	<0.01	<0.01	72	<50*	<0.02	0.3	2	<0.1	<0.05	<1	5	1.8	<0.2	10	<0.5	<1
SW2	31-May-10	10	10	<5	6.88	<0.01	<0.01	60	<2	--	0.3	<1	<0.1	<0.05	<1	4	--	<0.1	12	<0.5	<1
	16-Aug-10	13	13	<5	6.82	<0.01	<0.01	51	<50*	<0.02	0.3	1	<0.1	<0.05	<1	4	1.7	<0.2	11	<0.5	<1
SW3	31-May-10	11	11	<5	6.87	<0.01	<0.01	805	<2	--	0.3	<1	<0.1	<0.05	<1	3	--	<0.1	15	<0.5	<1
	16-Aug-10	13	13	<10	6.83	<0.01	<0.01	91	<50*	<0.02	0.3	1	<0.10	<0.05	<1	4	1.7	<0.2	10	<0.5	<1
SW4	31-May-10	10	10	<5	6.85	<0.01	<0.01	<40	<2	--	0.3	<1	0.1	<0.05	<1	4	--	0.1	11	<0.5	<1
	16-Aug-10	12	12	<5	6.75	<0.01	<0.01	66	<50*	<0.02	0.3	<1	<0.1	<0.05	<1	4	1.7	0.2	13	<0.5	<1

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: Petawawa (Big Eddy) Surface Water Chemistry
CB8944-00-07

Sample Location	Sample Date	Ba µg/L	Be µg/L	B µg/L	Cd µg/L	Ca ug/L	Cr ug/L	Co ug/L	Cu µg/L	Fe µg/L	Hg µg/L	Pb µg/L	Mg ug/L	Mn ug/L	Mo µg/L	Ni µg/L	K ug/L	Se ug/L	Ag ug/L	Na ug/L	Sr ug/L	Tl ug/L	Sn ug/L	Ti ug/L	W ug/L	U ug/L	V ug/L
	PWQO	nv	11	200	0.2	nv	1	0.9	5	300	0.2	1	nv	nv	40	25	nv	100	0.1	nv	nv	0.3	nv	nv	30	5	6
	MDL	5	0.5	10	0.1	100	1	0.5	0.5	100	0.1	0.1	200	5	1	1	100	1	0.1	200	10	0.1	5	5	10	0.1	1
SW1	31-May-10	19	<0.5	<10	<0.1	4,250	<1	<0.5	0.7	128	--	<0.1	1,410	17	<1	<1	615	<1	<0.1	1,780	28	<0.1	<5	<5	<10	<0.1	<1
	16-Aug-10	21	<0.5	<10	<0.1	4,990	<1	<0.5	0.6	131	<0.1	<0.1	1,610	21	<1	<1	622	<1	<0.1	2,020	35	<0.1	<5	<5	<10	<0.1	<1
SW2	31-May-10	18	<0.5	<10	<0.1	4,030	<1	<0.5	1.1	131	--	<0.1	1,310	18	<1	<1	571	<1	<0.1	1,430	28	<0.1	<5	<5	<10	<0.1	<1
	16-Aug-10	21	<0.5	<10	<0.1	4,830	<1	<0.5	0.9	130	<0.1	0.1	1,510	20	<1	<1	605	<1	<0.1	1,690	33	<0.1	<5	<5	<10	<0.1	<1
SW3	31-May-10	19	<0.5	<10	<0.1	4,050	<1	<0.5	2.6	137	--	<0.1	1,330	20	<1	<1	569	<1	<0.1	1,320	27	<0.1	<5	<5	<10	<0.1	<1
	16-Aug-10	21	<0.5	<10	<0.1	4,900	<1	<0.5	0.8	140	<0.1	<0.1	1,520	20	<1	<1	610	<1	<0.1	1,880	33	<0.1	<5	<5	<10	<0.1	<1
SW4	31-May-10	19	<0.5	<10	<0.1	4,020	<1	<0.5	0.6	126	--	<0.1	1,300	20	<1	<1	571	<1	<0.1	1,270	27	<0.1	<5	<5	<10	<0.1	<1
	16-Aug-10	20	<0.5	<10	<0.1	4,650	<1	<0.5	0.9	152	<0.1	0.2	1,490	26	<1	<1	610	<1	<0.1	1,520	33	<0.1	<5	<5	<10	<0.1	<1

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: Petawawa (Big Eddy) Surface Water Chemistry
CB8944-00-07

			Field Measurements				
		Zn	pH	Temp.	Cond.	DO	Ferrous Iron
		ug/L		°C	uS/cm	mg/L	mg/L
	PWQO	30	6.5-8.5				
	MDL	10					
Sample Location	Sample Date						
SW1	31-May-10	<10	6.37	21.59	39	8.84	0.05
	16-Aug-10	<10	7.22	22.33	83.1	86.4	0.02
SW2	31-May-10	<10	6.37	22.46	40	8.74	0.13
	16-Aug-10	<10	7.24	23.24	84.7	7.84	0.07
SW3	31-May-10	<10	6.11	21.68	36	8.43	0.07
	16-Aug-10	<10	--	--	--	--	--
SW4	31-May-10	<10	6.19	21.50	36	8.35	<0.02
	16-Aug-10	<10	7.04	23.75	85.6	7.4	0.02

Notes:

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

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Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com
www.paracellabs.com

Subcontracted Analysis

WESA Inc. (Carp)
P.O. Box 430, 3108 Carp Rd.
Carp, ON K7K 1Z7
Attn: Julia LaRonde

Tel: (613) 839-3053
Fax: (613) 839-5376

Paracel Report No.: **1023084**
Client Project(s): **CB8944-00-07**
Client PO:
Reference: **#10-170**
CoC Number: **71483**

Order Date: 01-Jun-10
Report Date: 7-Jun-10

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
1023084-01	SW-1	Sulfur, water
1023084-02	SW-2	Sulfur, water
1023084-03	SW-3	Sulfur, water
1023084-04	SW-4	Sulfur, water

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B10-15085

Report To:

Paracel Laboratories Ltd.
2319 St. Laurent Blvd. Unit 300
Ottawa, ON, K1G 4J8
Attention: Dale Robertson

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa, Ontario, K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 01-Jun-10
DATE REPORTED: 04-Jun-10
SAMPLE MATRIX: Water

JOB/PROJECT NO.: 1023084
P.O. NUMBER:
WATERWORKS NO.

	Parameter:		Sulphur				
	Units:		mg/L				
	M.D.L.:		0.1				
	Reference Method:		SM 3120				
	Date/Site Analyzed:		04-Jun-10/O				
Client I.D.	**Sample I.D.**	**Date Collected**					
SW-1	B10-15085-1	31-May-10	1.8				
SW-2	B10-15085-2	31-May-10	1.7				
SW-3	B10-15085-3	31-May-10	1.7				
SW-4	B10-15085-4	31-May-10	1.7				

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,P-Peterborough,M-Moncton

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Certificate of Analysis

WESA Inc. (Carp)
P.O. Box 430, 3108 Carp Rd.
Carp, ON K7K 1Z7
Attn: Julia LaRonde

Phone: (613) 839-3053
Fax: (613) 839-5376

Client PO:
Project: CB8944-00-07
Custody: 71483

Report Date: 28-Jul-2010
Order Date: 1-Jun-2010
Revised Report **Order #: 1023084**

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1023084-01	SW-1
1023084-02	SW-2
1023084-03	SW-3
1023084-04	SW-4

Approved By: Mark Foto

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

PARACEL LABORATORIES LTD.

Order #: 1023084

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date:1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, bicarbonate	calculated from EPA 310.1 - Titration	7-Jun-10	7-Jun-10
Alkalinity, carbonate	calculated from EPA 310.1 - Titration	7-Jun-10	7-Jun-10
Alkalinity, total	EPA 310.1 - Titration	3-Jun-10	4-Jun-10
Anions	EPA 300.1 - IC	7-Jun-10	7-Jun-10
Ferric Iron	Calculation	8-Jun-10	8-Jun-10
Metals, low level	EPA 200.8 - ICP-MS	9-Jun-10	9-Jun-10
pH	EPA 150.1 - pH probe	4-Jun-10	4-Jun-10
Phosphorus, total	EPA 365.4 - Auto Colour, digestion	2-Jun-10	3-Jun-10
Phosphorus, total dissolved	EPA 365.4; IC, filtration	3-Jun-10	3-Jun-10
Solids, dissolved	EPA SM 2540C - gravimetric, filtration	3-Jun-10	4-Jun-10
Solids, total suspended	SM 2540D - Gravimetric	2-Jun-10	2-Jun-10
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	2-Jun-10	3-Jun-10

PARACEL LABORATORIES LTD.

Order #: 1023084

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date:1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

	Client ID:	SW-1	SW-2	SW-3	SW-4
	Sample Date:	31-May-10	31-May-10	31-May-10	31-May-10
	Sample ID:	1023084-01	1023084-02	1023084-03	1023084-04
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Alkalinity, total	5 mg/L	11	10	11	10
Alkalinity, bicarbonate	5 mg/L	11	10	11	10
Alkalinity, carbonate	5 mg/L	<5	<5	<5	<5
pH	0.05 pH Units	6.77	6.88	6.87	6.85
Phosphorus, total	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Phosphorus, total dissolved	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	10 mg/L	48	60	805	<40
Total Suspended Solids	2 mg/L	3	<2	<2	<2
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	0.3	0.3	0.3
Anions					
Chloride	1 mg/L	2	<1	<1	<1
Nitrate as N	0.1 mg/L	<0.1	<0.1	<0.1	0.1
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05
Phosphate as P	1 mg/L	<1	<1	<1	<1
Sulphate	1 mg/L	4	4	3	4
Metals					
Ferric Iron	0.5 mg/L	<0.1 [3]	<0.1 [3]	<0.1 [3]	0.1 [3]
Aluminum	1 ug/L	13	12	15	11
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	5 ug/L	19	18	19	19
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Calcium	100 ug/L	4250	4030	4050	4020
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Copper	0.5 ug/L	0.7	1.1	2.6	0.6
Iron	100 ug/L	128	131	137	126
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Magnesium	200 ug/L	1410	1310	1330	1300

PARACEL LABORATORIES LTD.

Order #: 1023084

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date:1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

	Client ID:	SW-1	SW-2	SW-3	SW-4
	Sample Date:	31-May-10	31-May-10	31-May-10	31-May-10
	Sample ID:	1023084-01	1023084-02	1023084-03	1023084-04
	MDL/Units	Water	Water	Water	Water
Manganese	5 ug/L	17	18	20	20
Molybdenum	1 ug/L	<1	<1	<1	<1
Nickel	1 ug/L	<1	<1	<1	<1
Potassium	100 ug/L	615	571	569	571
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	1780	1430	1320	1270
Strontium	10 ug/L	28	28	27	27
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Tin	5 ug/L	<5	<5	<5	<5
Titanium	5 ug/L	<5	<5	<5	<5
Tungsten	10 ug/L	<10	<10	<10	<10
Uranium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Vanadium	1 ug/L	<1	<1	<1	<1
Zinc	10 ug/L	<10	<10	<10	<10

PARACEL LABORATORIES LTD.

Order #: 1023084

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date:1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Phosphate as P	ND	1	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Alkalinity, bicarbonate	ND	5	mg/L						
Alkalinity, carbonate	ND	5	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Phosphorus, total dissolved	ND	0.01	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Total Suspended Solids	ND	2	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Metals									
Aluminum	ND	1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	5	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10.0	ug/L						
Cadmium	ND	0.1	ug/L						
Calcium	ND	100	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Iron	ND	100	ug/L						
Lead	ND	0.1	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Molybdenum	ND	1	ug/L						
Nickel	ND	1	ug/L						
Potassium	ND	100	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Strontium	ND	10	ug/L						
Thallium	ND	0.1	ug/L						
Tin	ND	5	ug/L						
Titanium	ND	5	ug/L						
Tungsten	ND	10	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	1	ug/L						
Zinc	ND	10	ug/L						

PARACEL LABORATORIES LTD.

Order #: 1023084

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date: 1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L	ND				10	
Nitrate as N	ND	0.1	mg/L	ND				20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Phosphate as P	ND	1	mg/L	ND				20	
Sulphate	3.40	1	mg/L	3.44			1.2	10	
General Inorganics									
Alkalinity, total	10.6	5	mg/L	11.0			3.5	14	
Alkalinity, bicarbonate	11	5	mg/L	11			3.5	14	
Alkalinity, carbonate	ND	5	mg/L	ND				14	
pH	6.97	0.05	pH Units	6.98			0.1	10	
Phosphorus, total	2.78	0.05	mg/L	2.76			1.0	10	
Phosphorus, total dissolved	ND	0.01	mg/L	ND				10	
Total Dissolved Solids	240	10	mg/L	233			2.8	10	
Total Suspended Solids	10.8	2	mg/L	10.2			5.7	10	
Total Kjeldahl Nitrogen	17.5	1.0	mg/L	16.7			4.8	10	
Metals									
Aluminum	17.6	1	ug/L	20.7			16.3	27	
Antimony	0.55	0.5	ug/L	0.58			5.3	26	
Arsenic	10.0	1	ug/L	9.7			3.1	29	
Barium	7.8	5	ug/L	7.8			0.1	34	
Beryllium	ND	0.5	ug/L	ND				25	
Boron	256	10.0	ug/L	250			2.4	33	
Cadmium	ND	0.1	ug/L	ND				33	
Calcium	12200	100	ug/L	11700			3.8	30	
Chromium	ND	1	ug/L	ND				32	
Cobalt	ND	0.5	ug/L	ND				32	
Copper	6.29	0.5	ug/L	6.09			3.3	32	
Iron	ND	100	ug/L	ND				32	
Lead	ND	0.1	ug/L	ND				32	
Magnesium	3520	200	ug/L	3460			1.7	30	
Manganese	7.0	5	ug/L	7.0			0.8	29	
Molybdenum	1.1	1	ug/L	ND				29	QR-01
Nickel	7.8	1	ug/L	7.5			3.2	29	
Potassium	664	100	ug/L	639			3.8	28	
Selenium	ND	1	ug/L	ND				28	
Silver	ND	0.1	ug/L	ND				28	
Sodium	4270	200	ug/L	4200			1.7	27	
Strontium	44	10	ug/L	44			0.1	27	
Thallium	ND	0.1	ug/L	ND				27	
Tin	ND	5	ug/L	ND				27	
Titanium	ND	5	ug/L	ND				27	
Tungsten	ND	10	ug/L	ND				25	
Uranium	ND	0.1	ug/L	ND				27	
Vanadium	1.0	1	ug/L	ND				27	
Zinc	ND	10	ug/L	ND				27	

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date: 1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.37	1	mg/L	ND	93.7	78-112			
Nitrate as N	0.93	0.1	mg/L	ND	93.0	81-112			
Nitrite as N	0.938	0.05	mg/L	ND	93.8	76-107			
Phosphate as P	4.86	1	mg/L	ND	97.2	72-131			
Sulphate	8.90	1	mg/L	ND	89.0	75-111			
General Inorganics									
Phosphorus, total	0.463	0.01	mg/L	ND	92.6	80-120			
Phosphorus, total dissolved	0.47	0.01	mg/L	ND	94.1	80-120			
Total Dissolved Solids	107	10	mg/L	ND	107	75-125			
Total Suspended Solids	19.4	2	mg/L	ND	97.0	75-125			
Total Kjeldahl Nitrogen	2.00	0.1	mg/L	ND	100	81-126			
Metals									
Aluminum	38.5		ug/L	ND	77.0	74-130			
Antimony	49.7		ug/L	ND	99.4	78-126			
Arsenic	46.1		ug/L	ND	92.2	83-119			
Barium	45.6		ug/L	ND	91.3	83-116			
Beryllium	51.3		ug/L	ND	103	72-132			
Boron	50		ug/L	ND	101	71-128			
Cadmium	45.7		ug/L	ND	91.4	78-119			
Calcium	1060		ug/L	ND	106	64-127			
Chromium	45.9		ug/L	ND	91.8	80-124			
Cobalt	46.0		ug/L	ND	92.1	78-125			
Copper	46.1		ug/L	ND	92.2	75-123			
Iron	976		ug/L	ND	97.6	66-119			
Lead	45.9		ug/L	ND	91.9	77-126			
Magnesium	963		ug/L	ND	96.3	75-131			
Manganese	45.9		ug/L	ND	91.9	79-123			
Molybdenum	45.8		ug/L	ND	91.5	82-119			
Nickel	45.3		ug/L	ND	90.6	78-119			
Potassium	999		ug/L	ND	99.9	70-129			
Selenium	46.5		ug/L	ND	93.1	81-125			
Silver	45.5		ug/L	ND	91.0	70-128			
Sodium	941		ug/L	ND	94.1	67-132			
Strontium	46		ug/L	ND	91.9	88-114			
Thallium	48.4		ug/L	ND	96.8	82-127			
Tin	44.9		ug/L	ND	89.8	75-123			
Titanium	46.5		ug/L	ND	93.1	84-118			
Tungsten	44.6		ug/L	ND	89.1	70-130			
Uranium	46.2		ug/L	ND	92.4	70-131			
Vanadium	46.0		ug/L	ND	92.1	82-123			
Zinc	38		ug/L	ND	75.3	78-130			QS-02

Certificate of Analysis

Report Date: 28-Jul-2010
Order Date:1-Jun-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Sample and QC Qualifiers Notes

1- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

2- QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

3- Z-01 : Ferric Iron results are based on field measurements of Ferrous Iron provided by client.

Sample Data Revisions

None

Work Order Revisions/Comments:

Revision 1 - This report includes additional parameters.

Other Report Notes:

n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

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Chain of Custody

(lab use only)

No. 71483

Reg. Drinking Water

Client Name: WESA Inc	Project Ref: CB8944-00-07	Waterworks Name:	Page 1 of 1
Contact Name: Julia LaRonde	Quote # #10-170	Waterworks Number:	Sample Taken by:
Address: 3108 Carp Rd Carp, ON K0A 1L0	PO #	Address:	Print Name: K BEATTY
	E-mail Address: JLaronde@wesa.ca	After hours Contact:	Signature: K Beatty
Telephone: 613-839-3053 ex 251	Fax: 613-839-5376	Public Health Unit:	TAT: [ ] 1-day [ ] 2-day [✓] Reg.

Matrix Types: S–Soil/Sed. GW–Ground Water SW–Surface Water SS–Storm/Sanitary Sewer DW-Drinking Water RDW-Regulated Drinking Water P- Paint A-Air O-Other

Samples submitted under: (Indicate ONLY one)
☐ O. Reg 153 (511) Table ___ ☐ O. Reg 170/03 ☐ O. Reg 318/08 ☐ Private well
☐ CCME ____ ☐ O. Reg 243/07 ☐ O. Reg 319/08 ☐ Other: ____

Type of DW Sample: R = Raw; T = Treated; D = Distribution
Location Types: S = Surface Water; G = Ground Water

Paracel Order Number: 1023084

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: Quote #10-170 ✓	Ferrous Iron Field Result mg/L
1	SW-1	SW	-	S	3	31May10	1240	-	✓	0.05
2	SW-2	SW	-	S	3	31May10	1438	-	✓	0.13
3	SW-3	SW	-	S	3	31May10	1504	-	✓	0.07
4	SW-4	SW	-	S	3	31May10	1528	-	✓	0.00
5										
6										
7										
8										
9										
10										

Comments: * See Dale + Shawn (Big Eddy)

Preservation Verification: pH ____ Temperature ____
Verified by: ____

Relinquished By (Print & Sign): Kathryn Reburn BSc, MES

Date/Time: June 1, 2010 0934

Lab Use Only:

Received By Driver/Depot:	Received at Lab: RPA	Verified By:
Date/Time:	Date/Time: June 1/10 0934	Date/Time: June 1/10 1405

ChainOfCustody Rev 2.0, January 2010

Review Items

Lab Number	Analysis	Analyte	Exception
			Default Report (not modified)
			VERSION 6.04:2010
	Alkalinity, bicarbonate	(Water)	Special Units: (mg/L)
	Alkalinity, carbonate	(Water)	Special Units: (mg/L)
	Alkalinity, total	(Water)	Special Units: (mg/L)
	Aluminum (low level) ICP-MS	(Water)	Special Units: (ug/L)
	Antimony (low level) ICPMS	(Water)	Special Units: (ug/L)
	Arsenic - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Barium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Beryllium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Boron - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Cadmium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Calcium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Chloride by IC	(Water)	Special Units: (mg/L)
	Chromium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Cobalt - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Copper - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Ferric Iron - calculated	(Water)	Special Units: (mg/L)
	Ferrous Iron	(Water)	Special Units: (mg/L)
	Iron - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Lead - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Magnesium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Manganese - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Molybdenum - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Nickel - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Nitrate as N by IC	(Water)	Special Units: (mg/L)
	Nitrite as N by IC	(Water)	Special Units: (mg/L)
	pH	(Water)	Special Units: (pH Units)
	Phosphate as P by IC	(Water)	Special Units: (mg/L)
	Phosphorus, total (water)	(Water)	Special Units: (mg/L)
	Phosphorus, total dissolved	(Water)	Special Units: (mg/L)
	Potassium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Selenium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Silver - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Sodium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Solids, total dissolved	(Water)	Special Units: (mg/L)
	Solids, total suspended	(Water)	Special Units: (mg/L)
	Strontium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Sulfur, water	(Water)	Special Units: (% by Wt.)
	Sulphate by IC	(Water)	Special Units: (mg/L)
	Thallium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Tin - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Titanium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Total Kjeldahl Nitrogen, water	(Water)	Special Units: (mg/L)
	Tungsten - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Uranium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Vanadium - (low level) ICPMS	(Water)	Special Units: (ug/L)
	Zinc - (low level) ICPMS	(Water)	Special Units: (ug/L)
1007111-BS1	Zinc - (low level) ICPMS	Zinc	Exceeds lower control limit
1007111-BS1	Zinc - (low level) ICPMS	Zinc	QS-02: Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Review Items

Lab Number	Analysis	Analyte	Exception
1007111-DUP1	Molybdenum - (low level) ICPMS	Molybdenum	QR-01: Duplicate RPD is high, however, the sample result is less than 10x the MDL.
1023084-01	Ferric Iron - calculated		Sampled->Prepared > 7.00 days
1023084-01	Ferric Iron - calculated	Ferric Iron	Z-01: Ferric Iron results are based on field measurements of Ferrous Iron provided by client.
1023084-01	Nitrite as N by IC		Sampled->Analyzed > 7.00 days
1023084-01	Phosphate as P by IC		REV 6: Revision 1 - This report includes additional parameters.
1023084-02	Ferric Iron - calculated		Sampled->Prepared > 7.00 days
1023084-02	Ferric Iron - calculated	Ferric Iron	Z-01: Ferric Iron results are based on field measurements of Ferrous Iron provided by client.
1023084-02	Nitrite as N by IC		Sampled->Analyzed > 7.00 days
1023084-03	Ferric Iron - calculated		Sampled->Prepared > 7.00 days
1023084-03	Ferric Iron - calculated	Ferric Iron	Z-01: Ferric Iron results are based on field measurements of Ferrous Iron provided by client.
1023084-03	Nitrite as N by IC		Sampled->Analyzed > 7.00 days
1023084-04	Ferric Iron - calculated		Sampled->Prepared > 7.00 days
1023084-04	Ferric Iron - calculated	Ferric Iron	Z-01: Ferric Iron results are based on field measurements of Ferrous Iron provided by client.
1023084-04	Nitrite as N by IC		Sampled->Analyzed > 7.00 days

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Certificate of Analysis

WESA Inc. (Carp)
P.O. Box 430, 3108 Carp Rd.
Carp, ON K7K 1Z7
Attn: Julia LaRonde

Phone: (613) 839-3053
Fax: (613) 839-5376

Client PO:
Project: CB8944-00-07
Custody: 73171

Report Date: 23-Aug-2010
Order Date: 17-Aug-2010
Order #: 1034078

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1034078-01	SW-1
1034078-02	SW-2
1034078-03	SW-3
1034078-04	SW-4

Approved By:

Dale Robertson, BSc
Laboratory Director

PARACEL LABORATORIES LTD.

Order #: 1034078

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, bicarbonate	calculated from EPA 310.1 - Titration	23-Aug-10	23-Aug-10
Alkalinity, carbonate	calculated from EPA 310.1 - Titration	23-Aug-10	23-Aug-10
Alkalinity, total	EPA 310.1 - Titration	23-Aug-10	23-Aug-10
Anions	EPA 300.1 - IC	18-Aug-10	18-Aug-10
Ferric Iron	Calculation	23-Aug-10	23-Aug-10
Metals, low level	EPA 200.8 - ICP-MS	19-Aug-10	19-Aug-10
pH	EPA 150.1 - pH probe	19-Aug-10	19-Aug-10
Phosphorus, total	EPA 365.4 - Auto Colour, digestion	23-Aug-10	23-Aug-10
Phosphorus, total dissolved	EPA 365.4; IC, filtration	23-Aug-10	23-Aug-10
Solids, dissolved	EPA SM 2540C - gravimetric, filtration	17-Aug-10	19-Aug-10
Solids, total suspended	SM 2540D - Gravimetric	17-Aug-10	18-Aug-10
Sulphide	SM 4500SE - Colourimetric	17-Aug-10	17-Aug-10
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	23-Aug-10	23-Aug-10

PARACEL LABORATORIES LTD.

Order #: 1034078

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

	Client ID:	SW-1	SW-2	SW-3	SW-4
	Sample Date:	16-Aug-10	16-Aug-10	16-Aug-10	16-Aug-10
	Sample ID:	1034078-01	1034078-02	1034078-03	1034078-04
	MDL/Units	Water	Water	Water	Water
General Inorganics					
Alkalinity, total	5 mg/L	12	13	13	12
Alkalinity, bicarbonate	5 mg/L	12	13	13	12
Alkalinity, carbonate	5 mg/L	<5	<5	<10	<5
pH	0.05 pH Units	6.58	6.82	6.83	6.75
Phosphorus, total	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Phosphorus, total dissolved	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Total Dissolved Solids	10 mg/L	72	51	91	66
Total Suspended Solids	2 mg/L	<50 [1]	<50 [1]	<50 [1]	<50 [1]
Sulphide	0.02 mg/L	<0.02	<0.02	<0.02	<0.02
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	0.3	0.3	0.3
Anions					
Chloride	1 mg/L	2	1	1	<1
Nitrate as N	0.1 mg/L	<0.1	<0.1	<0.1	<0.1
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05
Phosphate as P	1 mg/L	<1	<1	<1	<1
Sulphate	1 mg/L	5	4	4	4
Metals					
Ferric Iron	0.2 mg/L	<0.2	<0.2	<0.2	0.2
Aluminum	1 ug/L	10	11	10	13
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	<1	<1
Barium	5 ug/L	21	21	21	20
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Calcium	100 ug/L	4990	4830	4900	4650
Chromium	1 ug/L	<1	<1	<1	<1
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Copper	0.5 ug/L	0.6	0.9	0.8	0.9
Iron	100 ug/L	131	130	140	152
Lead	0.1 ug/L	<0.1	0.1	<0.1	0.2
Magnesium	200 ug/L	1610	1510	1520	1490
Manganese	5 ug/L	21	20	20	26

PARACEL LABORATORIES LTD.

Order #: 1034078

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

	Client ID:	SW-1	SW-2	SW-3	SW-4
	Sample Date:	16-Aug-10	16-Aug-10	16-Aug-10	16-Aug-10
	Sample ID:	1034078-01	1034078-02	1034078-03	1034078-04
	MDL/Units	Water	Water	Water	Water
Metals (continued)					
Molybdenum	1 ug/L	<1	<1	<1	<1
Nickel	1 ug/L	<1	<1	<1	<1
Potassium	100 ug/L	622	605	610	610
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	2020	1690	1880	1520
Strontium	10 ug/L	35	33	33	33
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Tin	5 ug/L	<5	<5	<5	<5
Titanium	5 ug/L	<5	<5	<5	<5
Tungsten	10 ug/L	<10	<10	<10	<10
Uranium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Vanadium	1 ug/L	<1	<1	<1	<1
Zinc	10 ug/L	<10	<10	<10	<10

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Phosphate as P	ND	1	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Phosphorus, total dissolved	ND	0.01	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Total Suspended Solids	ND	2	mg/L						
Sulphide	ND	0.02	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Metals									
Aluminum	ND	1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	5	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10.0	ug/L						
Cadmium	ND	0.1	ug/L						
Calcium	ND	100	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Iron	ND	100	ug/L						
Lead	ND	0.1	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Molybdenum	ND	1	ug/L						
Nickel	ND	1	ug/L						
Potassium	ND	100	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Strontium	ND	10	ug/L						
Thallium	ND	0.1	ug/L						
Tin	ND	5	ug/L						
Titanium	ND	5	ug/L						
Tungsten	ND	10	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	1	ug/L						
Zinc	ND	10	ug/L						

PARACEL LABORATORIES LTD.

Order #: 1034078

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	236	1	mg/L	236			0.1	10	
Nitrate as N	10.5	0.1	mg/L	10.5			0.1	20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Phosphate as P	ND	1	mg/L	ND				20	
Sulphate	131	1	mg/L	131			0.5	10	
General Inorganics									
pH	6.61	0.05	pH Units	6.58			0.5	10	
Phosphorus, total	ND	0.01	mg/L	ND				10	
Phosphorus, total dissolved	ND	0.01	mg/L	ND				10	
Total Dissolved Solids	280	20	mg/L	285			1.7	10	
Total Suspended Solids	ND	2	mg/L	ND				10	
Sulphide	ND	0.02	mg/L	ND				10	
Total Kjeldahl Nitrogen	0.34	0.1	mg/L	0.32			4.9	10	
Metals									
Aluminum	8.6	1	ug/L	8.7			0.9	27	
Antimony	ND	0.5	ug/L	ND				26	
Arsenic	ND	1	ug/L	ND				29	
Barium	19.8	5	ug/L	19.5			1.8	34	
Beryllium	ND	0.5	ug/L	ND				25	
Boron	ND	10.0	ug/L	ND				33	
Cadmium	ND	0.1	ug/L	ND				33	
Calcium	4300	100	ug/L	4370			1.6	30	
Chromium	ND	1	ug/L	ND				32	
Cobalt	ND	0.5	ug/L	ND				32	
Copper	0.97	0.5	ug/L	1.01			3.5	32	
Iron	ND	100	ug/L	ND				32	
Lead	ND	0.1	ug/L	ND				32	
Magnesium	1390	200	ug/L	1410			1.7	30	
Manganese	15.0	5	ug/L	15.2			1.4	29	
Molybdenum	ND	1	ug/L	ND				29	
Nickel	ND	1	ug/L	ND				29	
Potassium	605	100	ug/L	620			2.4	28	
Selenium	ND	1	ug/L	ND				28	
Silver	ND	0.1	ug/L	ND				28	
Sodium	1330	200	ug/L	1370			3.1	27	
Strontium	32	10	ug/L	32			0.7	27	
Thallium	ND	0.1	ug/L	ND				27	
Tin	ND	5	ug/L	ND				27	
Titanium	ND	5	ug/L	ND				27	
Tungsten	ND	10	ug/L	ND				25	
Uranium	ND	0.1	ug/L	ND				27	
Vanadium	ND	1	ug/L	ND				27	
Zinc	ND	10	ug/L	ND				27	

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	8.49	1	mg/L	ND	84.9	78-112			
Nitrate as N	1.02	0.1	mg/L	ND	102	81-112			
Nitrite as N	0.864	0.05	mg/L	ND	86.4	76-107			
Phosphate as P	4.48	1	mg/L	ND	89.6	72-131			
Sulphate	8.95	1	mg/L	ND	89.5	75-111			
General Inorganics									
Phosphorus, total	0.487	0.01	mg/L	ND	97.3	80-120			
Phosphorus, total dissolved	0.49	0.01	mg/L	ND	97.3	80-120			
Total Dissolved Solids	104	10	mg/L	ND	104	75-125			
Total Suspended Solids	22.0	2	mg/L	ND	110	75-125			
Sulphide	0.52	0.02	mg/L	ND	104	79-115			
Total Kjeldahl Nitrogen	2.01	0.1	mg/L	ND	101	81-126			
Metals									
Aluminum	48.8		ug/L	ND	97.6	74-130			
Antimony	52.5		ug/L	ND	105	78-126			
Arsenic	49.8		ug/L	ND	99.5	83-119			
Barium	50.0		ug/L	ND	100	83-116			
Beryllium	43.4		ug/L	ND	86.7	72-132			
Boron	45		ug/L	ND	89.6	71-128			
Cadmium	48.9		ug/L	ND	97.9	78-119			
Calcium	1160		ug/L	ND	116	64-127			
Chromium	51.3		ug/L	ND	103	80-124			
Cobalt	50.9		ug/L	ND	102	78-125			
Copper	51.4		ug/L	ND	103	75-123			
Iron	1170		ug/L	ND	117	66-119			
Lead	52.7		ug/L	ND	105	77-126			
Magnesium	1000		ug/L	ND	100	75-131			
Manganese	50.6		ug/L	ND	101	79-123			
Molybdenum	49.1		ug/L	ND	98.2	82-119			
Nickel	50.5		ug/L	ND	101	78-119			
Potassium	983		ug/L	ND	98.3	70-129			
Selenium	51.6		ug/L	ND	103	81-125			
Silver	48.2		ug/L	ND	96.3	70-128			
Sodium	964		ug/L	ND	96.4	67-132			
Strontium	50		ug/L	ND	100	88-114			
Thallium	59.5		ug/L	ND	119	82-127			
Tin	49.7		ug/L	ND	99.3	75-123			
Titanium	51.6		ug/L	ND	103	84-118			
Tungsten	48.2		ug/L	ND	96.4	70-130			
Uranium	50.0		ug/L	ND	99.9	70-131			
Vanadium	50.9		ug/L	ND	102	82-123			
Zinc	50		ug/L	ND	100	78-130			

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Order #: 1034078

Certificate of Analysis

Report Date: 23-Aug-2010
Order Date:17-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Sample and QC Qualifiers Notes

1 - GEN01 : Elevated Reporting Limits due to limited sample volume.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

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800-749-1947
f: 613-731-9064
e: paracel@paracellabs.com

Chain of Custody

(lab use only)

No. 73171

Page 1 of 1

Client Name: WESA Inc.	Project Ref: CB8944-00-07	Reg. Drinking Water / Waterworks Name:	Sample Taken by:
Contact Name: Julia LaRonde	Quote # 10-170	Waterworks Number:	Print Name: BOB LAORANCHE
Address: 3108 Carp Rd. Carp, ON K0A1L0	PO #	Address:	Signature:
Telephone: 613-839-3053	E-mail Address: jlaronde@wesa.ca	After hou Contact:	TAT: [ ] 1-day [ ] 2-day [X] Reg.
	Fax: 613-839-5376	Public Health Unit:	

Matrix Types: S–Soil/Sed. GW–Ground Water (SW–Surface Water) SS–Storm/Sanitary Sewer DW-Drinking Water RDW-Regulated Drinking Water P- Paint A-Air O-Other

Samples submitted under: (Indicate ONLY one)
☐ O. Reg 153 (511) Table __ ☐ O. Reg 170/03 ☐ O. Reg 318/08 ☐ Private well
☐ CCME ____ ☐ O. Reg 243/07 ☐ O. Reg 319/08 ☐ Other: ____

Type of DW Sample: R = Raw; T = Treated; D = Distribution
Location Types: (S = Surface Water); G = Ground Water

Paracel Order Number: 1034078

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: Quote #10-170			Required Analyses: Ferrous Iron (Fe2+) Field Result					
1	SW-1	SW	-	S	4	16/08/10	9:20 AM	-	✓			.02					
2	SW-2	SW	-	S	4	16/08/10	10:00 AM	-	✓			.07					
3	SW-3	SW	-	S	4	16/08/10	10:30 AM	-	✓			.00					
4	SW-4	SW	-	S	4	16/08/10	11:00 AM	-	✓			.02					
5																	
6																	
7																	
8																	
9																	
10																	

Comments: *See Dale or Shawn* (Big Eddy)

Preservation Verification: pH: ____ Temperature ____
Verified by: ____

Relinquished By (Print & Sign): K Kilducka MD

Date/Time: 17/08/10 10:10

Lab Use Only

Received By Driver/Depot:	Received at Lab:	Verified By:
Date/Time:	Date/Time:	Date/Time:

ChainOfCustody Rev 2.0. January 2010

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Certificate of Analysis

WESA Inc. (Carp)
P.O. Box 430, 3108 Carp Rd.
Carp, ON K7K 1Z7
Attn: Julia LaRonde

Phone: (613) 839-3053
Fax: (613) 839-5376

Client PO:
Project: CB8944-00-07
Custody: 73171

Report Date: 27-Aug-2010
Order Date: 24-Aug-2010
Order #: 1035081

This Certificate of Analysis contains analytical data applicable to the following samples submitted:

Paracel ID	Client ID
1035081-01	SW-1
1035081-02	SW-2
1035081-03	SW-3
1035081-04	SW-4

Approved

Dale Robertson, BSc
Laboratory Director

PARACEL LABORATORIES LTD.

Order #: 1035081

Certificate of Analysis

Report Date: 27-Aug-2010
Order Date:24-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO: Project Description: CB8944-00-07

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Mercury	EPA 245.1 - Cold Vapour AA	25-Aug-10	25-Aug-10

Sample Data Revisions
None

Work Order Revisions/Comments:
None

Other Report Notes:
n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

PARACEL LABORATORIES LTD.

Order #: 1035081

Certificate of Analysis

Report Date: 27-Aug-2010
Order Date:24-Aug-2010

Client: **WESA Inc. (Carp)**
Client PO:

Project Description: CB8944-00-07

Sample Results

Mercury

Matrix: Water
Sample Date: 16-Aug-10

Paracel ID	Client ID	Units	MDL	Result
1035081-01	SW-1	ug/L	0.1	<0.1
1035081-02	SW-2	ug/L	0.1	<0.1
1035081-03	SW-3	ug/L	0.1	<0.1
1035081-04	SW-4	ug/L	0.1	<0.1

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Mercury	ND	0.1	ug/L						
Matrix Duplicate									
Mercury	ND	0.1	ug/L	ND				20	
Matrix Spike									
Mercury	3.88	0.1	ug/L	ND	129	78-137			

Dale Robertson

To: Stephanie Coleman (scoleman@paracellabs.com)
Cc: Donna Bloom
Subject: WESA Project CB89

Julie ask that analyze for mercury in all the water samples submitted for this project. They include the following 4 work orders:

1033126, 1033127, 1034078, 1034079
Aug10 Aug9 Aug16 Aug16 (sample dates)
Log each group of samples into a separate, new work order.

Dale Robertson, B.Sc.
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WESA Project CB89

SW1 " " "
SW2 " " "
SW3 " " "
SW4 "

[redacted]

1033126 → 1035073
1033127 → 1035077
1034078 → 1035081
1034079 → 1035082

Hutchinson

Environmental Sciences Ltd.

Big Eddy Hydroelectric Generating Facility

2012 Baseline Water Quality and Fish Tissue Mercury

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

May 7, 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

May 7, 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: Big Eddy Hydroelectric Generating Facility – Draft 2012 Baseline Water and Fish Tissue Mercury

Dear Mr. Laratta,

Please find enclosed our draft 2012 baseline fish and water quality report for Xeneca Power Development's Big Eddy hydroelectric generating facility, proposed for the Petawawa River adjacent to Petawawa, Ontario.

The report presents the reference concentrations of mercury in large fish before facility development and a discussion on mercury dynamics and hydropower in Ontario. Year one of pre-development water quality information is also presented and interpreted; a second year of water quality monitoring and first year of forage fish sampling will be conducted in 2013 to complete the baseline sampling program. This report will be updated with the results of the 2013 field program in late 2013 or early 2014.

The baseline work reported herein was conducted according to the recommendations of the Ontario Ministry of the Environment (MOE) document "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 recommendations to the Big Eddy 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

Disclaimer

The data presented in this report were provided to Hutchinson Environmental Sciences Ltd. (HESL) for reporting and interpretation by other consultants working for Xeneca. HESL has prepared this report with the data provided, under the assumption that all relevant procedures for sampling and quality control were followed in the sampling process.

Executive Summary

Water quality and fish sampling were conducted in 2012 at Xeneca's proposed hydroelectric facility on the Petawawa River adjacent to Petawawa, Ontario, at the present day location of the Big Eddy Rapids. The 2012 water quality sampling represented the first year of a two year program. Large fish were collected in 2012 and forage fish will be collected in 2013 to fully describe the baseline conditions of mercury in fish at the proposed facility. The 2012 baseline report will be updated with 2013 water quality and mercury in fish data, in late 2013 or early 2014.

Impounding rivers 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, as well as 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. Therefore, it is important to establish a pre-development reference of water quality from which to compare the post-development conditions, especially during early operation when the changes to water and the potential for adverse impacts are the highest.

Impoundments may also enhance the methylation of mercury in surface water through flooding. Mercury concentrations in fish may increase rapidly after impoundment and then decrease and stabilize in subsequent years as observed in experimental inundation in Ontario and in hydroelectric projects in Quebec. 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. In some cases fish accumulate mercury at higher rates immediately downstream of hydroelectric facilities because the turbines injure some fish passing through the facility and make them more easily available as food for fish downstream, encouraging piscivory and increasing mercury bioaccumulation rates.

Research is sparse on small-scale projects like Big Eddy which has a relatively small area of inundation and rapid flows relative to large impoundments such as those in northern Quebec and Ontario. The lack of data makes desk top predictions of mercury generation and bioaccumulation difficult and unreliable. However, site-specific factors including type of terrain, hydraulic residence time and water level fluctuation can be used to identify site-specific sensitivities to mercury accumulation. As the operating regime for the facility is established, these factors can refine post-development monitoring to target the periods of highest sensitivity, and provide valuable data to the operator and the Ontario Ministry of the Environment (MOE) on mercury dynamics in small-scale impoundments.

Baseline sampling establishes a reference condition of water quality and mercury in fish prior to facility development which can be used for comparison post-development. This, plus upstream-downstream water quality 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 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 (HESL 2012).

In 2012 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 (i.e., temperature, dissolved oxygen, pH, conductivity, alkalinity, major ions, organic carbon, suspended solids and nutrients) as well as total metals, including mercury and methyl mercury, which can have adverse toxic effects at elevated concentrations.

Year 1 of the baseline water quality monitoring indicates that the Petawawa River in the project area has very good water quality, typical of a northern Canadian Precambrian Shield river with few contaminant sources in its watershed. The water quality is summarized as follows:

- Low total suspended solids, dissolved organic carbon, metals and nutrient concentrations, with all parameter concentrations except pH well below the Ontario Provincial Water Quality Objectives (PWQOs); and
- Poorly buffered and slightly acidic.

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

- Increased suspended solids, and associated adsorbed nutrients and metals if the operating regimes increase sediment movement in the river. The river may be especially sensitive to increases in these parameters during spring and fall when it has a naturally higher base load. Conversely, impoundment may allow some settling of particulate matter immediately behind the dams;
- Methyl mercury concentrations could increase in water and fish independently of suspended sediment as a result of water impoundment; and,
- Dissolved oxygen concentrations may decrease if water temperatures warm from impoundment. Decreased turbulent flow, changes in aquatic plant communities and sediment weathering may also reduce dissolved oxygen. A decrease in dissolved oxygen may be most pronounced in the summer months when water temperatures are the highest and night-time plant respiration consumes oxygen.

Water quality monitoring will be conducted on the same schedule in 2013 to confirm the baseline conditions. The program will be repeated following development and will include monitoring during the facility's peak daily flows to monitor any associated sediment movement. Dissolved oxygen monitoring will be conducted in the early morning when it is typically lowest due to overnight plant respiration.

Large fish size, diet and trophic position variables were partly controlled during baseline sampling through the preferential sampling of Channel Catfish (*Ictalurus punctatus*) from a specific size class, to aid in determining the appropriate range in pre-development mercury concentrations. Channel Catfish were substituted for large piscivorous fish because population studies in 2011 showed that it would be difficult to collect a sufficient number of piscivorous fish in the study area. However, Channel Catfish were easily collected and were recommended as an alternative species for mercury monitoring, and approved as an

alternative species by MOE on the basis of a literature search completed by HESL in 2012[1], providing: Channel Catfish > 400 mm in length were used because larger fish include more fish in their diet and thus bioaccumulate mercury at faster rates.

Baseline fish monitoring indicated that total mercury concentrations in large fish were relatively high when compared to various consumption guidelines. No comparisons were made between sites because the proposed facility will operate with a 'run of the river' flow regime and will not restrict fish passage so a before vs. after comparison on the same site will be made post-construction. Following development, mercury concentrations are expected to increase in forage and predator fish based on the results of previous hydroelectric developments in northern Ontario, Quebec and Manitoba. Therefore it is important to note that:

1. Mercury concentrations 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 Big Eddy Rapids approach or exceed fish consumption guidelines.

Forage fish sampling will be completed in 2013 and will provide additional insight into the dynamics of mercury accumulation in that tropic level, the proportion of methyl mercury in total mercury and mercury concentrations in fish with higher exposure to the project area.

[1] Hutchinson Environmental Sciences Ltd. Technical Memorandum – Hg Accumulation in Channel Channel Catfish. April 9, 2012.

Table of Contents

List of Figures

List of Tables

Appendices

1 Introduction

Water quality and fish sampling were conducted in 2012 at Xeneca's proposed hydroelectric facility on the Petawawa River adjacent to Petawawa, Ontario, at the present day location of the Big Eddy Rapids (the facility). The 2012 water quality sampling represented the first year of a two year program. Large fish were collected in 2012 and forage fish will be sampled in 2013 to fully describe the baseline conditions of mercury concentrations in fish at the proposed facility. Forage fish sampling was attempted by Ontario Resources Management Group (ORMG) in 2012 but they were unable to complete the collection because of equipment failure and vandalism.

The water quality in the river hydraulically connected to the facility may change following development and the mercury dynamics in the aquatic system may increase the uptake of mercury by fish. To quantify change, post-development water quality conditions will be compared to pre-development conditions (i.e., the environmental baseline). 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 water quality samples upstream of the area which are not impacted by the project and thus help to infer natural variability. This report describes the results, rationale and regulatory context of the pre-development reference sampling conducted at Big Eddy Rapids on the Petawawa River. The report presents:

1. A description of the water quality and fish sampling programs, including the rationale for the programs and their regulatory context;

2. Year 1 results from the baseline water quality program which was developed in consultation with the Ontario Ministry of the Environment (MOE). The second year of assessment will be conducted in 2013; in late 2013 or early 2014 this report will be updated with year 2 data to further define baseline conditions;

3. Mercury concentrations in large fish collected in 2012; and,

4. An interpretive description of the current water and fish quality in the Petawawa River at the proposed facility, including identification of potential sensitivities and mitigation measures.

2 Facility Description

Xeneca is proposing to construct a hydroelectric generating facility at the present day Big Eddy Rapids on the Petawawa River approximately 125 metres (m) upstream of the Canadian Pacific Railway bridge (Figure 1).

The facility will consist of an open approach canal, a concrete weir, a powerhouse and an earthen dam. It will operate a 'run of the river' flow regime with no provisions for peaking as there is no realistic capacity for storing water at the site The proposed project would flood riparian lands up to 1.9 kilometres (km) upstream and inundate approximately 12.1 hectares (ha) of land based on hydrological investigations. The layout of the proposed hydroelectric facility and extent of inundation are shown on Figure 2.

Figure 1. The location of the proposed Big Eddy hydroelectric facility on the Petawawa River.

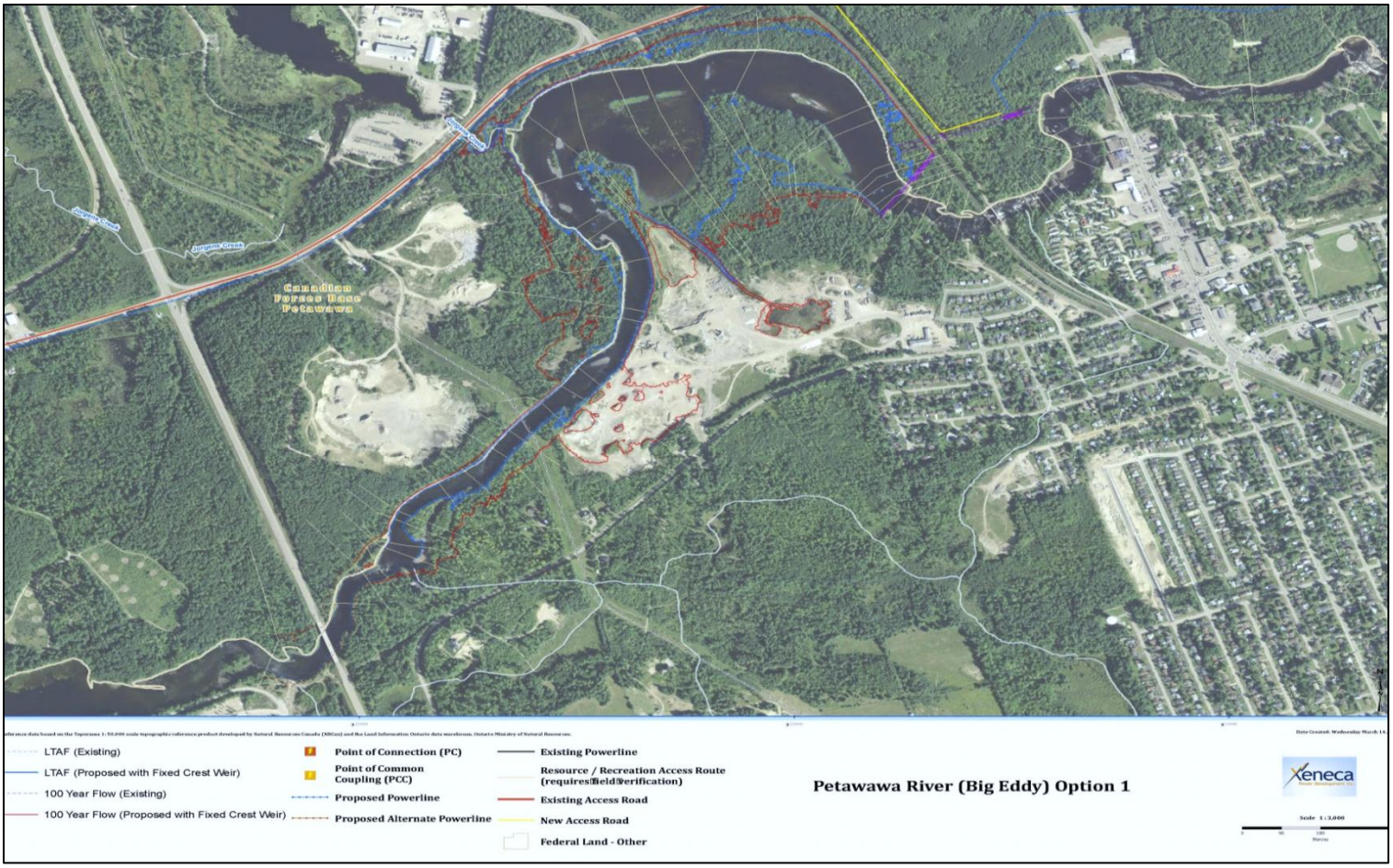

Figure 2. The layout of the proposed Big Eddy hydroelectric facility and the extent of inundation.

3 Background

3.1 Possible Changes to Water Quality Following Impoundment

Damming a river creates an impoundment upstream which may result in physical changes to the aquatic environment including vertical thermal stratification in the impounded water, increased exposure of water to soils, a change in 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. 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 new, overlying aquatic environment. The rate and nature of change from terrestrial soils to stable saturated sediment will affect the rate of release of the materials and 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 and total 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 discharged to the 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 it can also decrease methylation rates due to increased complexation of mercury to organic ligands, reducing its 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 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 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 projects in ways which minimize environmental impacts.

The rate of mercury accumulation in fish is dependent 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). Forage fish were also collected so that impacts could be assessed at multiple trophic levels and since these fish have a lower trophic position, 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 Big Eddy, which has a small area of inundation and rapid flow-through rate, which makes desk top predictions of mercury generation and bioaccumulation difficult. However, site-specific factors including type of terrain, hydraulic residence time and water level fluctuation can be used to identify site-specific sensitivities. As the operating regime for the facility is established, these factors can refine post-development monitoring to target the periods of highest sensitivity.

Mercury concentrations in water and mercury in fish tissue will therefore 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 baseline water quality and fish sampling program for Big Eddy 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, with input from HESL, 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" (HESL, June 2012), and applied in this report to Big Eddy.

4 Water Quality and Fish Sampling Programs

4.1 Objectives

The baseline water quality and fish sampling programs were conducted to:

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

2) Establish a pre-development baseline of mercury 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 baseline results to assess any changes in water and fish quality following development.

4.2 Water Sampling

The 2012 water quality program collected representative samples of river water, consistent with the MOE's draft guidance (2012), to provide a pre-development reference of water quality and address changes to water quality in the river in response to the seasonal changes in the hydrograph. Samples were collected seasonally and in duplicate pairs to address variance in water quality.

Baseline sampling will be conducted over two years to reduce the variability associated with one year of water quality data and provide a more representative baseline. 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 baseline 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

Sampling was conducted once during each of the three annual open water flow periods in 2012: immediately after the first flush 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 results of the MOE's Provincial Water Quality Monitoring Network (PWQMN). Data from a PWQMN monitoring station on the Petawawa River in 1996, 1999 and 2000 (PWQMN station 18493002002) confirmed the seasonal pattern for the Petawawa River (Figure 3).

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

Sampling periods for Big Eddy were identified by examining the Petawawa River's mean daily hydrograph from 1915 to 2011, produced by the Water Survey of Canada online http://www.wsc.ec.gc.ca/applications/H2O/graph-eng.cfm?station=02KB001&report=daily&year=2011 (Figure 4) so that representative samples could be collected during each flow regime. Hydrograph data from 2012 was not included in Figure 5 because it was not available in a graphic form at the time of reporting. The sampling dates are refined based on the river's actual flow: for example, 2012 spring sampling was conducted in mid-April, reflecting a spring freshet in 2012 that was slightly earlier than the 1915 to 2011 mean.

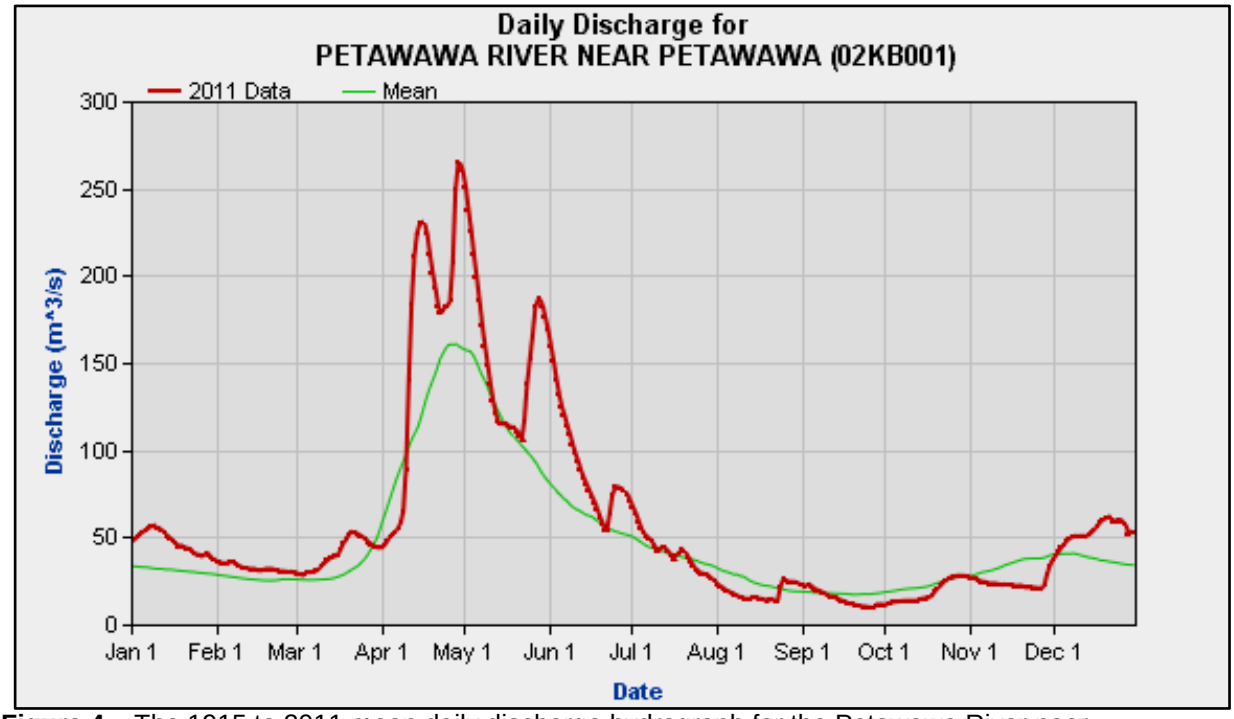

Figure 4. The 1915 to 2011 mean daily discharge hydrograph for the Petawawa River near Petawawa, Ontario.

4.2.2 Sample Locations – Baseline

Baseline water quality samples were collected in 2012 and will be collected in 2013, immediately downstream of the proposed facility and upstream of developed areas in the town of Petawawa (Figure 5, following page).

The baseline sample locations are downstream of all appreciable tributaries and wetlands that could affect the water quality at the facility, and represent the ambient water quality in the project area. No construction activities will be conducted in 2013 and so the 2013 sampling will complete the baseline water quality sampling in the Big Eddy project area.

4.2.3 Sample Locations – Post-Development

Post-development samples will be collected from upstream, within the impoundment, and at two locations downstream of the proposed facility as shown on Figure 5 and described on Table 1.

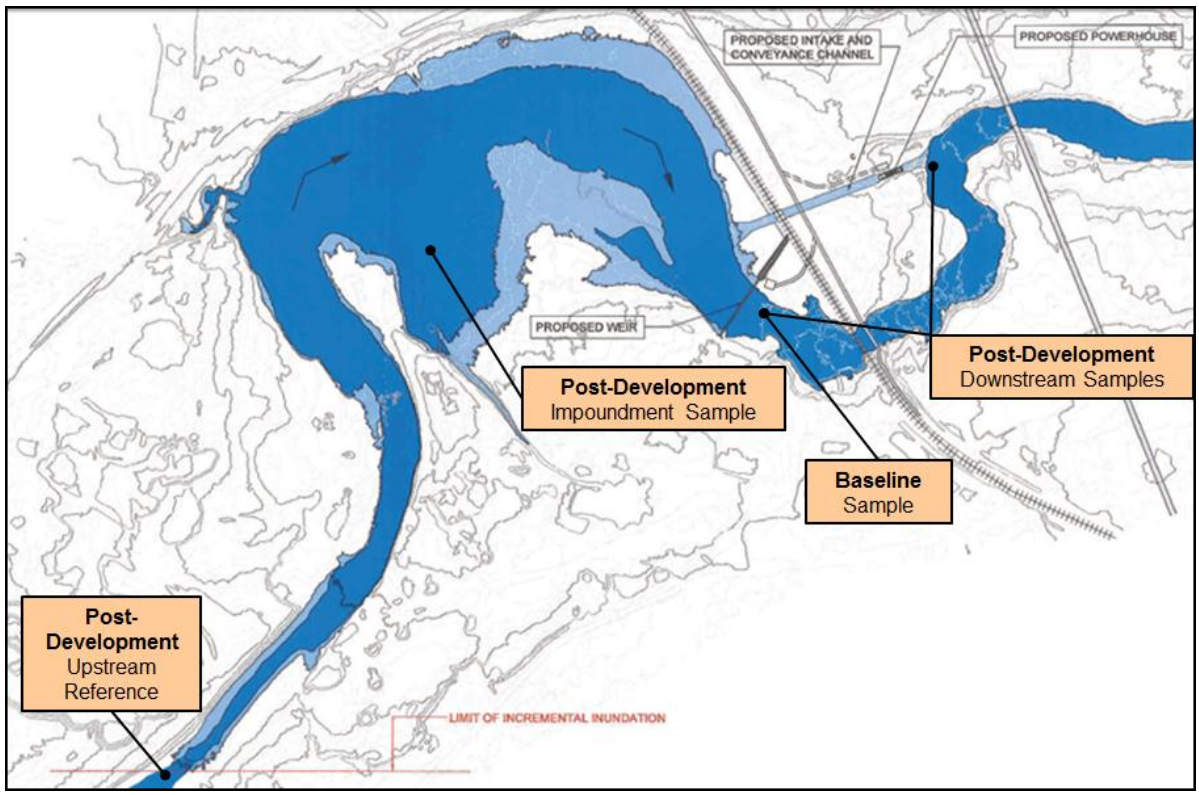

Figure 5. The baseline and post-development water sampling locations.

Table 1. Post-development water sampling locations.

Sample Site	Location	Rationale
Upstream Reference	Upstream of the impoundment and downstream of all confluences which could affect the aggregate water quality flowing into the project area	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 stratification is identified, a discrete water quality sample will be collected from each thermal layer.
Downstream - Weir	Immediately downstream of the proposed weir	The sample will be collected from the same location where baseline samples were collected to allow for temporal assessments. It is a conservative representation of water quality affected by the proposed facility as it is immediately downstream of the facility and impoundment water quality will not be appreciably attenuated with background water.
Downstream - Conveyance Channel	Immediately downstream of the discharge of the proposed conveyance channel	This location will assess the water quality immediately downstream of the conveyance channel and should be collected as close as possible to the outfall so that the effects of urban inputs to river upstream (if any) are not sampled. If the analytical results of this sample are different than the other post-development downstream water sample, the impoundment water sample results should be examined to determine if the difference in water quality is from water discharging from the conveyance channel or urban inputs influencing the water quality at the conveyance channel outfall.

4.2.4 Duplicate Samples

During baseline 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.

4.2.5 Sample Collection – Methods

Water samples were collected in the field by staff of ORMG who worked according to the following directions provided by HESL:

- 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, un-powdered 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.

All water samples were collected by ORMG with results presented to HESL for inclusion in this report and interpretation.

4.2.6 Analysis

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

- pH, conductivity, alkalinity;
- total suspended solids (TSS) and total dissolved solids (TDS);
- cations (Mg, Na, Ca, K);
- anions (Cl, SO_4);

- dissolved organic carbon (DOC);
- total phosphorus (TP);
- 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:

- Mercury and methyl mercury in water and fish were analyzed by Flett Research Ltd., Winnipeg, Manitoba (CALA accredited); and,
- 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.

Water temperature, dissolved oxygen, pH and conductivity were also measured in the field.

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 and suspended solid flowing downstream, and actively in fish body burdens which can move up and downstream);
- Naturally occurring mercury in the environment, and differentiation from facility-generated mercury by providing temporal references as there is no barrier to fish migration that would isolate an upstream fish population from the project area post-development to provide a reference;
- The availability of fish for sampling, including where fish are seasonally and the sustainability of sampling a population of fish four 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 MNR, according to their “Riverine Index Netting, Manual of Instructions” (March, 2010) and in keeping with the recommendations of MOE (2012).

MOE (2012) identified young-of-the-year Yellow Perch (*Perca flavescens*) as the preferred forage fish mercury sentinel species. On a conference call with MOE in June, 2012, MOE confirmed that yearling Yellow Perch were acceptable because young-of-the-year may not have had sufficient time to forage and accumulate mercury, and are difficult to find and catch. If these fish were not available, then a cyprinid

species which was common within the river section was used as a proxy, an approach that is acceptable to MOE.

4.3.1 Sampling Intervals

A baseline of mercury concentrations in fish tissue has been established for large fish (Section 5.2) from which to compare post-development mercury concentrations, and a baseline of mercury in forage fish will be established in 2013.

Mercury accumulation in the food chain has a slower response to inundation than water quality. Post-development sampling will therefore be conducted during each of years 3, 6 and 9 following development, in line with the MOE (2012) guidance. If mercury concentrations in fish tissue have not stabilized within nine years then 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 the Ministry publishes every year, and increase the Ministry's database on the concentrations of mercury in fish prior to and following development of hydropower facilities.

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 in length; fish species common to the area that can be caught in subsequent years. Piscivorous fish were preferred, but fish population studies in 2011 showed that piscivorous fish may be difficult to collect in sufficient numbers in the study area. However, Channel Catfish (*Ictalurus punctatus*) were easily collected, recommended as an alternative species for mercury monitoring, and approved as an alternative species by MOE on the basis of a literature search completed by HESL (HESL 2012b (Appendix A)), with the following conditions:
    - Channel Catfish > 400 mm in length should be used because larger fish include more fish in their diet and thus bioaccumulate mercury at faster rates, and;
    - Target and submit, where possible, Walleye (*Sander vitreus*) and Bass (*Micropterus spp*.).
- Forage Fish: five (5) composite samples of 5 to 10 individuals of yearling Yellow Perch or other cyprinid species were targeted to provide a composite sample of 10 grams for each sample. Forage fish sampling and analysis will be completed in 2013.

4.3.3 Annual Timing of Sample Events

The relative sizes of forage fish increase quickly over the course of one year and so the forage fish sampling program was planned during the August water quality survey to avoid confounding results with the age of the fish collected over multiple visits, and to coincide with high abundance and catchability of forage fish before waters cooled. Larger fish can be sampled over multiple visits in a single season, or even over two years, provided that a comparable size and distribution of fish are submitted for each

sampling event; sizes are carefully documented and a relationship is established between size and mercury content.

4.3.4 Sample Locations – Baseline

Large fish were collected in the reach downstream of the confluence of the Petawawa and Barron Rivers, to upstream of the proposed facility (Figure 6), as part of the baseline ecological studies for the project. Forage fish sampling in 2013 will be conducted in close proximity to the proposed facility because forage fish migration is limited and sampling fish further afield may not provide an accurate representation of mercury concentrations in the project area.

Figure 6. The baseline and post-development fish sampling locations. The reach of river to be sampled is highlighted

4.3.5 Sample Locations – Post-Development

The proposed Big Eddy hydroelectric facility will provide fish passage after construction because it will operate a 'run of the river' flow regime and is required to allow for upstream migration of Lake Sturgeon (*Acipenser fulvescens*). Post-development fish sampling will therefore be focused on temporal as opposed to spatial comparisons to determine project impacts because fish can't be collected from an adjacent control site after construction. 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. Sampling will be focused in the same area as 2012, which is the reach between the confluence of the Petawawa and Barron Rivers, to upstream of the proposed facility so that urban impacts from the town of Petawawa do not confound the assessment (Figure 6).

4.3.6 Sampling Methods

Large fish were collected by ORMG with fish sampling results provided to HESL for inclusion in this report. Samples were stored in coolers on ice upon packaging and frozen at the end of each sample day and were shipped frozen to Flett Research in Winnipeg, Manitoba for total mercury analysis.

4.3.7 Analysis

Large fish were analyzed for total mercury (detection limit < 2.0 ng/g) by Flett Research of Winnipeg, MN and it was conservatively assumed that all mercury was methyl mercury. 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.

5 2012 Baseline Results

5.1 Water Quality

5.1.1 Sampling Dates

Table 2 provides the dates that water quality samples were collected at Big Eddy Rapids in 2012. All samples were collected during the intended open water periods and represent the water quality in the river during the indicated flow regime.

Table 2. 2012 water quality sampling dates.

Facility	Hydrograph Period	Sample Date
Big Eddy	- Spring freshet, following first flush	16-Apr-12
	- Summer low-flow	23-Aug-12
	- Fall flow (increasing)	20-Nov-12

5.1.2 Locations

The 2012 baseline water quality samples were collected from the location shown on Figure 5 (page 15).

5.1.3 Analytical Results

All parameter concentrations analyzed at a laboratory except pH, were within the Ontario Provincial Water Quality Objectives (PWQOs (MOE, 1998)) the regulatory guidelines applicable to surface water in the project area, and reflected good water quality. A single duplicate laboratory sample of pH from August (6.49) was slightly below the PWQO of 6.5. Lower pH in the Petawawa River reflects the low buffering capacity and acidic soils of the Precambrian Shield, and humic acids in the many wetlands of the Petawawa River watershed. The median conductivity of 36 µS/cm confirms the low TDS, alkalinity levels and acid sensitivity of the Petawawa River. The annual median concentrations of all detected parameters for the project area are presented in Table 3.

Table 3. The 2012 median laboratory-derived concentrations of all measurable water quality parameters in the project area.

Parameter	Units	2012 Median for the Project Area
Aluminum (Al)	µg/L	45
Barium (Ba)	µg/L	17.5
Calcium (Ca)	µg/L	3,925
Iron (Fe)	µg/L	168
Magnesium (Mg)	µg/L	1,165
Manganese (Mn)	µg/L	10.2
Total Mercury (Mercury)	µg/L	0.00215
Methyl Mercury ($[CH_3Mercury)^+]$	µg/L	0.000065
Silicon (Si)	µg/L	2550
Strontium (Sr)	µg/L	25.5
Zinc (Zn)	µg/L	1.5
Conductivity	µS/cm	36
pH	pH	7.11
Total Dissolved Solids	mg/L	39
Alkalinity, Total (as $CaCO_3$)	mg/L	11.5
Total Kjeldahl Nitrogen	mg/L	0.335
Total Phosphorus (ALS)	mg/L	0.00455
Sulphate	mg/L	4.75
Dissolved Organic Carbon	mg/L	7

Some parameter concentrations were greater or less than the laboratory's reported detection limit (RDL) on different dates so for the purpose of statistical analyses, the concentrations of these parameters were assumed to be ½ the RDL. The seasonal trends of selected measured parameter concentrations are presented on the plots in Figure 7. The analytical results of all analyzed parameters are presented in Tables 4 to 6.

The headwaters of the Petawawa River are located in Algonquin Provincial Park where there are no known major contaminant sources. The results indicate seasonality in the river's water quality. Aluminum, iron and total mercury were all elevated during the spring freshet, decreased during the summer low flow, and increased again in the fall, coincident with DOC levels in the river as shown in Figure 7; these patterns reflect wetland drainage flushing into the river during higher flow periods. Conductivity, magnesium, manganese, strontium, TP and TKN concentrations were inversely related to the river's flow in 2012 (i.e., the highest concentrations occurred during the summer low flow). Calcium, zinc and TDS decreased throughout the year.

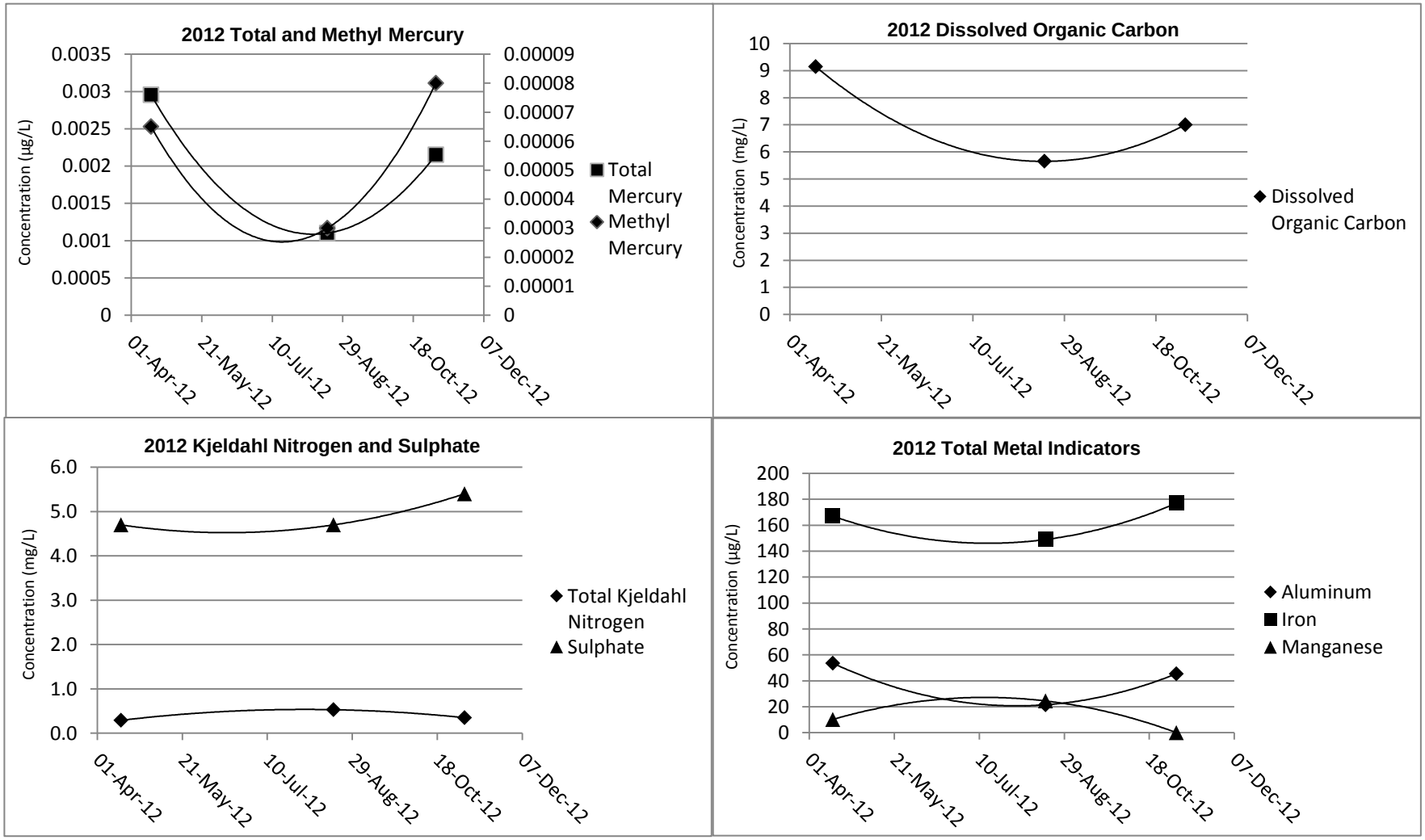

Figure 7. Seasonality of selected 2012 baseline monitoring parameters. Plotted values are medians for all sites.

Table 4. 2012 baseline water quality results: field parameters.

Parameter	Units	PWQO	Big Eddy					
			Baseline	**Replicate** (of Baseline)	**Baseline**	**Replicate** (of Baseline)	**Baseline**	**Replicate** (of Baseline)
			16-Apr-12	16-Apr-12	23-Aug-12	23-Aug-12	20-Nov-12	20-Nov-12
Laboratory Results								
Conductivity	µS/cm	N/V	29.7	29.8	47.0	44.0	35.9	35.8
pH	pH	6.5 - 8.5	7.33	7.05	7.35	6.49	7.15	7.06
Total Suspended Solids	mg/L	N/V	<3.0	<3.0	<3.0	<3.0	<2.0	<2.0
Total Dissolved Solids	mg/L	N/V	46	44	40	38	34	34
Field Measurements								
Dissolved Oxygen	mg/L	> 7[1]	8.63	--	*	--	18[2]	--
Water Temperature	°C	N/V	10	--	*	--	3.45	--
Conductivity	µS/cm	N/V	38	--	*	--	22[2]	--
pH	pH	6.5 - 8.5	6.26	--	*	--	5.01[2]	--

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.
* Data from field biologists never received by HESL.
1. PWQO for dissolved oxygen at 0°C.
2. Inconsistent data not utilized in analyses.

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

Parameter	Units	PWQO	Big Eddy					
			Baseline	**Replicate** (of Baseline)	**Baseline**	**Replicate** (of Baseline)	**Baseline**	**Replicate** (of Baseline)
			16-Apr-12	16-Apr-12	23-Aug-12	23-Aug-12	20-Nov-12	20-Nov-12
Alkalinity, Total (as $CaCO_3$)	mg/L	No decrease > 25% of background.	11	<10	13	11	12	12
Ammonia, Total (as N)	mg/L	20	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride	mg/L	N/V	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Nitrate-N	mg/L	N/V	<0.10	<0.10	<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	0.29	0.32	0.53	0.50	0.35	0.27
Total Phosphorus (ALS)	mg/L	0.03	0.0066	0.0034	0.0057	0.0065	<0.0030	<0.0030
Total Phosphorus (Dorset)	mg/L	0.03	0.0052	0.0054	--	--	0.0212[1]	0.0201[1]
Sulphate	mg/L	N/V	4.7	4.8	4.7	4.7	5.4	5
Dissolved Organic Carbon	mg/L	N/V	9.1	9.2	5.6	5.7	7	7

Notes:

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

-- - Parameter not analyzed.

1. - Sample appears to be contaminated from filtering error.

Table 6. 2012 baseline water quality results: metals.

Parameter	Units	PWQO	Big Eddy					
			Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)	Baseline	Replicate (of Baseline)
			16-Apr-12	16-Apr-12	23-Aug-12	23-Aug-12	20-Nov-12	20-Nov-12
Aluminum (Al)	µg/L	75[1.]	58	49	20	23	50	41
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	<1.0	<1.0	<1.0	<1.0
Barium (Ba)	µg/L	N/V	17	17	21	22	18	17
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	6,080	3,140	4,310	4,310	3,540	3,370
Chromium (Cr)	µg/L	8.9[3.]	<0.50	<0.50	<0.50	0.58	<0.50	<0.50
Cobalt (Co)	µg/L	0.9	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Copper (Cu)	µg/L	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Iron (Fe)	µg/L	300	167	171	149	147	177	168
Lead (Pb)	µg/L	20[4.]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Magnesium (Mg)	µg/L	N/V	1,160	1,130	1,480	1,500	1,170	1,120
Manganese (Mn)	µg/L	N/V	11.1	9.3	25.3	23.6	0.0103	0.0096
Mercury	µg/L	0.2	0.00295	0.00296	0.00107	0.00113	0.00207	0.00223
MeMercury	µg/L	N/V	0.00005	0.00008	0.00004	0.00002	0.00008	0.00008
Molybdenum (Mo)	µg/L	40	<1.0	<1.0	<1.0	<1.0	<0.0010	<0.0010
Nickel (Ni)	µg/L	25	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Potassium (K)	µg/L	N/V	<1000	<1000	<1000	<1000	<1000	<1000
Selenium (Se)-Total	µg/L	100	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Silicon (Si)	µg/L	N/V	2700	2,600	2,000	2,000	2,600	2,500
Silver (Ag)	µg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Strontium (Sr)	µg/L	N/V	25.6	23.5	35.5	35.6	25.3	24.5
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	<1.0	<1.0
Titanium (Ti)	µg/L	N/V	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Tungsten (W)	µg/L	30	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	5	<5	<5	<5	<5	<5	<5
Vanadium (V)	µg/L	6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc (Zn)	µg/L	30	19.1	<3.0	<3.0	3.9	<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.
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.

The following qualifiers have been applied to the 2012 water sampling data:

- There were no total phosphorus results from the Trent University Laboratory for the August 23, 2012 sampling event because the samples broke in transit to the laboratory. The November results appear to be contaminated, possibly because of the inclusion of zooplankton or other debris as the phosphorous concentrations are significantly higher than those reported by ALS throughout the year and by Trent University in April;

- Field measurements of turbidity, dissolved oxygen, water temperature, conductivity and pH taken on August 23, 2012 were shipped by ORMG biologists but never received by HESL. These field parameters, including turbidity, will be measured during all sampling events in 2013; and,

- Field measurements on November 20, 2012 are not consistent with laboratory and historical PWQMN results (Table 3 and supplementary Table 7, respectively). Therefore, laboratory results were deemed to be more representative of conditions in the Petawawa River and were used in the analyses.

Table 7. A comparison of ORMG field measurements collected on November 20, 2012 and the historical range of parameter values at the downstream PWQMN station.

Parameter	Results			
	ORMG	PWQMN		
		Min	Max	Mean
pH	5.01	6.4	9.5	7.4
Dissolved Oxygen (mg/L)	18	3.9	15	9.7

A complete interpretive description 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 B and C, respectively.

5.1.4 Quality Assurance

The quality of the field collection and laboratory methods and the precision of the data were assessed by inspecting the results of field duplicate samples. Relative percent differences between parameter concentrations in duplicate samples were considered significant if they departed more than 20% from the mean and were greater than 5 times the detection limit (U.S. EPA 2012). The only samples which exceeded these parameters were the calcium samples collected in April which differed by 48%, and the duplicate zinc results from April, which were 19 and < 3 µg/L. The analytical results indicate good quality control and sample representativeness for all but Zn and Ca. Additional sampling in 2013 will provide more data to assess the significance of these differences.

5.2 Fish

5.2.1 Sampling Dates

Large fish sampling was conducted by ORMG on August 21, 2012.

5.2.2 Locations

The baseline large fish samples were collected from the highlighted reaches of the Petawawa River (shown on Figure 6, page 20).

5.2.3 Description of Catch

ORMG submitted 37 Channel Catfish and 3 Walleye for total mercury analysis. The summary statistics for size and weight are presented in Table 8.

Channel Catfish > 400 mm in length were targeted during baseline sampling and the same size range should be targeted during post-development sampling to maintain consistency with the baseline sampling population. Summary statistics of the population are presented as means because the population distribution was normal.

Table 8. Baseline large fish physical summary statistics.

Sample Location	**Number of Individuals Analyzed**	**Mean Total Length** (mm)	**Mean Weight** (wet g)
Big Eddy Rapids	40	467	837

5.2.4 Analytical Results

The maximum concentration of total mercury in large fish was 1720 ng/g, the minimum was 222 ng/g and the median was 436 ng/g within the project area in 2012 (Table 8). All mercury concentrations are presented as nanograms of mercury per wet weight (grams) of fish tissue sample. Mercury concentrations were positively correlated with weight ($y = 0.57x + 514$, $R^2 = 0.34$) and length ($y = 0.08x + 420$, $R^2 = 0.27$), albeit weakly, indicating heavier and longer fish have higher concentrations of mercury. Relational plots of fish weight and length to mercury concentration are presented in Figure 8. The analytical results for each individual fish are presented in Table 10 (page 30). Laboratory certificates of analysis are included in Appendix B.

Table 9. Summary of baseline large fish analytical results.

Sample Location	**No. of Samples**	**Total Mercury Concentrations** (ng/g wet weight)		
		Max	**Min**	**Median**
Big Eddy Rapids	40	1720	222	436

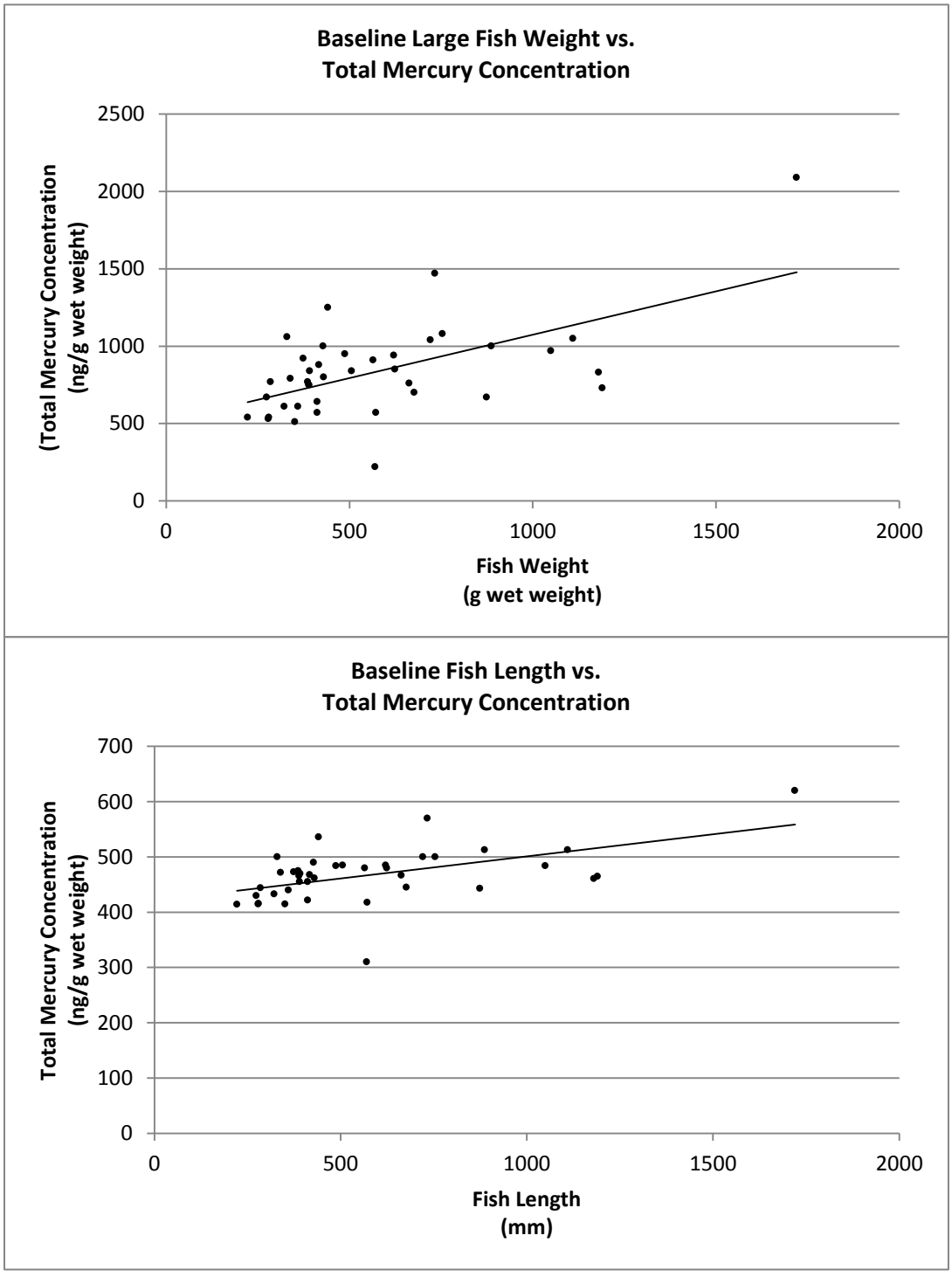

Figure 8. Relational plots of large fish weight and length vs. total mercury concentrations.

Table 10. Large fish analytical results for baseline sampling.

Big Eddy					
Sample ID	**Date**	**Total Mercury** (ng/g wet wt.)	**Species**	**Total Length** (mm)	**Total Weight** (wet g)
TMDSOL100312ZB1-001	21-Aug-12	874	Channel Catfish	443	670
TMDSOL100312ZB1-002	21-Aug-12	572	Walleye	418	570
TMDSOL100312ZB1-004	21-Aug-12	733	Walleye	570	1470
TMDSOL100312ZB1-005	21-Aug-12	330	Channel Catfish	500	1060
TMDSOL100312ZB1-006	21-Aug-12	386	Channel Catfish	475	770
TMDSOL100312ZB1-007	21-Aug-12	222	Channel Catfish	414	540
TMDSOL100312ZB1-008	21-Aug-12	721	Channel Catfish	500	1040
TMDSOL100312ZB1-009	21-Aug-12	360	Channel Catfish	440	610
TMDSOL100312ZB1-010	21-Aug-12	339	Channel Catfish	472	790
TMDSOL100312ZB1-011	21-Aug-12	1050	Channel Catfish	484	970
TMDSOL100312ZB1-015	21-Aug-12	1110	Channel Catfish	513	1050
TMDSOL100312ZB1-017	21-Aug-12	351	Channel Catfish	415	510
TMDSOL100312ZB1-018	21-Aug-12	285	Channel Catfish	444	770
TMDSOL100312ZB1-019	21-Aug-12	389	Channel Catfish	466	750
TMDSOL100312ZB1-020	21-Aug-12	417	Channel Catfish	468	880
TMDSOL100312ZB1-021	21-Aug-12	412	Channel Catfish	455	640
TMDSOL100312ZB1-025	21-Aug-12	274	Channel Catfish	430	670
TMDSOL100312ZB1-026	21-Aug-12	322	Channel Catfish	433	610
TMDSOL100312ZB1-027	21-Aug-12	677	Channel Catfish	445	700
TMDSOL100312ZB1-028	21-Aug-12	624	Channel Catfish	480	850
TMDSOL100312ZB1-029	21-Aug-12	279	Channel Catfish	415	530
TMDSOL100312ZB1-030	21-Aug-12	621	Channel Catfish	485	940
TMDSOL100312ZB1-031	21-Aug-12	754	Channel Catfish	500	1080
TMDSOL100312ZB1-033	21-Aug-12	570	Walleye	310	220
TMDSOL100312ZB1-034	21-Aug-12	374	Channel Catfish	473	920
TMDSOL100312ZB1-035	21-Aug-12	392	Channel Catfish	470	840
TMDSOL100312ZB1-036	21-Aug-12	280	Channel Catfish	416	540
TMDSOL100312ZB1-037	21-Aug-12	887	Channel Catfish	513	1000
TMDSOL100312ZB1-038	21-Aug-12	390	Channel Catfish	455	750
TMDSOL100312ZB1-039	21-Aug-12	428	Channel Catfish	490	1000
TMDSOL100312ZB1-040	21-Aug-12	1190	Channel Catfish	465	730
TMDSOL100312ZB1-042	21-Aug-12	488	Channel Catfish	484	950
TMDSOL100312ZB1-043	21-Aug-12	441	Channel Catfish	536	1250
TMDSOL100312ZB1-044	21-Aug-12	430	Channel Catfish	462	800
TMDSOL100312ZB1-045	21-Aug-12	506	Channel Catfish	485	840
TMDSOL100312ZB1-046	21-Aug-12	565	Channel Catfish	480	910
TMDSOL100312ZB1-048	21-Aug-12	663	Channel Catfish	467	760
TMDSOL100312ZB1-049	21-Aug-12	412	Channel Catfish	422	570
TMDSOL100312ZB1-050	21-Aug-12	1180	Channel Catfish	461	830
TMDSOL100312ZB1-051	21-Aug-12	1720	Channel Catfish	620	2090
Number of samples:		**40**		Mean Total Length:	Mean Weight:
Max. Total Mercury concentration (ng/g wet wt.):		**1720**			
Min. Total Mercury concentration (ng/g wet wt.):		**222**			
Mean Total Mercury concentration (ng/g wet wt.):		**575**		**467**	**837**
Median Total Mercury concentration (ng/g wet wt.):		**436**			

5.2.5 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: Methyl mercury (CCME 1999).

The baseline large fish mercury analytical results are presented in Table 10 and the results relative to consumption guidelines are shown in Table 11. 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 level of restriction (partial restrictions or complete restriction).

Table 11. Number and percentage of large fish with Mercury concentrations that exceeded mercury consumption guidelines.

	Mercury Guidelines					
	MOE[1]	MOE[2]	MOE[3]	MOE[4]	Health Canada[5]	CCME[6]
Guideline Value	0.26 µg/g	0.52 µg/g	0.61 µg/g	1.84 µg/g	0.5 µg/g	0.033 µg/g
Big Eddy	39 (98%)	17 (43%)	14 (35%)	0 (0%)	18 (45%)	40 (100%)

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: Methyl Mercury (CCME 1999)

The number of fish with mercury concentrations that exceeded Guide to Eating Sport Fish guidelines ranged from 0 (0%) for the general population – complete restrictions, to 38 (98%) for women of child bearing age and children under 15 – partial restrictions. Approximately half (48%) of the specimens exceeded the guideline set by Health Canada and all exceeded the CCME guideline, which is the most stringent of those used in this comparison and is intended for the protection of piscivorous wildlife.

6 Discussion and Conclusions

6.1 Water Quality

The 2012 baseline results indicate that the Petawawa River in the project area has very good water quality, typical of a Precambrian Shield river with few contaminant sources in its watershed. Metal concentrations in the river were all below PWQOs in 2012.

Nutrient concentrations in the river were low with nitrite and nitrate concentrations below the laboratory's reported detection limit (i.e., less than 0.10 mg/L), and all phosphorous concentrations were below the PWQO of 0.03 mg/L. The river water is not well buffered and is slightly acidic as indicated by conductivities ranging from 30 to 47 µS/cm, a laboratory-measured pH of 6.49 to 7.35 and a total alkalinity of < 10 to 13 mg/L.

The river's water quality is linked to its seasonal flows:

- Aluminum, iron, total mercury and dissolved organic carbon were all elevated during the 2012 spring freshet, decreased during the summer low flow, and increased again in the fall mid-flow; and,
- Conductivity, magnesium, manganese, strontium, TP and TKN concentrations were inversely related to the river's flow in 2012 (i.e., the highest concentrations occurred during the summer low flow).

Developing the Big Eddy facility should not affect the alkalinity, pH or buffering capacity of the river. However, other water quality parameters may be affected, 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.

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 Mercury in Fish

The Big Eddy hydroelectric facility will not impede fish movement so the study design to assess mercury concentrations in fish is based on a before vs. after approach where populations will be compared between years.

Many fish collected during baseline sampling contained mercury concentrations that exceeded various consumption guidelines. These results are not surprising as the mean mercury concentration of Walleye in 79 lakes throughout Ontario was 0.65 µg/L (Wren et al. 1991), which exceeds all but one of the mercury consumption guidelines used for comparison. Following development, mercury concentrations are expected to increase in forage and predator fish based on the results of previous hydroelectric developments in northern Ontario, Quebec and Manitoba. Therefore it is important to note that:

3. Mercury concentrations often occur independent of impacts associated with hydroelectric development; and,

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

Forage fish sampling will be completed in 2013 and will provide additional insight into the dynamics of mercury accumulation in that tropic level, the proportion of methyl mercury in total mercury, and mercury concentrations in fish with higher exposure to the project area.

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.

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Appendix A. Catfish Memo

Hutchinson
Environmental Sciences Ltd.

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

Technical Memorandum

To: Ed Laratta, Xeneca Power Development

From: Bev Clark

Date: April 09 2012

Project: J100036

Re: Mercury accumulation in Channel Catfish

Background

Xeneca's 2011 field programs at their proposed power sites on the Petawawa River showed that there was some concern that the preferred predator species of fish may be difficult to collect in sufficient numbers for Hg accumulation monitoring. Channel catfish (*Ictalurus punctatus*) were easily collected in the Petawawa River and were recommended as an alternative species for mercury monitoring. In a conference call on March 30, 2012, MOE staff suggested that further information was required before allowing that catfish would be suitable as a target species for Hg effects monitoring. To this end, Hutchinson Environmental Sciences Ltd. conducted a brief literature search to summarize what is currently know about Hg accumulation and feeding habits of Channel Catfish.

The two most pertinent questions are:

1. Do Channel Catfish accumulate mercury?
2. Do Channel Catfish, which are benthic omnivores, consume sufficient quantities of fish or crayfish to consider them as being representative of a predator species?

Literature Search

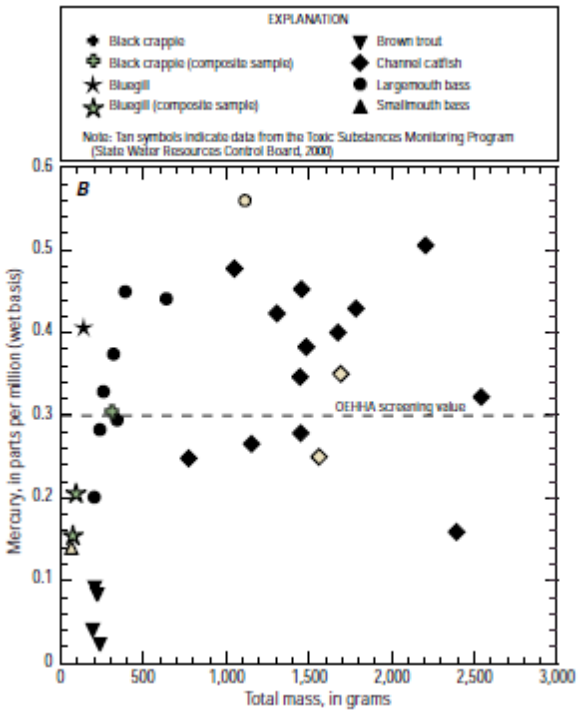
Mercury in Channel Catfish

It is important to consider reported mercury concentrations in Catfish relative to other species. Absolute concentrations in Channel Catfish are not as useful as knowing how Catfish will accumulate Hg relative to Bass or Walleye that are living in the same water body. Huggett et al. (2001) reported total mercury concentrations in a variety of edible fish fillets in Enid Lake in a watershed in North Mississippi. Catfish accumulated ~60% as much Hg as Largemouth Bass with fish falling into an order from lowest to highest that would intuitively match their level of piscivory, i.e. Carp<Catfish<Bass<Crappie<Gar, as shown in the excerpted Table below:

Table 2
Concentrations of mercury (mg/kg) in individual fish collected from Enid Lake

Fish type	*n*	Mean (S.D.)	Range
Carp	3	0.634 (0.453)	0.352–1.218
Largemouth bass	5	1.400 (0.300)	1.122–1.868
Gar	3	1.890 (0.307)	1.584–2.198
Black crappie	3	1.690 (0.100)	1.590–1.790
Catfish	4	0.820 (0.567)	0.425–1.660

May et al. (2000) found similar concentrations among a variety of species: Black Bass (0.2 to 1.5 mg/kg), Sunfish (<0.1 to 0.41) , Channel Catfish (0.16 to 0.75) and Rainbow Trout (0.06 to 0.38) mg/kg. In this study there was no clear relationship between fish length (or mass) and mercury concentration for Catfish as shown in the table below (excerpted from May et al. 2000) This lack of a relationship might be expected for omnivorous fish. The study also noted that Hg concentrations in Catfish were similar to those measured for intermediate trophic level predators.



Davis et al. (2007) found similar Hg concentrations in Channel Catfish (0.50 mg/kg wet) and in Largemouth Bass (0.53mg/kg wet) in the Sacramento-San Joaquin Delta.

From this, and without completing an exhaustive review, we can conclude that Channel Catfish accumulate Hg at an intermediate level compared to other sport fish and that there may not be a good relationship between the size of the fish and the accumulation of Hg.

Channel Catfish Diet

Both Scott and Crossman (1973) and Holm et al (2009) confirm that catfish are opportunistic omnivores that include fish in their diet. Holm et al (2009) state that "*Larger channel catfish feed almost exclusively on fishes*." and Scott and Crossman (1973) indicate a varied invertebrate diet which also includes "*such fishes as are present in the habitat*" and "*In Canada various minnows and yellow perch predominate".*

Vigg et al. (2011) found that Channel Catfish consumed juvenile salmonids with the highest consumption in the catfish size range 401-450 mm. Tyus and Nikirk (1990) noted piscivory in larger catfish (average length 420mm). Griswald and Tubb (1977), found that catfish in Lake Erie fed on dipterans, fish and cladocerans with fish representing > 30% of the diet in April, May and July in some years.

From this, and without completing an exhaustive review, we can conclude that Channel Catfish as benthic omnivores can be partially piscivorous in some areas and it is likely that this tendency increases with larger fish.

Summary

The intent of monitoring Hg in fish for the Xeneca projects is a) to determine if Hg increases as a result of the project and b) to determine if the project increases Hg to levels that pose a threat to consumers. Catfish are a suitable species to use to monitor pre and post project accumulation of mercury because they accumulate mercury at similar levels to predator fish . In addition they have been shown to utilize fish as part of their generally omnivorous diet. Catfish are considered a sport fish but are not widely angled or consumed in Ontario. Hg levels in catfish may not provide a good reference for protection of all sport fish, unless larger catfish are used.

The two cautions are 1) there may not be a relationship between size or length and Hg accumulation and, 2) piscivory may not be prevalent in smaller fish.

We therefore recommend that catfish can be used as a good monitor of pre and post project effects on Hg uptake and that catfish > 400mm in length be used. MOE requires that at least 20 fish of 25 to 55 cm length be submitted for Hg analysis. We therefore recommend that field crews submit at least 20 Channel Catfish of 40 to 55 cm length for the required Hg analysis and that field crews target and submit, where possible, walleye and bass in the 25-55 cm range for additional analysis of Hg.

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Appendix B. Laboratory Certificates of Analysis

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

Date Received: 17-APR-12
Report Date: 23-APR-12 13:55 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1135328

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

Lindsay D. Zuiker
Account Manager

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1135328-1 BIG EDDY BASELINE						
Sampled By: CLIENT on 16-APR-12 @ 13:02						
Matrix: WATER						
Physical Tests						
Conductivity	29.7		3.0	umhos/cm	17-APR-12	
pH	7.33		0.10	pH units	17-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	46		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	11		10	mg/L	17-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	18-APR-12	
Chloride	<2.0		2.0	mg/L	19-APR-12	
Nitrate-N	<0.10		0.10	mg/L	19-APR-12	
Nitrite-N	<0.10		0.10	mg/L	19-APR-12	
Total Kjeldahl Nitrogen	0.29		0.15	mg/L	18-APR-12	
Total Phosphorus	0.0066		0.0030	mg/L	18-APR-12	0.02
Sulphate	4.7		2.0	mg/L	19-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	9.1		1.0	mg/L	22-APR-12	
Total Metals						
Aluminum (Al)	0.058		0.010	mg/L	18-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	18-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	18-APR-12	0.005
Barium (Ba)	0.017		0.010	mg/L	18-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	18-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	18-APR-12	
Boron (B)	<0.050		0.050	mg/L	18-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	18-APR-12	0.0001
Calcium (Ca)	6.08		0.50	mg/L	18-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	18-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	18-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	18-APR-12	0.001
Iron (Fe)	0.167		0.050	mg/L	18-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	18-APR-12	0.001
Magnesium (Mg)	1.16		0.50	mg/L	18-APR-12	
Manganese (Mn)	0.0111		0.0010	mg/L	18-APR-12	
Molybdenum (Mo)	<0.0010		0.0010	mg/L	18-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	18-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	18-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	18-APR-12	0.1
Silicon (Si)	2.7		1.0	mg/L	18-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	18-APR-12	0.0001
Strontium (Sr)	0.0256		0.0010	mg/L	18-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	18-APR-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	18-APR-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	18-APR-12	
Tungsten (W)	<0.010		0.010	mg/L	18-APR-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	18-APR-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	18-APR-12	0.006
Zinc (Zn)	0.0191		0.0030	mg/L	18-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
L1135328-1 BIG EDDY BASELINE Sampled By: CLIENT on 16-APR-12 @ 13:02 Matrix: WATER						#1
Total Metals						
Zirconium (Zr)	<0.0040		0.0040	mg/L	18-APR-12	0.004
L1135328-2 REPLICATE 1 Sampled By: CLIENT on 16-APR-12 @ 13:15 Matrix: WATER						#1
Physical Tests						
Conductivity	29.8		3.0	umhos/cm	17-APR-12	
pH	7.05		0.10	pH units	17-APR-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	20-APR-12	
Total Dissolved Solids	44		20	mg/L	23-APR-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	<10		10	mg/L	17-APR-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	18-APR-12	
Chloride	<2.0		2.0	mg/L	19-APR-12	
Nitrate-N	<0.10		0.10	mg/L	19-APR-12	
Nitrite-N	<0.10		0.10	mg/L	19-APR-12	
Total Kjeldahl Nitrogen	0.32		0.15	mg/L	18-APR-12	
Total Phosphorus	0.0034		0.0030	mg/L	18-APR-12	0.02
Sulphate	4.8		2.0	mg/L	19-APR-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	9.2		1.0	mg/L	22-APR-12	
Total Metals						
Aluminum (Al)	0.049		0.010	mg/L	18-APR-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	18-APR-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	18-APR-12	0.005
Barium (Ba)	0.017		0.010	mg/L	18-APR-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	18-APR-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	18-APR-12	
Boron (B)	<0.050		0.050	mg/L	18-APR-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	18-APR-12	0.0001
Calcium (Ca)	3.14		0.50	mg/L	18-APR-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	18-APR-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	18-APR-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	18-APR-12	0.001
Iron (Fe)	0.171		0.050	mg/L	18-APR-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	18-APR-12	0.001
Magnesium (Mg)	1.13		0.50	mg/L	18-APR-12	
Manganese (Mn)	0.0093		0.0010	mg/L	18-APR-12	
Molybdenum (Mo)	<0.0010		0.0010	mg/L	18-APR-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	18-APR-12	0.025
Potassium (K)	<1.0		1.0	mg/L	18-APR-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	18-APR-12	0.1
Silicon (Si)	2.6		1.0	mg/L	18-APR-12	
Silver (Ag)	<0.00010		0.00010	mg/L	18-APR-12	0.0001
Strontium (Sr)	0.0235		0.0010	mg/L	18-APR-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	18-APR-12	0.0003

** 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			
L1135328-2 REPLICATE 1 Sampled By: CLIENT on 16-APR-12 @ 13:15 Matrix: WATER									
Total Metals									
Tin (Sn)	<0.0010		0.0010	mg/L	18-APR-12				
Titanium (Ti)	<0.0020		0.0020	mg/L	18-APR-12				
Tungsten (W)	<0.010		0.010	mg/L	18-APR-12	0.03			
Uranium (U)	<0.0050		0.0050	mg/L	18-APR-12	0.005			
Vanadium (V)	<0.0010		0.0010	mg/L	18-APR-12	0.006			
Zinc (Zn)	<0.0030		0.0030	mg/L	18-APR-12	0.02			
Zirconium (Zr)	<0.0040		0.0040	mg/L	18-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

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.

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.

Quality Control Report

Workorder: L1135328 Report Date: 23-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 R2352317								
WG1457920-5 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			107.6		%		80-120	17-APR-12
WG1457920-2 CVS								
Alkalinity, Total (as CaCO3)			103.5		%		85-115	17-APR-12
WG1457920-3 DUP		**L1134495-1**						
Alkalinity, Total (as CaCO3)		424	421		mg/L	0.73	20	17-APR-12
WG1457920-4 DUP		**L1135236-9**						
Alkalinity, Total (as CaCO3)		174	171		mg/L	1.6	20	17-APR-12
WG1457920-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-APR-12
ANIONS4-WT	**Water**							
Batch R2353919								
WG1459270-5 DUP		**L1135328-1**						
Chloride		<2.0	<2.0	RPD-NA	mg/L	N/A	20	19-APR-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	19-APR-12
Nitrate-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	19-APR-12
Sulphate		4.7	4.7		mg/L	0.086	20	19-APR-12
WG1459270-3 LCS								
Chloride			99.4		%		85-115	19-APR-12
Nitrite-N			91.0		%		85-115	19-APR-12
Nitrate-N			97.4		%		85-115	19-APR-12
Sulphate			101.4		%		85-115	19-APR-12
WG1459270-4 LCSD		**WG1459270-3**						
Chloride		99.4	99.5		%	0.052	25	19-APR-12
Nitrite-N		91.0	90.6		%	0.44	25	19-APR-12
Nitrate-N		97.4	97.4		%	0.041	25	19-APR-12
Sulphate		101.4	101.7		%	0.31	25	19-APR-12
WG1459270-1 MB								
Chloride			<2.0		mg/L		2	19-APR-12
Nitrite-N			<0.10		mg/L		0.1	19-APR-12
Nitrate-N			<0.10		mg/L		0.1	19-APR-12
Sulphate			<2.0		mg/L		2	19-APR-12
C-DIS-ORG-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
C-DIS-ORG-WT	**Water**							
Batch R2354327								
WG1459640-11 DUP		**L1136000-22**						
Dissolved Organic Carbon		9.1	9.7		mg/L	6.2	20	22-APR-12
WG1459640-3 DUP		**L1135352-1**						
Dissolved Organic Carbon		4.8	5.0		mg/L	2.7	20	22-APR-12
WG1459640-5 DUP		**L1135646-1**						
Dissolved Organic Carbon		3.2	3.2		mg/L	0.94	20	22-APR-12
WG1459640-7 DUP		**L1135804-1**						
Dissolved Organic Carbon		1.1	1.1		mg/L	2.7	20	22-APR-12
WG1459640-9 DUP		**L1135804-19**						
Dissolved Organic Carbon		1.3	1.3		mg/L	0.78	20	22-APR-12
WG1459640-2 LCS								
Dissolved Organic Carbon			94.2		%		80-120	22-APR-12
WG1459640-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	22-APR-12
WG1459640-10 MS		**L1135804-19**						
Dissolved Organic Carbon			91.8		%		70-130	22-APR-12
WG1459640-12 MS		**L1136000-22**						
Dissolved Organic Carbon			79.5		%		70-130	22-APR-12
WG1459640-4 MS		**L1135352-1**						
Dissolved Organic Carbon			86.3		%		70-130	22-APR-12
WG1459640-6 MS		**L1135646-1**						
Dissolved Organic Carbon			90.2		%		70-130	22-APR-12
WG1459640-8 MS		**L1135804-1**						
Dissolved Organic Carbon			90.7		%		70-130	22-APR-12
EC-WT	**Water**							
Batch R2352029								
WG1457837-1 CVS								
Conductivity			98.7		%		90-110	17-APR-12
WG1457837-3 DUP		**L1135281-1**						
Conductivity		570	568		umhos/cm	0.35	10	17-APR-12
WG1457837-4 DUP		**L1135328-1**						
Conductivity		29.7	29.5		umhos/cm	0.68	10	17-APR-12
WG1457837-2 MB								
Conductivity			<3.0		umhos/cm		3	17-APR-12
MET-ONT-PWQO-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
MET-ONT-PWQO-WT	**Water**							
Batch R2352521								
WG1458365-2 CVS								
Aluminum (Al)			105.4		%		80-120	18-APR-12
Antimony (Sb)			99.7		%		80-120	18-APR-12
Arsenic (As)			98.9		%		80-120	18-APR-12
Barium (Ba)			99.7		%		80-120	18-APR-12
Beryllium (Be)			107.5		%		80-120	18-APR-12
Bismuth (Bi)			97.7		%		80-120	18-APR-12
Boron (B)			114.2		%		70-130	18-APR-12
Cadmium (Cd)-Total			105.9		%		80-120	18-APR-12
Calcium (Ca)			101.9		%		80-120	18-APR-12
Chromium (Cr)			108.3		%		80-120	18-APR-12
Cobalt (Co)			99.3		%		80-120	18-APR-12
Copper (Cu)			100.9		%		80-120	18-APR-12
Iron (Fe)			105.4		%		70-130	18-APR-12
Lead (Pb)			104.6		%		80-120	18-APR-12
Magnesium (Mg)			102.7		%		80-120	18-APR-12
Manganese (Mn)			111.4		%		80-120	18-APR-12
Molybdenum (Mo)			100.2		%		90-110	18-APR-12
Nickel (Ni)			100.8		%		80-120	18-APR-12
Potassium (K)			101.3		%		80-120	18-APR-12
Selenium (Se)-Total			100.2		%		80-120	18-APR-12
Silicon (Si)			110.3		%		70-130	18-APR-12
Silver (Ag)			108.7		%		80-120	18-APR-12
Strontium (Sr)			98.6		%		80-120	18-APR-12
Thallium (Tl)			110.3		%		80-120	18-APR-12
Tin (Sn)			100.2		%		70-130	18-APR-12
Titanium (Ti)			101.9		%		80-120	18-APR-12
Tungsten (W)			102.0		%		70-130	18-APR-12
Uranium (U)			102.3		%		80-120	18-APR-12
Vanadium (V)			107.9		%		80-120	18-APR-12
Zinc (Zn)			99.2		%		80-120	18-APR-12
Zirconium (Zr)			99.2		%		80-120	18-APR-12
WG1458146-4 DUP		**WG1458146-3**						
Aluminum (Al)		0.110	0.117		mg/L	6.9	20	18-APR-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-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 R2352521								
WG1458146-4 DUP		**WG1458146-3**						
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Barium (Ba)		0.029	0.030		mg/L	2.3	20	18-APR-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-APR-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	18-APR-12
Calcium (Ca)		73.2	75.4		mg/L	2.9	20	18-APR-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-APR-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-APR-12
Copper (Cu)		0.0013	0.0014		mg/L	2.3	20	18-APR-12
Iron (Fe)		0.136	0.146		mg/L	7.2	20	18-APR-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Magnesium (Mg)		17.8	18.3		mg/L	3.0	20	18-APR-12
Manganese (Mn)		0.0204	0.0211		mg/L	3.7	20	18-APR-12
Molybdenum (Mo)		0.0011	0.0010		mg/L	4.9	20	18-APR-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	18-APR-12
Potassium (K)		2.4	2.5		mg/L	2.9	20	18-APR-12
Selenium (Se)-Total		0.00045	<0.00040	RPD-NA	mg/L	N/A	20	18-APR-12
Silicon (Si)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-APR-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-APR-12
Strontium (Sr)		0.905	0.916		mg/L	1.2	20	18-APR-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	18-APR-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Titanium (Ti)		0.0034	0.0035		mg/L	2.1	20	18-APR-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-APR-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-APR-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-APR-12
Zinc (Zn)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	18-APR-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	18-APR-12
WG1458146-2 LCS								
Aluminum (Al)			95.0		%		80-120	18-APR-12
Antimony (Sb)			91.2		%		70-130	18-APR-12
Arsenic (As)			101.9		%		70-130	18-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 R2352521								
WG1458146-2 LCS								
Barium (Ba)			99.0		%		70-130	18-APR-12
Beryllium (Be)			92.5		%		70-130	18-APR-12
Bismuth (Bi)			102.0		%		70-130	18-APR-12
Boron (B)			86.9		%		70-130	18-APR-12
Cadmium (Cd)-Total			104.7		%		70-130	18-APR-12
Calcium (Ca)			99.0		%		70-130	18-APR-12
Chromium (Cr)			87.7		%		70-130	18-APR-12
Cobalt (Co)			102.9		%		70-130	18-APR-12
Copper (Cu)			107.5		%		70-130	18-APR-12
Iron (Fe)			90.1		%		70-130	18-APR-12
Lead (Pb)			103.8		%		70-130	18-APR-12
Magnesium (Mg)			91.9		%		70-130	18-APR-12
Manganese (Mn)			88.7		%		70-130	18-APR-12
Molybdenum (Mo)			107.8		%		70-130	18-APR-12
Nickel (Ni)			107.3		%		70-130	18-APR-12
Potassium (K)			96.1		%		70-130	18-APR-12
Selenium (Se)-Total			106.1		%		70-130	18-APR-12
Silicon (Si)			95.0		%		70-130	18-APR-12
Silver (Ag)			96.5		%		70-130	18-APR-12
Strontium (Sr)			102.6		%		70-130	18-APR-12
Thallium (Tl)			103.7		%		70-130	18-APR-12
Tin (Sn)			94.7		%		70-130	18-APR-12
Titanium (Ti)			95.6		%		70-130	18-APR-12
Tungsten (W)			104.7		%		70-130	18-APR-12
Uranium (U)			99.6		%		70-130	18-APR-12
Vanadium (V)			91.8		%		70-130	18-APR-12
Zinc (Zn)			104.6		%		70-130	18-APR-12
Zirconium (Zr)			100.7		%		70-130	18-APR-12
WG1458146-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	18-APR-12
Antimony (Sb)			<0.0050		mg/L		0.005	18-APR-12
Arsenic (As)			<0.0010		mg/L		0.001	18-APR-12
Barium (Ba)			<0.010		mg/L		0.01	18-APR-12
Beryllium (Be)			<0.0010		mg/L		0.001	18-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 R2352521								
WG1458146-1 MB								
Bismuth (Bi)			<0.0010		mg/L		0.001	18-APR-12
Boron (B)			<0.050		mg/L		0.05	18-APR-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	18-APR-12
Calcium (Ca)			<0.50		mg/L		0.5	18-APR-12
Chromium (Cr)			<0.00050		mg/L		0.0005	18-APR-12
Cobalt (Co)			<0.00050		mg/L		0.0005	18-APR-12
Copper (Cu)			<0.0010		mg/L		0.001	18-APR-12
Iron (Fe)			<0.050		mg/L		0.05	18-APR-12
Lead (Pb)			<0.0010		mg/L		0.001	18-APR-12
Magnesium (Mg)			<0.50		mg/L		0.5	18-APR-12
Manganese (Mn)			<0.0010		mg/L		0.001	18-APR-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	18-APR-12
Nickel (Ni)			<0.0020		mg/L		0.002	18-APR-12
Potassium (K)			<1.0		mg/L		1	18-APR-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	18-APR-12
Silicon (Si)			<1.0		mg/L		1	18-APR-12
Silver (Ag)			<0.00010		mg/L		0.0001	18-APR-12
Strontium (Sr)			<0.0010		mg/L		0.001	18-APR-12
Thallium (Tl)			<0.00030		mg/L		0.0003	18-APR-12
Tin (Sn)			<0.0010		mg/L		0.001	18-APR-12
Titanium (Ti)			<0.0020		mg/L		0.002	18-APR-12
Tungsten (W)			<0.010		mg/L		0.01	18-APR-12
Uranium (U)			<0.0050		mg/L		0.005	18-APR-12
Vanadium (V)			<0.0010		mg/L		0.001	18-APR-12
Zinc (Zn)			<0.0030		mg/L		0.003	18-APR-12
Zirconium (Zr)			<0.0040		mg/L		0.004	18-APR-12
WG1458146-5 MS		**WG1458146-3**						
Aluminum (Al)			N/A	MS-B	%		-	18-APR-12
Antimony (Sb)			95.3		%		70-130	18-APR-12
Arsenic (As)			99.9		%		70-130	18-APR-12
Barium (Ba)			103.2		%		70-130	18-APR-12
Beryllium (Be)			94.0		%		70-130	18-APR-12
Bismuth (Bi)			100.4		%		70-130	18-APR-12
Boron (B)			99.96		%		70-130	18-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 R2352521								
WG1458146-5 MS		**WG1458146-3**						
Cadmium (Cd)-Total			97.7		%		70-130	18-APR-12
Calcium (Ca)			N/A	MS-B	%		-	18-APR-12
Chromium (Cr)			97.0		%		70-130	18-APR-12
Cobalt (Co)			96.8		%		70-130	18-APR-12
Copper (Cu)			92.5		%		70-130	18-APR-12
Iron (Fe)			100.7		%		70-130	18-APR-12
Lead (Pb)			97.0		%		70-130	18-APR-12
Magnesium (Mg)			N/A	MS-B	%		-	18-APR-12
Manganese (Mn)			99.1		%		70-130	18-APR-12
Molybdenum (Mo)			97.4		%		70-130	18-APR-12
Nickel (Ni)			97.0		%		70-130	18-APR-12
Potassium (K)			100.3		%		70-130	18-APR-12
Selenium (Se)-Total			97.4		%		70-130	18-APR-12
Silicon (Si)			121.1		%		70-130	18-APR-12
Silver (Ag)			99.2		%		70-130	18-APR-12
Strontium (Sr)			N/A	MS-B	%		-	18-APR-12
Thallium (Tl)			97.9		%		70-130	18-APR-12
Tin (Sn)			98.0		%		70-130	18-APR-12
Titanium (Ti)			98.1		%		70-130	18-APR-12
Tungsten (W)			105.8		%		70-130	18-APR-12
Uranium (U)			99.5		%		70-130	18-APR-12
Vanadium (V)			98.1		%		70-130	18-APR-12
Zinc (Zn)			98.8		%		70-130	18-APR-12
Zirconium (Zr)			94.2		%		70-130	18-APR-12
NH3-WT	**Water**							
Batch R2352537								
WG1458214-2 CVS								
Ammonia, Total (as N)			102.0		%		85-115	18-APR-12
WG1458214-3 DUP		**L1134798-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-APR-12
WG1458214-5 DUP		**L1135352-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-APR-12
WG1458214-7 DUP		**L1135718-6**						
Ammonia, Total (as N)		4.90	4.71		mg/L	4.1	20	18-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
NH3-WT	**Water**							
Batch R2352537								
WG1458214-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	18-APR-12
WG1458214-4 MS		**L1134798-1**						
Ammonia, Total (as N)			76.8		%		75-125	18-APR-12
WG1458214-6 MS		**L1135352-1**						
Ammonia, Total (as N)			90.4		%		75-125	18-APR-12
WG1458214-8 MS		**L1135718-6**						
Ammonia, Total (as N)			N/A	MS-B	%		-	18-APR-12
P-TOTAL-LOW-WT	**Water**							
Batch R2352953								
WG1458247-3 DUP		**L1134798-1**						
Total Phosphorus		0.0069	0.0069		mg/L	0.15	20	18-APR-12
WG1458247-5 DUP		**L1135484-1**						
Total Phosphorus		0.0075	0.0077		mg/L	2.0	20	18-APR-12
WG1458247-2 LCS								
Total Phosphorus			99.6		%		80-120	18-APR-12
WG1458247-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	18-APR-12
WG1458247-4 MS		**L1134798-1**						
Total Phosphorus			100.7		%		70-130	18-APR-12
WG1458247-6 MS		**L1135484-1**						
Total Phosphorus			106.1		%		70-130	18-APR-12
PH-WT	**Water**							
Batch R2351975								
WG1457832-2 DUP		**L1134903-2**						
pH		8.22	8.14		pH units	0.98	20	17-APR-12
WG1457832-3 DUP		**L1135281-1**						
pH		9.53	9.58		pH units	0.52	20	17-APR-12
WG1457832-4 DUP		**L1135328-1**						
pH		7.33	7.13		pH units	2.8	20	17-APR-12
WG1457832-1 LCS								
pH			7.03		pH units		6.9-7.1	17-APR-12
SOLIDS-TDS-WT	**Water**							
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**						

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-TDS-WT	**Water**							
Batch R2354538								
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
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 R2352485								
WG1458210-2 CVS								
Total Kjeldahl Nitrogen			92.6		%		80-120	18-APR-12
WG1458167-3 DUP		**L1134572-1**						
Total Kjeldahl Nitrogen		19.2	21.0		mg/L	9.0	20	18-APR-12
WG1458167-4 DUP		**L1135204-1**						
Total Kjeldahl Nitrogen		54.6	52.8		mg/L	3.2	20	18-APR-12
WG1458167-2 LCS								
Total Kjeldahl Nitrogen			96.0		%		80-120	18-APR-12
WG1458167-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	18-APR-12

Quality Control Report

Workorder: L1135328 Report Date: 23-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.

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

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX			SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	ANALYSIS REQUEST											INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)	
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER			Anions4	Alk, EC, pH, TDS, TSS	DOC	Metals (PWQO)	NH3, TKN, TP(LL)							COMMENTS	LAB ID
12/04/16	1302		X	X			Big Eddy Baseline	5	X	X	X	X	X								1
12/04/16	1315		X	X			Replicate 1	5	X	X	X	X	X								2

SUBMISSION # L1135328
ENTERED BY: RH
DATE/TIME ENTERED: 17-APR-12
BIN # 336

L1135328-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLE CONDITION
FROZEN
COLD ✓
AMBIENT
MEAN TEMP 7.9
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___
INIT RH

SAMPLED BY:	DATE & TIME 16 APR 2012 1255	RECEIVED BY:	DATE & TIME
RELINQUISHED BY:	DATE & TIME 16 Apr 2012 1430	RECEIVED AT LAB BY: RH	DATE & TIME 17-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

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

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 18, 2012
Sampling Date: April 16, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.: .
Date Analysed: April 27, 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)

Comments: Sample bottles for 'HM Up #1' and 'Big Eddy #2' cracked in Flett freezer. Samples were successfullly recovered before sample distillation.

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

		pg of MeHg in whole ethylation EPA vial	Gross Peak Area	Mean Ethylation Blank (ng/L)
Blanks	Ethylation blank (H_20+Reagent)	0.49	1719	
	Mean Eth. Blank (last 30 runs)	0.62		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.17	2330	0.01
	Method Blank 2	0.22	2477	0.01
	Method Blank 3	0.01	1763	0.00
	Mean Method Blank	**0.14**		**0.01**

		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
Standards	Mean Value			5959	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 (%)**
	(HM Down #1)	MS2	355308	100%	47.9	4.15	97.4
	(HM Down #1)	MS2D	350112	100%	48.0	4.08	95.8
	Mean of Recoveries						**96.6**
QC Samples	MeOPR ID0801 (1000ng/L)		144984	100%	0.2	954	95.4
	MeOPR ID0801 (1000ng/L)	**Repeat Aliquot**	172769	100%	0.2	898	89.8
	Mean of MeOPR					926	**92.6**
	A.S.S.-Alfa ID0702 (1000 ng/L)		342538	100%		972	**97.2**

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]
57138		HM Down #1	April 16, 2012		8615	96.6	44.20	**0.09**
57139		HM Down #2	April 16, 2012		8648	96.6	46.68	**0.08**
57140		HM Up #1	April 16, 2012		5909	96.6	46.56	**~0.04**
57141		HM Up #2	April 16, 2012		7083	96.6	46.53	**~0.07**
57141		HM Up #2	April 16, 2012	**Duplicate**	6660	96.6	46.44	**~0.06**
57142		Big Eddy #1	April 16, 2012		6274	96.6	47.27	**~0.05**
57143		Big Eddy #2	April 16, 2012		9180	96.6	47.70	**0.08**

* : See 'Comments' section above for discussion.

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

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

Date Received: 24-AUG-12
Report Date: 31-AUG-12 13:37 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1199130

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

Mary-Lynn Pires
Account Manager

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1199130-1 BID EDDY BASELINE						
Sampled By: K.BEATTY on 23-AUG-12 @ 12:23						
Matrix: WATER						
Physical Tests						
Conductivity	47.0		3.0	umhos/cm	24-AUG-12	
pH	7.35		0.10	pH units	24-AUG-12	6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	30-AUG-12	
Total Dissolved Solids	40		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	13		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	28-AUG-12	
Chloride	<2.0		2.0	mg/L	25-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	25-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	25-AUG-12	
Total Kjeldahl Nitrogen	0.53		0.15	mg/L	28-AUG-12	
Total Phosphorus	0.0057		0.0030	mg/L	29-AUG-12	0.02
Sulphate	4.7		2.0	mg/L	25-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.6		1.0	mg/L	28-AUG-12	
Total Metals						
Aluminum (Al)	0.020		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)	0.021		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	30-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	30-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	4.31		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)	0.149		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	1.48		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0253		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	26-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	30-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)	0.0355		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
L1199130-1 BID EDDY BASELINE Sampled By: K.BEATTY on 23-AUG-12 @ 12:23 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
L1199130-2 REPLICATE 2 Sampled By: K.BEATTY on 23-AUG-12 @ 12:11 Matrix: WATER						#1
Physical Tests						
Conductivity	44.0		3.0	umhos/cm	24-AUG-12	
pH	6.49		0.10	pH units	24-AUG-12	*6.5-8.5
Total Suspended Solids	<3.0		3.0	mg/L	30-AUG-12	
Total Dissolved Solids	38		20	mg/L	25-AUG-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	11		10	mg/L	28-AUG-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	28-AUG-12	
Chloride	<2.0		2.0	mg/L	25-AUG-12	
Nitrate-N	<0.10		0.10	mg/L	25-AUG-12	
Nitrite-N	<0.10		0.10	mg/L	25-AUG-12	
Total Kjeldahl Nitrogen	0.50		0.15	mg/L	28-AUG-12	
Total Phosphorus	0.0065		0.0030	mg/L	29-AUG-12	0.02
Sulphate	4.7		2.0	mg/L	25-AUG-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	5.7		1.0	mg/L	28-AUG-12	
Total Metals						
Aluminum (Al)	0.023		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)	0.022		0.010	mg/L	29-AUG-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	30-AUG-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	29-AUG-12	
Boron (B)	<0.050		0.050	mg/L	30-AUG-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	29-AUG-12	0.0001
Calcium (Ca)	4.31		0.50	mg/L	29-AUG-12	
Chromium (Cr)	0.00058		0.00050	mg/L	30-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)	0.147		0.050	mg/L	29-AUG-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	29-AUG-12	0.001
Magnesium (Mg)	1.50		0.50	mg/L	29-AUG-12	
Manganese (Mn)	0.0236		0.0010	mg/L	29-AUG-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	26-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	30-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

** 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
L1199130-2 REPLICATE 2						
Sampled By: K.BEATTY on 23-AUG-12 @ 12:11						
Matrix: WATER						
Total Metals						
Strontium (Sr)	0.0356		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)	0.0039		0.0030	mg/L	29-AUG-12	0.02
Zirconium (Zr)	<0.0040		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

Sample Parameter Qualifier key listed:

Qualifier	Description
CINT	Cooling initiated. Samples were packaged with ice or ice packs upon receipt.

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.

Quality Control Report

Workorder: L1199130 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
WG1535173-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	28-AUG-12
ANIONS4-WT	**Water**							
Batch R2425072								
WG1533995-3 LCS								
Chloride			101.5		%		85-115	25-AUG-12
Nitrite-N			96.0		%		85-115	25-AUG-12
Nitrate-N			99.8		%		85-115	25-AUG-12
Sulphate			103.5		%		85-115	25-AUG-12
WG1533995-4 LCSD		**WG1533995-3**						
Chloride		101.5	101.7		%	0.2	25	25-AUG-12
Nitrite-N		96.0	96.2		%	0.2	25	25-AUG-12
Nitrate-N		99.8	100.3		%	0.5	25	25-AUG-12
Sulphate		103.5	103.7		%	0.2	25	25-AUG-12
WG1533995-1 MB								
Chloride			<2.0		mg/L		2	25-AUG-12
Nitrite-N			<0.10		mg/L		0.1	25-AUG-12
Nitrate-N			<0.10		mg/L		0.1	25-AUG-12
Sulphate			<2.0		mg/L		2	25-AUG-12
C-DIS-ORG-WT	**Water**							
Batch R2426082								
WG1535197-3 DUP		**L1199139-1**						
Dissolved Organic Carbon		3.0	3.0		mg/L	1.7	20	28-AUG-12
WG1535197-5 DUP		**L1199817-5**						

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
C-DIS-ORG-WT	**Water**							
Batch R2426082								
WG1535197-5 DUP		**L1199817-5**						
Dissolved Organic Carbon		4.3	4.3		mg/L	0.7	20	28-AUG-12
WG1535197-2 LCS								
Dissolved Organic Carbon			97.0		%		80-120	28-AUG-12
WG1535197-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	28-AUG-12
WG1535197-4 MS		**L1199139-1**						
Dissolved Organic Carbon			80.2		%		70-130	28-AUG-12
WG1535197-6 MS		**L1199817-5**						
Dissolved Organic Carbon			83.7		%		70-130	28-AUG-12
EC-WT	**Water**							
Batch R2424250								
WG1533395-1 CVS								
Conductivity			100.4		%		90-110	24-AUG-12
WG1533395-3 DUP		**L1198634-1**						
Conductivity		2720	2710		umhos/cm	0.4	10	24-AUG-12
WG1533395-4 DUP		**L1199067-4**						
Conductivity		2000	2000		umhos/cm	0.2	10	24-AUG-12
WG1533395-5 DUP		**L1198631-3**						
Conductivity		9680	9600		umhos/cm	0.9	10	24-AUG-12
WG1533395-2 MB								
Conductivity			<3.0		umhos/cm		3	24-AUG-12
HG-ONT-PWQO-WT	**Water**							
Batch R2424055								
WG1533562-4 DUP		**WG1533562-3**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-AUG-12
WG1533562-2 LCS								
Mercury (Hg)			97.0		%		80-120	26-AUG-12
WG1533562-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	26-AUG-12
WG1533562-6 MS		**WG1533562-5**						
Mercury (Hg)			95.5		%		70-130	26-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

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								
WG1535211-2 CVS								
Arsenic (As)			99.1		%		80-120	29-AUG-12
Barium (Ba)			105.4		%		80-120	29-AUG-12
Bismuth (Bi)			108.0		%		80-120	29-AUG-12
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
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
WG1534354-4 DUP		**WG1534354-3**						
Aluminum (Al)		<0.010	<0.010	RPD-NA	mg/L	N/A	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)		0.015	0.015		mg/L	0.5	20	29-AUG-12
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	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								
WG1534354-4 DUP		**WG1534354-3**						
Calcium (Ca)		19.0	19.2		mg/L	1.3	20	29-AUG-12
Chromium (Cr)		0.00050	0.00080	J	mg/L	0.00029	0.001	29-AUG-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	29-AUG-12
Copper (Cu)		0.0120	0.0123		mg/L	2.5	20	29-AUG-12
Iron (Fe)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	29-AUG-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	29-AUG-12
Magnesium (Mg)		4.66	4.71		mg/L	1.0	20	29-AUG-12
Manganese (Mn)		0.0058	0.0058		mg/L	0.3	20	29-AUG-12
Molybdenum (Mo)		0.0010	0.0013	J	mg/L	0.0002	0.002	29-AUG-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	29-AUG-12
Potassium (K)		1.3	1.3		mg/L	1.6	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)		0.0922	0.0946		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)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	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)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	29-AUG-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	29-AUG-12
WG1534354-2 LCS								
Aluminum (Al)			102.2		%		80-120	29-AUG-12
Antimony (Sb)			91.3		%		70-130	29-AUG-12
Arsenic (As)			102.3		%		70-130	29-AUG-12
Barium (Ba)			97.6		%		70-130	29-AUG-12
Bismuth (Bi)			92.9		%		70-130	29-AUG-12
Cadmium (Cd)-Total			91.9		%		70-130	29-AUG-12
Calcium (Ca)			105.4		%		70-130	29-AUG-12
Chromium (Cr)			97.8		%		70-130	29-AUG-12
Cobalt (Co)			95.6		%		70-130	29-AUG-12
Copper (Cu)			96.7		%		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								
WG1534354-2 LCS								
Iron (Fe)			93.9		%		70-130	29-AUG-12
Lead (Pb)			93.6		%		70-130	29-AUG-12
Magnesium (Mg)			96.7		%		70-130	29-AUG-12
Manganese (Mn)			95.4		%		70-130	29-AUG-12
Molybdenum (Mo)			103.9		%		70-130	29-AUG-12
Nickel (Ni)			96.4		%		70-130	29-AUG-12
Potassium (K)			101.7		%		70-130	29-AUG-12
Silicon (Si)			98.8		%		70-130	29-AUG-12
Silver (Ag)			92.7		%		70-130	29-AUG-12
Strontium (Sr)			100.9		%		70-130	29-AUG-12
Thallium (Tl)			93.8		%		70-130	29-AUG-12
Tin (Sn)			86.8		%		70-130	29-AUG-12
Titanium (Ti)			100.5		%		70-130	29-AUG-12
Tungsten (W)			94.8		%		70-130	29-AUG-12
Uranium (U)			85.3		%		70-130	29-AUG-12
Vanadium (V)			98.9		%		70-130	29-AUG-12
Zinc (Zn)			85.9		%		70-130	29-AUG-12
Zirconium (Zr)			94.1		%		70-130	29-AUG-12
WG1534354-1 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
Bismuth (Bi)			<0.0010		mg/L		0.001	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
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

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								
WG1534354-1 MB								
Nickel (Ni)			<0.0020		mg/L		0.002	29-AUG-12
Potassium (K)			<1.0		mg/L		1	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
WG1534354-5 MS		**WG1534354-3**						
Aluminum (Al)			103.6		%		70-130	29-AUG-12
Antimony (Sb)			92.3		%		70-130	29-AUG-12
Arsenic (As)			103.6		%		70-130	29-AUG-12
Barium (Ba)			95.7		%		70-130	29-AUG-12
Bismuth (Bi)			94.5		%		70-130	29-AUG-12
Cadmium (Cd)-Total			91.5		%		70-130	29-AUG-12
Calcium (Ca)			N/A	MS-B	%		-	29-AUG-12
Chromium (Cr)			97.7		%		70-130	29-AUG-12
Cobalt (Co)			97.5		%		70-130	29-AUG-12
Copper (Cu)			96.2		%		70-130	29-AUG-12
Iron (Fe)			96.2		%		70-130	29-AUG-12
Lead (Pb)			94.9		%		70-130	29-AUG-12
Magnesium (Mg)			96.6		%		70-130	29-AUG-12
Manganese (Mn)			95.5		%		70-130	29-AUG-12
Molybdenum (Mo)			106.2		%		70-130	29-AUG-12
Nickel (Ni)			96.3		%		70-130	29-AUG-12
Potassium (K)			105.3		%		70-130	29-AUG-12
Silicon (Si)			108.7		%		70-130	29-AUG-12
Silver (Ag)			92.4		%		70-130	29-AUG-12
Strontium (Sr)			105.6		%		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								
WG1534354-5 MS		**WG1534354-3**						
Thallium (Tl)			94.0		%		70-130	29-AUG-12
Tin (Sn)			87.1		%		70-130	29-AUG-12
Titanium (Ti)			101.6		%		70-130	29-AUG-12
Tungsten (W)			95.0		%		70-130	29-AUG-12
Uranium (U)			86.8		%		70-130	29-AUG-12
Vanadium (V)			99.8		%		70-130	29-AUG-12
Zinc (Zn)			86.7		%		70-130	29-AUG-12
Zirconium (Zr)			96.4		%		70-130	29-AUG-12
Batch R2427064								
WG1537269-2 CVS								
Beryllium (Be)			106.5		%		80-120	30-AUG-12
Boron (B)			104.2		%		70-130	30-AUG-12
Chromium (Cr)			104.0		%		80-120	30-AUG-12
Selenium (Se)-Total			98.9		%		80-120	30-AUG-12
WG1534354-4 DUP		**WG1534354-3**						
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-AUG-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-AUG-12
Selenium (Se)-Total		0.00052	<0.00040	RPD-NA	mg/L	N/A	20	30-AUG-12
WG1534354-2 LCS								
Beryllium (Be)			113.3		%		70-130	30-AUG-12
Boron (B)			105.7		%		70-130	30-AUG-12
Selenium (Se)-Total			97.7		%		70-130	30-AUG-12
WG1534354-1 MB								
Beryllium (Be)			<0.0010		mg/L		0.001	30-AUG-12
Boron (B)			<0.050		mg/L		0.05	30-AUG-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	30-AUG-12
WG1534354-5 MS		**WG1534354-3**						
Beryllium (Be)			106.6		%		70-130	30-AUG-12
Boron (B)			110.5		%		70-130	30-AUG-12
Selenium (Se)-Total			100.7		%		70-130	30-AUG-12
NH3-WT	**Water**							
Batch R2425137								
WG1535232-2 CVS								
Ammonia, Total (as N)			94.4		%		85-115	28-AUG-12
WG1535232-3 DUP		**L1199130-1**						

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
NH3-WT	**Water**							
Batch R2425137								
WG1535232-3 DUP		**L1199130-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-12
WG1535232-5 DUP		**L1199602-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-12
WG1535232-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-AUG-12
WG1535232-4 MS		**L1199130-1**						
Ammonia, Total (as N)			93.6		%		75-125	28-AUG-12
WG1535232-6 MS		**L1199602-1**						
Ammonia, Total (as N)			98.4		%		75-125	28-AUG-12
P-TOTAL-LOW-WT	**Water**							
Batch R2426024								
WG1536062-3 DUP		**L1199078-1**						
Total Phosphorus		173	173		mg/L	0.3	20	29-AUG-12
WG1536062-5 DUP		**L1199078-14**						
Total Phosphorus		68.2	68.6		mg/L	0.6	20	29-AUG-12
WG1536062-7 DUP		**L1199140-5**						
Total Phosphorus		0.0076	0.0065		mg/L	15	20	29-AUG-12
WG1536062-2 LCS								
Total Phosphorus			97.6		%		80-120	29-AUG-12
WG1536062-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	29-AUG-12
WG1536062-4 MS		**L1199078-1**						
Total Phosphorus			N/A	MS-B	%		-	29-AUG-12
WG1536062-6 MS		**L1199078-14**						
Total Phosphorus			N/A	MS-B	%		-	29-AUG-12
WG1536062-8 MS		**L1199140-5**						
Total Phosphorus			88.0		%		70-130	29-AUG-12
PH-WT	**Water**							
Batch R2424242								
WG1533383-2 DUP		**L1198855-1**						
pH		7.55	7.60		pH units	0.7	20	24-AUG-12
WG1533383-3 DUP		**L1198934-3**						
pH		7.81	7.87		pH units	0.8	20	24-AUG-12
WG1533383-4 DUP		**L1198631-3**						
pH		2.29	2.20		pH units	4.0	20	24-AUG-12
WG1533383-1 LCS								
pH			6.94		pH units		6.9-7.1	24-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
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 R2426617								
WG1536215-3 DUP		**L1198875-7**						
Total Suspended Solids		6000	6100		mg/L	1.7	20	30-AUG-12
WG1536215-4 DUP		**L1199037-4**						
Total Suspended Solids		2670	2730		mg/L	2.5	20	30-AUG-12
WG1536215-5 DUP		**L1199037-5**						
Total Suspended Solids		2600	2670		mg/L	2.5	20	30-AUG-12
WG1536215-6 DUP		**L1199037-7**						
Total Suspended Solids		5000	5030		mg/L	0.7	20	30-AUG-12
WG1536215-1 LCS								
Total Suspended Solids			99.6		%		80-120	30-AUG-12
WG1536215-2 MB								
Total Suspended Solids			<3.0		mg/L		3	30-AUG-12
TKN-WT	**Water**							
Batch R2425212								
WG1534345-4 CRM		**ERA525**						
Total Kjeldahl Nitrogen			103.3		%		80-120	28-AUG-12
WG1535427-1 CVS								
Total Kjeldahl Nitrogen			99.5		%		75-125	28-AUG-12
WG1534345-3 DUP		**L1199139-1**						
Total Kjeldahl Nitrogen		0.47	0.39		mg/L	18	20	28-AUG-12
WG1534345-5 DUP		**L1199381-3**						
Total Kjeldahl Nitrogen		123	127		mg/L	3.7	20	28-AUG-12
WG1534345-2 LCS								
Total Kjeldahl Nitrogen			101.8		%		80-120	28-AUG-12
WG1534345-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	28-AUG-12

Quality Control Report

Workorder: L1199130 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
J	Duplicate results and limits are expressed in terms of absolute difference.
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.

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 ___
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_____

SUBMISSION # L1199130
ENTERED BY: MLP
DATE/TIME ENTERED: 8/24/12
BIN # 588

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX			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
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER									
23/08/12	1223		✓	X			Big Eddy Baseline	5	X	X	X	X	X		1
12/08/23	1211		✓	X			Replicate 2	5	X	X	X	X	X		2

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

L1199130-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLE CONDITION
FROZEN
COLD /
AMBIENT
MEAN TEMP 18.4 C
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___
INIT KS

SAMPLED BY: KRISTI BEATTY	DATE & TIME 1211 23Aug 2012	RECEIVED BY:	DATE & TIME
RELINQUISHED BY: K Beatty	DATE & TIME 1340 23Aug2012	RECEIVED AT LAB BY: KSM	DATE & TIME AUG 24/12 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

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: April 18, 2012
Sampling Date(s): April 16, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: April 25, 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		1397	1337	1379	1475	
	Bubbler Blank (pg)		0.42	0.40	0.41	0.44	
Standards			Gross Peak Area	Net Peak Area	Area Units/ ng		
	Hg STD Mean				**3350888**		
		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)		630006		**5.12**	0.03	**100**
	Baker QCS (1000 ng/L)	QCS-3	335986	0.10	**998.51**	0.00	**99.9**
Method/Bottle Blanks	125ml glass bottle(washed Apr 20/12)	MBlk-1	13621	42.77	**0.03**	0.02	
	F142(washed Apr 20/12)	MBlk-2	10453	36.19	**0.02**	0.02	
	FR205(new bottle-washed Apr 24/12)	MBlk-3	7142	43.72	**-0.02**	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)
	HM Down #1	April 16, 2012		251964	33.54	**2.21**	0.02
	HM Down #2	April 16, 2012		263909	35.24	**2.21**	0.02
	HM Up #1	April 16, 2012		408943	55.36	**2.18**	0.02
	HM Up #2	April 16, 2012		288015	38.97	**2.18**	0.02
	Big Eddy #1	April 16, 2012		324255	32.56	**2.95**	0.02
	Big Eddy #2	April 16, 2012		348051	34.87	**2.96**	0.03

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* : See 'Comments' section above for discussion.
~ : Below our official detection limit for this analyte in this matrix.

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: November 22, 2012
Sampling Date(s): November 19, 2012 to November 20, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.:
Date Analysed: December 6, 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		1317	1216	1624	1111	
	Bubbler Blank (pg)		0.46	0.43	0.57	0.39	
Standards			Gross Peak Area	Net Peak Area	Area Units/ ng		
	Hg STD Mean				**2855211**		
		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)		506807		**4.99**	0.03	**97**
	Baker QCS (1000 ng/L)	QCS-3	277023	0.10	**965.63**	0.00	**96.6**
Method/Bottle Blanks	Trish19	MBlk-1	7308	32.92	**0.03**	0.02	
	Roulet82(washed Nov 26/12)	MBlk-2	8464	33.30	**0.04**	0.02	
	FR40(washed Nov 26/12)	MBlk-3	6821	30.99	**0.03**	0.02	
Sample Spike Recovery	Big Eddy Replicate (RUDD193)	Sample-1-US	211816	32.89	**2.23**	0.02	**MS/MSD Hg Recovery (%)** (71-125% limit)
	Mean of Recoveries				99.50		**99.5**

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)
Marter Twp Baseline	FR38	November 19, 2012		291467	33.66	**3.01**	0.02
Big Eddy Baseline	FR233	November 20, 2012		254103	42.60	**2.07**	0.02
Marter Twp Dup-2	FR223	November 19, 2012		267984	30.24	**3.08**	0.02
Big Eddy Replicate	RUDD193	November 20, 2012		211816	32.89	**2.23**	0.02

W:\Projects\2013\130003-Xeneca-2012Reports\Job\Reports\Drafts\Big Eddy\Appendix D - Laboratory Certificates of Analysis\TMWATR120612ZB3.xls

* : See 'Comments' section above for discussion.

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

ISO/IEC17025:2005 Accredited with the Canadian Association for Laboratory Accreditation

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

Date Received: 23-NOV-12
Report Date: 28-NOV-12 13:33 (MT)
Version: FINAL

Client Phone: 705-645-0021

Certificate of Analysis

Lab Work Order #: L1241193

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

Lindsay D. Zuiker
Account Manager

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1
L1241193-1 BID EDDY BASELINE						
Sampled By: CLIENT on 20-NOV-12						
Matrix: WATER						
Physical Tests						
Conductivity	35.9		3.0	umhos/cm	23-NOV-12	
pH	7.15		0.10	pH units	23-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	24-NOV-12	
Total Dissolved Solids	34		20	mg/L	28-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	12		10	mg/L	23-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	26-NOV-12	
Chloride	<2.0		2.0	mg/L	23-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	23-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	23-NOV-12	
Total Kjeldahl Nitrogen	0.35		0.15	mg/L	26-NOV-12	
Total Phosphorus	<0.0030		0.0030	mg/L	26-NOV-12	0.02
Sulphate	5.4		2.0	mg/L	23-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	7.0		1.0	mg/L	26-NOV-12	
Total Metals						
Aluminum (Al)	0.050		0.010	mg/L	26-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	26-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	26-NOV-12	0.005
Barium (Ba)	0.018		0.010	mg/L	26-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	26-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	26-NOV-12	
Boron (B)	<0.050		0.050	mg/L	26-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	26-NOV-12	0.0001
Calcium (Ca)	3.54		0.50	mg/L	26-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	26-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	26-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	26-NOV-12	0.001
Iron (Fe)	0.177		0.050	mg/L	26-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	26-NOV-12	0.001
Magnesium (Mg)	1.17		0.50	mg/L	26-NOV-12	
Manganese (Mn)	0.0103		0.0010	mg/L	26-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	26-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	26-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	26-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	26-NOV-12	0.1
Silicon (Si)	2.6		1.0	mg/L	26-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	26-NOV-12	0.0001
Strontium (Sr)	0.0253		0.0010	mg/L	26-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	26-NOV-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	26-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	26-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	26-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	26-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	26-NOV-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
L1241193-1 BID EDDY BASELINE						
Sampled By: CLIENT on 20-NOV-12						
Matrix: WATER						#1
Total Metals						
Zinc (Zn)	<0.0030		0.0030	mg/L	26-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	26-NOV-12	0.004
L1241193-2 REPLICATE						
Sampled By: CLIENT on 20-NOV-12						
Matrix: WATER						#1
Physical Tests						
Conductivity	35.8		3.0	umhos/cm	23-NOV-12	
pH	7.06		0.10	pH units	23-NOV-12	6.5-8.5
Total Suspended Solids	<2.0		2.0	mg/L	24-NOV-12	
Total Dissolved Solids	34		20	mg/L	28-NOV-12	
Anions and Nutrients						
Alkalinity, Total (as CaCO3)	12		10	mg/L	23-NOV-12	
Ammonia, Total (as N)	<0.050		0.050	mg/L	26-NOV-12	
Chloride	<2.0		2.0	mg/L	23-NOV-12	
Nitrate-N	<0.10		0.10	mg/L	23-NOV-12	
Nitrite-N	<0.10		0.10	mg/L	23-NOV-12	
Total Kjeldahl Nitrogen	0.27		0.15	mg/L	26-NOV-12	
Total Phosphorus	<0.0030		0.0030	mg/L	26-NOV-12	0.02
Sulphate	5.0		2.0	mg/L	23-NOV-12	
Organic / Inorganic Carbon						
Dissolved Organic Carbon	7.0		1.0	mg/L	26-NOV-12	
Total Metals						
Aluminum (Al)	0.041		0.010	mg/L	26-NOV-12	*0.015
Antimony (Sb)	<0.0050		0.0050	mg/L	26-NOV-12	0.02
Arsenic (As)	<0.0010		0.0010	mg/L	26-NOV-12	0.005
Barium (Ba)	0.017		0.010	mg/L	26-NOV-12	
Beryllium (Be)	<0.0010		0.0010	mg/L	26-NOV-12	0.011
Bismuth (Bi)	<0.0010		0.0010	mg/L	26-NOV-12	
Boron (B)	<0.050		0.050	mg/L	26-NOV-12	0.2
Cadmium (Cd)-Total	<0.000090		0.000090	mg/L	26-NOV-12	0.0001
Calcium (Ca)	3.37		0.50	mg/L	26-NOV-12	
Chromium (Cr)	<0.00050		0.00050	mg/L	26-NOV-12	
Cobalt (Co)	<0.00050		0.00050	mg/L	26-NOV-12	0.0009
Copper (Cu)	<0.0010		0.0010	mg/L	26-NOV-12	0.001
Iron (Fe)	0.168		0.050	mg/L	26-NOV-12	0.3
Lead (Pb)	<0.0010		0.0010	mg/L	26-NOV-12	0.001
Magnesium (Mg)	1.12		0.50	mg/L	26-NOV-12	
Manganese (Mn)	0.0096		0.0010	mg/L	26-NOV-12	
Mercury (Hg)	<0.00010		0.00010	mg/L	23-NOV-12	0.0002
Molybdenum (Mo)	<0.0010		0.0010	mg/L	26-NOV-12	0.04
Nickel (Ni)	<0.0020		0.0020	mg/L	26-NOV-12	0.025
Potassium (K)	<1.0		1.0	mg/L	26-NOV-12	
Selenium (Se)-Total	<0.00040		0.00040	mg/L	26-NOV-12	0.1
Silicon (Si)	2.5		1.0	mg/L	26-NOV-12	
Silver (Ag)	<0.00010		0.00010	mg/L	26-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
L1241193-2 REPLICATE Sampled By: CLIENT on 20-NOV-12 Matrix: WATER						
Total Metals						
Strontium (Sr)	0.0245		0.0010	mg/L	26-NOV-12	
Thallium (Tl)	<0.00030		0.00030	mg/L	26-NOV-12	0.0003
Tin (Sn)	<0.0010		0.0010	mg/L	26-NOV-12	
Titanium (Ti)	<0.0020		0.0020	mg/L	26-NOV-12	
Tungsten (W)	<0.010		0.010	mg/L	26-NOV-12	0.03
Uranium (U)	<0.0050		0.0050	mg/L	26-NOV-12	0.005
Vanadium (V)	<0.0010		0.0010	mg/L	26-NOV-12	0.006
Zinc (Zn)	<0.0030		0.0030	mg/L	26-NOV-12	0.02
Zirconium (Zr)	<0.0040		0.0040	mg/L	26-NOV-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, 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.

Quality Control Report

Workorder: L1241193 Report Date: 28-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 R2484023								
WG1591071-5 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			111.6		%		80-120	23-NOV-12
WG1591071-2 CVS								
Alkalinity, Total (as CaCO3)			104.7		%		70-130	23-NOV-12
WG1591071-3 DUP		**L1240604-2**						
Alkalinity, Total (as CaCO3)		494	493		mg/L	0.0	20	23-NOV-12
WG1591071-4 DUP		**L1241102-1**						
Alkalinity, Total (as CaCO3)		246	248		mg/L	0.9	20	23-NOV-12
WG1591071-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	23-NOV-12
ANIONS4-WT	**Water**							
Batch R2483598								
WG1591220-6 DUP		**L1241043-3**						
Chloride		22.5	22.5		mg/L	0.1	20	23-NOV-12
Nitrite-N		<0.10	<0.10	RPD-NA	mg/L	N/A	20	23-NOV-12
Nitrate-N		1.50	1.50		mg/L	0.0	20	23-NOV-12
Sulphate		24.9	24.9		mg/L	0.1	20	23-NOV-12
WG1591220-3 LCS								
Chloride			100.7		%		85-115	23-NOV-12
Nitrite-N			96.4		%		85-115	23-NOV-12
Nitrate-N			98.4		%		85-115	23-NOV-12
Sulphate			102.7		%		85-115	23-NOV-12
WG1591220-4 LCSD		**WG1591220-3**						
Chloride		100.7	100.8		%	0.1	25	23-NOV-12
Nitrite-N		96.4	96.4		%	0.0	25	23-NOV-12
Nitrate-N		98.4	99.0		%	0.6	25	23-NOV-12
Sulphate		102.7	102.9		%	0.2	25	23-NOV-12
WG1591220-1 MB								
Chloride			<2.0		mg/L		2	23-NOV-12
Nitrite-N			<0.10		mg/L		0.1	23-NOV-12
Nitrate-N			<0.10		mg/L		0.1	23-NOV-12
Sulphate			<2.0		mg/L		2	23-NOV-12
C-DIS-ORG-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
C-DIS-ORG-WT	**Water**							
Batch R2485322								
WG1592216-3 DUP		**L1241254-1**						
Dissolved Organic Carbon		3.3	3.4		mg/L	2.4	20	26-NOV-12
WG1592216-5 DUP		**L1241193-2**						
Dissolved Organic Carbon		7.0	6.9		mg/L	2.2	20	26-NOV-12
WG1592216-2 LCS								
Dissolved Organic Carbon			92.0		%		80-120	26-NOV-12
WG1592216-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	26-NOV-12
WG1592216-4 MS		**L1241254-1**						
Dissolved Organic Carbon			94.0		%		70-130	26-NOV-12
EC-WT	**Water**							
Batch R2484025								
WG1590984-1 CVS								
Conductivity			99.1		%		90-110	23-NOV-12
WG1590984-3 DUP		**L1241127-4**						
Conductivity		304	293		umhos/cm	3.6	10	23-NOV-12
WG1590984-4 DUP		**L1241281-3**						
Conductivity		44.9	45.3		umhos/cm	1.0	10	23-NOV-12
WG1590984-2 MB								
Conductivity			<3.0		umhos/cm		3	23-NOV-12
HG-ONT-PWQO-WT	**Water**							
Batch R2483304								
WG1591290-4 DUP		**WG1591290-3**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	23-NOV-12
WG1591290-2 LCS								
Mercury (Hg)			91.5		%		80-120	23-NOV-12
WG1591290-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	23-NOV-12
WG1591290-6 MS		**WG1591290-5**						
Mercury (Hg)			94.1		%		70-130	23-NOV-12
MET-ONT-PWQO-WT	**Water**							
Batch R2484430								
WG1592032-2 CVS								
Aluminum (Al)			104.8		%		80-120	26-NOV-12
Antimony (Sb)			101.7		%		80-120	26-NOV-12
Arsenic (As)			98.7		%		80-120	26-NOV-12
Barium (Ba)			101.0		%		80-120	26-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 R2484430								
WG1592032-2 CVS								
Beryllium (Be)			112.3		%		80-120	26-NOV-12
Bismuth (Bi)			102.1		%		80-120	26-NOV-12
Boron (B)			112.9		%		70-130	26-NOV-12
Cadmium (Cd)-Total			105.9		%		80-120	26-NOV-12
Calcium (Ca)			102.5		%		80-120	26-NOV-12
Chromium (Cr)			100.6		%		80-120	26-NOV-12
Cobalt (Co)			99.0		%		80-120	26-NOV-12
Copper (Cu)			103.1		%		80-120	26-NOV-12
Iron (Fe)			104.9		%		80-120	26-NOV-12
Lead (Pb)			103.8		%		80-120	26-NOV-12
Magnesium (Mg)			102.7		%		80-120	26-NOV-12
Manganese (Mn)			107.4		%		80-120	26-NOV-12
Molybdenum (Mo)			98.4		%		90-110	26-NOV-12
Nickel (Ni)			103.0		%		80-120	26-NOV-12
Potassium (K)			98.9		%		80-120	26-NOV-12
Selenium (Se)-Total			98.5		%		80-120	26-NOV-12
Silicon (Si)			100.8		%		70-130	26-NOV-12
Silver (Ag)			105.0		%		80-120	26-NOV-12
Strontium (Sr)			97.9		%		80-120	26-NOV-12
Thallium (Tl)			105.3		%		80-120	26-NOV-12
Tin (Sn)			101.0		%		70-130	26-NOV-12
Titanium (Ti)			102.4		%		80-120	26-NOV-12
Tungsten (W)			101.1		%		70-130	26-NOV-12
Uranium (U)			102.0		%		80-120	26-NOV-12
Vanadium (V)			100.5		%		80-120	26-NOV-12
Zinc (Zn)			102.2		%		80-120	26-NOV-12
Zirconium (Zr)			96.6		%		80-120	26-NOV-12
WG1591168-4 DUP		**WG1591168-3**						
Aluminum (Al)		0.044	0.042		mg/L	5.1	20	26-NOV-12
Antimony (Sb)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	26-NOV-12
Arsenic (As)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Barium (Ba)		0.018	0.017		mg/L	4.2	20	26-NOV-12
Beryllium (Be)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-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 R2484430								
WG1591168-4 DUP		**WG1591168-3**						
Bismuth (Bi)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Boron (B)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-NOV-12
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	26-NOV-12
Calcium (Ca)		3.43	3.24		mg/L	5.9	20	26-NOV-12
Chromium (Cr)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	26-NOV-12
Cobalt (Co)		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	26-NOV-12
Copper (Cu)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Iron (Fe)		0.175	0.169		mg/L	3.8	20	26-NOV-12
Lead (Pb)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Magnesium (Mg)		1.13	1.07		mg/L	5.1	20	26-NOV-12
Manganese (Mn)		0.0102	0.0099		mg/L	2.2	20	26-NOV-12
Molybdenum (Mo)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Nickel (Ni)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	26-NOV-12
Potassium (K)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	26-NOV-12
Selenium (Se)-Total		<0.00040	<0.00040	RPD-NA	mg/L	N/A	20	26-NOV-12
Silicon (Si)		2.5	2.4		mg/L	5.0	20	26-NOV-12
Silver (Ag)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-NOV-12
Strontium (Sr)		0.0254	0.0240		mg/L	5.7	20	26-NOV-12
Thallium (Tl)		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	26-NOV-12
Tin (Sn)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Titanium (Ti)		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	26-NOV-12
Tungsten (W)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	26-NOV-12
Uranium (U)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	26-NOV-12
Vanadium (V)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	26-NOV-12
Zinc (Zn)		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	26-NOV-12
Zirconium (Zr)		<0.0040	<0.0040	RPD-NA	mg/L	N/A	20	26-NOV-12
WG1591168-2 LCS								
Aluminum (Al)			91.6		%		80-120	26-NOV-12
Antimony (Sb)			89.4		%		70-130	26-NOV-12
Arsenic (As)			89.1		%		70-130	26-NOV-12
Barium (Ba)			91.0		%		70-130	26-NOV-12
Beryllium (Be)			88.6		%		70-130	26-NOV-12
Bismuth (Bi)			92.2		%		70-130	26-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 R2484430								
WG1591168-2 LCS								
Boron (B)			82.9		%		70-130	26-NOV-12
Cadmium (Cd)-Total			89.9		%		70-130	26-NOV-12
Calcium (Ca)			92.5		%		70-130	26-NOV-12
Chromium (Cr)			89.8		%		70-130	26-NOV-12
Cobalt (Co)			88.4		%		70-130	26-NOV-12
Copper (Cu)			88.5		%		70-130	26-NOV-12
Iron (Fe)			95.3		%		70-130	26-NOV-12
Lead (Pb)			90.5		%		70-130	26-NOV-12
Magnesium (Mg)			89.5		%		70-130	26-NOV-12
Manganese (Mn)			94.6		%		70-130	26-NOV-12
Molybdenum (Mo)			89.2		%		70-130	26-NOV-12
Nickel (Ni)			88.7		%		70-130	26-NOV-12
Potassium (K)			86.8		%		70-130	26-NOV-12
Selenium (Se)-Total			88.1		%		70-130	26-NOV-12
Silicon (Si)			90.2		%		70-130	26-NOV-12
Silver (Ag)			92.6		%		70-130	26-NOV-12
Strontium (Sr)			90.3		%		70-130	26-NOV-12
Thallium (Tl)			89.6		%		70-130	26-NOV-12
Tin (Sn)			91.4		%		70-130	26-NOV-12
Titanium (Ti)			90.1		%		70-130	26-NOV-12
Tungsten (W)			90.6		%		70-130	26-NOV-12
Uranium (U)			91.6		%		70-130	26-NOV-12
Vanadium (V)			91.4		%		70-130	26-NOV-12
Zinc (Zn)			88.4		%		70-130	26-NOV-12
Zirconium (Zr)			86.5		%		70-130	26-NOV-12
WG1591168-1 MB								
Aluminum (Al)			<0.010		mg/L		0.01	26-NOV-12
Antimony (Sb)			<0.0050		mg/L		0.005	26-NOV-12
Arsenic (As)			<0.0010		mg/L		0.001	26-NOV-12
Barium (Ba)			<0.010		mg/L		0.01	26-NOV-12
Beryllium (Be)			<0.0010		mg/L		0.001	26-NOV-12
Bismuth (Bi)			<0.0010		mg/L		0.001	26-NOV-12
Boron (B)			<0.050		mg/L		0.05	26-NOV-12
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	26-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 R2484430								
WG1591168-1 MB								
Calcium (Ca)			<0.50		mg/L		0.5	26-NOV-12
Chromium (Cr)			<0.00050		mg/L		0.0005	26-NOV-12
Cobalt (Co)			<0.00050		mg/L		0.0005	26-NOV-12
Copper (Cu)			<0.0010		mg/L		0.001	26-NOV-12
Iron (Fe)			<0.050		mg/L		0.05	26-NOV-12
Lead (Pb)			<0.0010		mg/L		0.001	26-NOV-12
Magnesium (Mg)			<0.50		mg/L		0.5	26-NOV-12
Manganese (Mn)			<0.0010		mg/L		0.001	26-NOV-12
Molybdenum (Mo)			<0.0010		mg/L		0.001	26-NOV-12
Nickel (Ni)			<0.0020		mg/L		0.002	26-NOV-12
Potassium (K)			<1.0		mg/L		1	26-NOV-12
Selenium (Se)-Total			<0.00040		mg/L		0.0004	26-NOV-12
Silicon (Si)			<1.0		mg/L		1	26-NOV-12
Silver (Ag)			<0.00010		mg/L		0.0001	26-NOV-12
Strontium (Sr)			<0.0010		mg/L		0.001	26-NOV-12
Thallium (Tl)			<0.00030		mg/L		0.0003	26-NOV-12
Tin (Sn)			<0.0010		mg/L		0.001	26-NOV-12
Titanium (Ti)			<0.0020		mg/L		0.002	26-NOV-12
Tungsten (W)			<0.010		mg/L		0.01	26-NOV-12
Uranium (U)			<0.0050		mg/L		0.005	26-NOV-12
Vanadium (V)			<0.0010		mg/L		0.001	26-NOV-12
Zinc (Zn)			<0.0030		mg/L		0.003	26-NOV-12
Zirconium (Zr)			<0.0040		mg/L		0.004	26-NOV-12
WG1591168-5 MS		**WG1591168-3**						
Aluminum (Al)			91.8		%		70-130	26-NOV-12
Antimony (Sb)			94.3		%		70-130	26-NOV-12
Arsenic (As)			94.0		%		70-130	26-NOV-12
Barium (Ba)			97.8		%		70-130	26-NOV-12
Beryllium (Be)			89.9		%		70-130	26-NOV-12
Bismuth (Bi)			97.7		%		70-130	26-NOV-12
Boron (B)			86.1		%		70-130	26-NOV-12
Cadmium (Cd)-Total			95.6		%		70-130	26-NOV-12
Calcium (Ca)			94.8		%		70-130	26-NOV-12
Chromium (Cr)			92.3		%		70-130	26-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 R2484430								
WG1591168-5 MS		**WG1591168-3**						
Cobalt (Co)			91.8		%		70-130	26-NOV-12
Copper (Cu)			92.3		%		70-130	26-NOV-12
Iron (Fe)			96.9		%		70-130	26-NOV-12
Lead (Pb)			97.4		%		70-130	26-NOV-12
Magnesium (Mg)			86.9		%		70-130	26-NOV-12
Manganese (Mn)			97.5		%		70-130	26-NOV-12
Molybdenum (Mo)			91.9		%		70-130	26-NOV-12
Nickel (Ni)			94.6		%		70-130	26-NOV-12
Potassium (K)			107.4		%		70-130	26-NOV-12
Selenium (Se)-Total			85.5		%		70-130	26-NOV-12
Silicon (Si)			N/A	MS-B	%		-	26-NOV-12
Silver (Ag)			96.8		%		70-130	26-NOV-12
Strontium (Sr)			94.0		%		70-130	26-NOV-12
Thallium (Tl)			97.3		%		70-130	26-NOV-12
Tin (Sn)			95.6		%		70-130	26-NOV-12
Titanium (Ti)			94.3		%		70-130	26-NOV-12
Tungsten (W)			97.8		%		70-130	26-NOV-12
Uranium (U)			99.9		%		70-130	26-NOV-12
Vanadium (V)			93.2		%		70-130	26-NOV-12
Zinc (Zn)			93.5		%		70-130	26-NOV-12
Zirconium (Zr)			87.8		%		70-130	26-NOV-12
NH3-WT	**Water**							
Batch R2484266								
WG1592034-2 CVS								
Ammonia, Total (as N)			99.3		%		85-115	26-NOV-12
WG1592034-3 DUP		**L1240805-1**						
Ammonia, Total (as N)		0.194	0.201		mg/L	3.6	20	26-NOV-12
WG1592034-5 DUP		**L1240889-2**						
Ammonia, Total (as N)		4.62	4.67		mg/L	1.1	20	26-NOV-12
WG1592034-7 DUP		**L1241281-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	26-NOV-12
WG1592034-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	26-NOV-12
WG1592034-4 MS		**L1240805-1**						
Ammonia, Total (as N)			88.2		%		75-125	26-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
NH3-WT	**Water**							
Batch R2484266								
WG1592034-6 MS		**L1240889-2**						
Ammonia, Total (as N)			N/A	MS-B	%		-	26-NOV-12
WG1592034-8 MS		**L1241281-1**						
Ammonia, Total (as N)			88.0		%		75-125	26-NOV-12
P-TOTAL-LOW-WT	**Water**							
Batch R2484510								
WG1592045-3 DUP		**L1240910-1**						
Total Phosphorus		0.853	0.811		mg/L	5.0	20	26-NOV-12
WG1592045-5 DUP		**L1241133-1**						
Total Phosphorus		31.4	31.4		mg/L	0.2	20	26-NOV-12
WG1592045-2 LCS								
Total Phosphorus			99.9		%		80-120	26-NOV-12
WG1592045-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	26-NOV-12
WG1592045-4 MS		**L1240910-1**						
Total Phosphorus			N/A	MS-B	%		-	26-NOV-12
WG1592045-6 MS		**L1241133-1**						
Total Phosphorus			N/A	MS-B	%		-	26-NOV-12
PH-WT	**Water**							
Batch R2483989								
WG1590983-3 DUP		**WG1590983-2**						
pH		9.41	9.59		pH units	1.9	20	23-NOV-12
WG1590983-5 DUP		**L1241127-4**						
pH		8.45	8.49		pH units	0.4	20	23-NOV-12
WG1590983-6 DUP		**L1241281-3**						
pH		6.77	6.65		pH units	1.7	20	23-NOV-12
WG1590983-1 LCS								
pH			7.01		pH units		6.9-7.1	23-NOV-12
SOLIDS-TDS-WT	**Water**							
Batch R2487364								
WG1592561-3 DUP		**L1240901-1**						
Total Dissolved Solids		198	206		mg/L	4.0	20	28-NOV-12
WG1592561-4 DUP		**L1240901-2**						
Total Dissolved Solids		162	168		mg/L	3.6	20	28-NOV-12
WG1592561-2 LCS								
Total Dissolved Solids			96.0		%		85-115	28-NOV-12
WG1592561-1 MB								

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-TDS-WT	**Water**							
Batch R2487364								
WG1592561-1 MB								
Total Dissolved Solids			<20		mg/L		20	28-NOV-12
SOLIDS-TSS-WT	**Water**							
Batch R2483458								
WG1591058-4 DUP		**WG1591058-3**						
Total Suspended Solids		1600	1670		mg/L	4.1	20	24-NOV-12
WG1591058-5 DUP		**L1240330-8**						
Total Suspended Solids		3400	3500		mg/L	2.9	20	24-NOV-12
WG1591058-6 DUP		**L1240330-10**						
Total Suspended Solids		2970	2830		mg/L	4.6	20	24-NOV-12
WG1591058-7 DUP		**L1240259-3**						
Total Suspended Solids		320	340		mg/L	6.1	20	24-NOV-12
WG1591058-8 DUP		**L1240519-1**						
Total Suspended Solids		190	180		mg/L	5.4	20	24-NOV-12
WG1591058-1 LCS								
Total Suspended Solids			97.6		%		85-115	24-NOV-12
WG1591058-2 MB								
Total Suspended Solids			<2.0		mg/L		2	24-NOV-12
TKN-WT	**Water**							
Batch R2484307								
WG1591915-4 CRM		**ERA525**						
Total Kjeldahl Nitrogen			98.9		%		80-120	26-NOV-12
WG1591977-1 CVS								
Total Kjeldahl Nitrogen			97.0		%		75-125	26-NOV-12
WG1591915-3 DUP		**L1240901-1**						
Total Kjeldahl Nitrogen		0.42	0.41		mg/L	3.3	20	26-NOV-12
WG1591915-5 DUP		**L1241213-1**						
Total Kjeldahl Nitrogen		17.1	17.4		mg/L	1.7	20	26-NOV-12
WG1591915-2 LCS								
Total Kjeldahl Nitrogen			103.7		%		80-120	26-NOV-12
WG1591915-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	26-NOV-12

Quality Control Report

Workorder: L1241193 Report Date: 28-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____

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

SUBMISSION # L1241193
ENTERED BY: MLP
DATE/TIME ENTERED: 11/23/12
BIN # 256

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX													
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
				X			Big Eddy Baseline	5	X	X	X	X	X				1
				X			Replicate 4	5	X	X	X	X	X				2

L1241193-COFC

SPECIAL INSTRUCTIONS/COMMENTS

SAMPLE CONDITION
FROZEN ✓
COLD
AMBIENT
MEAN TEMP 7°C
CONDITION ACCEPTABLE UPON RECEIPT (Y/N)___
INIT WS

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
LISA LISKOV, KRISTI BEATTI	NOV 20, 2012	Wayne Smith	23-NOV-12 09:55
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	

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 22, 2012
Sampling Date: November 19, 2012 to November 20, 2012

Matrix: Water
Transaction ID: 592
PO/Contract No.: .
Date Analysed: December 1, 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)	0.52	1505	
	Mean Eth. Blank (last 30 runs)	0.55		0.01
		Net pg MeHg in whole Ethylation EPA vial	Gross Peak Area	Net Method Blank (ng/L)
	Method Blank 1	0.11	1836	0.01
	Method Blank 2	0.12	1857	0.01
	Method Blank 3	0.14	1914	0.01
	Mean Method Blank	**0.13**		**0.01**

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			4959	2.3

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 (%)**
	Big Eddy Baseline (FR124)	MS2	293843	100%	47.6	4.00	93.2
	Big Eddy Baseline (FR124)	MS2D	273260	100%	46.8	4.08	93.5
	Mean of Recoveries						**93.3**
QC Samples	MeOPR ID1201 (1000ng/L)		121595	100%	0.2	938	93.8
	MeOPR ID1201 (1000ng/L)	**Repeat Aliquot**	129525	100%	0.2	852	85.2
	MeOPR ID1201 (1000ng/L)		153681	100%	0.2	843	84.3
	Mean of MeOPR					878	**87.8**
	A.S.S.-Alfa ID0702 (1000 ng/L)		277240	100%		945	**94.5**

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]	
60964	Marter Twp Baseline	FR215	November 19, 2012		7262	93.3	47.30	**0.08**	
60964	Marter Twp Baseline	FR215	November 19, 2012	**Duplicate**	6756	93.3	48.34	**~0.08**	
60965	Big Eddy Baseline	FR124	November 20, 2012		7333	93.3	47.60	**0.08**	
60966	Marter Twp Dup-2	Flett28	November 19, 2012		7202	93.3	47.27	**0.08**	
60967	Big Eddy Replicate	BOD121	November 20, 2012		6547	93.3	46.96	**~0.08**	

* : See 'Comments' section above for discussion.

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

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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:Petawawa River
3-1 Taylor Road
Bracebridge, ON P1L 1S6
Date Received: August 29, 2012
Sampling Date: August 21, 2012

Matrix: Fish(wet)
Transaction ID: 592
PO/Contract No.:
Date Analysed: October 3, 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)

P:\Total Hg DMA80\Methods & SOPs\T00210 Total Hg in Solids - DMA80.doc

Comments: *The relative % difference between duplicates of samples 10 and 17 fell outside of our acceptance criteria. The samples was re-analyzed and the relative % difference was within acceptance criteria. All results have been reported as in indication of sample heterogeneity. It is recommended that an average concentration be used for reporting purposes.

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 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 (Catfish)		31.83			
	Mean of spiked duplicates for 7 (Catfish)					99.3
	15 (Catfish)		14.15			
	Mean of spiked duplicates for 15 (Catfish)					96.0
	Mean of Spike Recoveries					**97.6**
QC Samples	**DORM-3 (382 ng/g) Mean**					**109.5**

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]	
Catfish	1	August 21, 2012		46.15	0.05407	**874**	
Pickerel	2	August 21, 2012	DupA1	16.42	0.02938	**572**	
Pickerel	2	August 21, 2012	DupA2	16.52	0.02816	**601**	
Pickerel	3	August 21, 2012		29.13	0.04069	**733**	
Catfish	4	August 21, 2012		13.13	0.0408	**330**	
Catfish	5	August 21, 2012		11.33	0.03005	**386**	
Catfish	6	August 21, 2012		6.21	0.0287	**222**	
Catfish	7	August 21, 2012	Sample 1-US	31.83	0.04522	**721**	
Catfish	8	August 21, 2012		14.23	0.04049	**360**	
Catfish	9	August 21, 2012		12.61	0.03811	**339**	
Catfish	**10***	August 21, 2012	DupB1	34.53	0.0336	**1050**	
Catfish	**10***	August 21, 2012	DupB2	36.56	0.04384	**854**	
Catfish	**10***	August 21, 2012	DupB3	59.49	0.05387	**1130**	
Catfish	**10***	August 21, 2012	DupB4	92.97	0.07406	**1290**	
Catfish	11	August 21, 2012	DupC1	43.82	0.04044	**1110**	
Catfish	11	August 21, 2012	DupC2	51.01	0.0541	**966**	
Catfish	12	August 21, 2012		11.31	0.03298	**351**	
Catfish	13	August 21, 2012		10	0.03598	**285**	
Catfish	14	August 21, 2012		16.83	0.04436	**389**	
Catfish	15	August 21, 2012	DupD1	14.15	0.03473	**417**	
Catfish	15	August 21, 2012	DupD2	19.8	0.04924	**412**	
Catfish	16	August 21, 2012		29.51	0.03842	**787**	
Catfish	**17***	August 21, 2012	DupE1	11.96	0.04354	**281**	
Catfish	**17***	August 21, 2012	DupE2	11.24	0.05265	**219**	
Catfish	**17***	August 21, 2012	DupE3	10.27	0.03835	**274**	
Catfish	18	August 21, 2012		11.4	0.03622	**322**	
Catfish	19	August 21, 2012		20.86	0.03156	**677**	
Catfish	20	August 21, 2012		22.11	0.0363	**624**	

* : See 'Comments' section above for discussion.
~ : Below our official detection limit for this analyte in this matrix.

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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:Petawawa River
3-1 Taylor Road
Bracebridge, ON P1L 1S6

Matrix: Fish(wet)
Transaction ID: 592
PO/Contract No.:
Date Received: August 29, 2012
Date Analysed: October 10, 2012
Sampling Date: August 21, 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)

P:\Total Hg DMA80\Methods & SOPs\T00210 Total Hg in Solids - DMA80.doc

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 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 (%)
	27 (Catfish)		11.96			
	Mean of spiked duplicates for 27 (Catfish)					97.4
	38 (Catfish)		22.54			
	Mean of spiked duplicates for 38 (Catfish)					100.3
	Mean of Spike Recoveries					**98.8**
QC Samples	**DORM-3 (382 ng/g) Mean**					**107.1**

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]	
Catfish	21	August 21, 2012		10.94	0.03962	**279**	
Catfish	22	August 21, 2012		20.19	0.03289	**621**	
Catfish	23	August 21, 2012	DupA1	29.2	0.0392	**754**	
Catfish	23	August 21, 2012	DupA2	25.28	0.03121	**819**	
Pickerel	24	August 21, 2012		24.79	0.044	**570**	
Catfish	25	August 21, 2012		15.85	0.04285	**374**	
Catfish	26	August 21, 2012		14.56	0.03756	**392**	
Catfish	27	August 21, 2012	Sample 1-US	11.96	0.04325	**280**	
Catfish	28	August 21, 2012		37.06	0.04227	**887**	
Catfish	29	August 21, 2012		15.78	0.04094	**390**	
Catfish	30	August 21, 2012		31.06	0.07351	**428**	
Catfish	31	August 21, 2012	DupB1	43.85	0.03724	**1190**	
Catfish	31	August 21, 2012	DupB2	38.53	0.03455	**1130**	
Catfish	32	August 21, 2012		22.24	0.04607	**488**	
Catfish	33	August 21, 2012		15.61	0.03584	**441**	
Catfish	34	August 21, 2012		19.11	0.04494	**430**	
Catfish	35	August 21, 2012		15.1	0.03019	**506**	
Catfish	36	August 21, 2012	DupC1	24.1	0.04313	**565**	
Catfish	36	August 21, 2012	DupC2	27.34	0.04931	**561**	
Catfish	37	August 21, 2012		31.65	0.04829	**663**	
Catfish	38	August 21, 2012	Sample 2-US	22.54	0.0554	**412**	
Catfish	39	August 21, 2012		56.7	0.04869	**1180**	
Catfish	40	August 21, 2012		64.44	0.03788	**1720**	

* : See 'Comments' section above for discussion.

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

Appendix C. Field data sheets

Field Data Sheet

Xeneca Power Developments - Baseline Water Quality Sampling Program

Facility Information

Facility Name: BIG EDDY Date: APR 16/12 Time: 1254

Sample ID: BIG EDDY Sample Co-ordinates: 322320 5985546

Sampling Location (brief description): DOWNSTREAM OF DAM LOCATION - 60m UPSTREAM OF CP RAIL BRIDGE

Sampling Personnel

Company: ORMG

Personnel: ANDREA ELLIS-NSIAH, BOB LABRANCHE, LISA USKOV

Weather Conditions

Precipitation in the last 24 hours (mm rain): 6

Current conditions (e.g., snow, rain, overcast, sunny): SUN/CLOUD MIX

Wind direction and velocity: EAST - 2 km/hr

Field Measurements

Water depth at sample location (m): 0.78 m

Sample depth (m): ~~7~~ 10 cm

Dissolved Oxygen (mg/L): 8.63

Water Temp. (°C): 10°C

Conductivity (microS/cm): 38

pH: 6.26

Turbidity (NTU): /

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: BIG EDDY Date: NOV 20/12 Time: 1053

Sample ID: FALL SAMPLE Sample Co-ordinates: 17T 583559 5306400

Sampling Location (brief description): APPROX. WEIR LOCATION

Sampling Personnel

Company: ORMG

Personnel: LISA LISKOV, KRISTI BEATTY

Weather Conditions

Precipitation in the last 24 hours (mm rain): 0

Current conditions (e.g., snow, rain, overcast, sunny): SUNNY, 6.5°C

Wind direction and velocity: CALM - NO WIND

Field Measurements

Water depth at sample location (m): 1 m

Sample depth (m): 10 cm

Dissolved Oxygen (mg/L): ~~138.1~~ 18.00

Water Temp. (°C): 3.45

Conductivity (microS/cm): 0.022

pH: 5.01

Turbidity (NTU): –

Equipment calibrated (date): NOV 18/12

Samples Collected

TSS and Dissolved Solids: [X]

Cations/Anions: [X]

Nutrients: [X]

Dissolved Organic Carbon: [X]

pH, Cond., Alk.: [X]

Metals (total): [X]

Low-level Mercury (total): [X]

Low-level Mercury (methyl): [X]

Frozen? Y / (N)

Low-level Phosphorus: [X]

Filtered? (Y) / N

All samples in cooler less than 5°C? (Y) / N

Additional Comment / Observations

RIN Fish Sample Form

Waterbody Name	Sample Number	Lift Date
Petawawa River		21 Aug 2012
Net Type: Small Large Extra-large	4' Trap Net	

FISH SAMPLE

Mesh Size (mm)	Fish Species	Fish Number	Total Length (mm)	Fork Length (mm)	Round Weight (g)	Sex	Maturity	Ageing Structure
	CATFISH	1	443		670			
—	PICKEREL	2	418		570			
—	PICKEREL	3	570		1470	FEMALE		
	CATFISH	4	500		1060			
	CAT FISH	5	475		770			
	CAT FISH	6	414		540			
	CATFISH	7	500		1040			
	CATFISH	8	440		610			
	CATFISH	9	472		790			
	CATFISH	10	484		970			
	CATFISH	11	513		1050			
	CAT FISH	12	415		510			
	CATFISH	13	444		770			
	CATFISH	14	466		750			
	CATFISH	15	468		880			
	CATFISH	16	455		640			
	CATFISH	17	430		670			
	CATFISH	18	433		610			
	CATFISH	19	445		700			

Mesh Sizes (mm):	Sex Codes:	Maturity Codes:	Ageing Structure Codes:
38, 51, 64, 76, 89, 102 and 127	1 = male 2 = female 9 = unknown	1 = immature 2 = mature 9 = unknown	2 = scales, 4 = pectoral rays, 7 = dorsal spine, A = otolith, B = operculum, D = cleithrum

RIN Fish Sample Form

Waterbody Name	Sample Number	Lift Date
Net Type: Small Large Extra-large		

FISH SAMPLE

Mesh Size (mm)	Fish Species	Fish Number	Total Length (mm)	Fork Length (mm)	Round Weight (g)	Sex	Maturity	Ageing Structure
	CATFISH	20	480		850			
	CAT.FISH	21	415		530			
	CATFISH	22	485		940			
	CATFISH	23	500		1080			
—	PICKEREL	24	310		220			
	CATFISH	25	473		920			
	CATFISH	26	470		840			
	CATFISH	27	416		540			
	CATFISH	28	513		1000			
	CAT FISH	29	455		750			
	CATFISH	30	490		1000			
	CATFISH	31	465		730			
	CATFISH	32	484		950			
	CATFISH	33	536		1250			
	CATFISH	34	462		800			
	CATFISH	35	485		840			
	CATFISH	36	480		910			
	CATFISH	37	467		760			
	CATFISH	38	422		570			

Page ___ of ___

Mesh Sizes (mm):	Sex Codes:	Maturity Codes:	Ageing Structure Codes:
38, 51, 64, 76, 89, 102 and 127	1 = male 2 = female 9 = unknown	1 = immature 2 = mature 9 = unknown	2 = scales, 4 = pectoral rays, 7 = dorsal spine, A = otolith, B = operculum, D = cleithrum

RIN Fish Sample Form

Waterbody Name	Sample Number	Lift Date
Petawawa River		21 Aug 2012
Net Type: (Small) Large Extra-large	4' Trap Net	

FISH SAMPLE

Mesh Size (mm)	Fish Species	Fish Number	Total Length (mm)	Fork Length (mm)	Round Weight (g)	Sex	Maturity	Ageing Structure
	CATFISH	39	461		830			
	CATFISH	40	620		2090			

Page 3 of 3

Mesh Sizes (mm):	Sex Codes:	Maturity Codes:	Ageing Structure Codes:
38, 51, 64, 76, 89, 102 and 127	1 = male 2 = female 9 = unknown	1 = immature 2 = mature 9 = unknown	2 = scales, 4 = pectoral rays, 7 = dorsal spine, A = otolith, B = operculum, D = cleithrum