

Appendix F5

Report: *2011 Mine Site Habitat Compensation Monitoring Report*

AGNICO-EAGLE MINES: MEADOWBANK DIVISION

**AQUATIC EFFECTS MONITORING PROGRAM (AEMP): 2011
MEADOWBANK MINE SITE HABITAT COMPENSATION
MONITORING**

FEBRUARY 2012

Executive Summary

In 2011, AEM conducted Habitat Monitoring along the East Dike and Bay-Goose Dike Habitat Compensation Feature (HCFs). As per the habitat monitoring compensation Tier 1 evaluation consisted of interstitial water quality, periphyton community analysis (qualitative underwater camera work and quantitative periphyton biomass and richness), and fish use (using index gill net sets). The habitat monitoring program uses a *weight of evidence* approach to assess the functionality of the HCFs.

Interstitial water sampling (referred in the HCMP as pore water) was completed to address the issue of potential metal leaching from dike construction material as identified in the prehearing and environmental assessment process. The interstitial water sampling results did not indicate any concerns for leaching or likely to cause any reduction in periphyton growth or impact fish egg incubation. This was confirmed with the periphyton qualitative and quantitative analysis which found successful immature colonization of periphyton along the Bay-Goose Dike HCF and continued improved colonization of periphyton (density and biomass) since the 2009 study (C+1) along the East Dike HCF. Index gill netting results indicate that fish were present in and around the vicinity of the East Dike and Bay-Goose Dike HCFs at densities or frequencies that were greater than reference high value habitat areas elsewhere in Second Portage Lake and Third Portage Lake. Recruitment of year 2-3 was greater along the East Dike HCF than high value habitat reference stations and CPUE was statistically significantly different along the East Dike HCF than both Bay-Goose Dike HCF and high value habitat reference stations.

Overall, the results indicate comparable water quality to reference stations and improvements from 2009 sampling, periphyton communities are developing and/or improving along the HCFs, and fish are evidently using the areas near HCFs.

Acknowledgements

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- Appendix B: Photographic Presentation
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SECTION 1 • INTRODUCTION

1.1 BACKGROUND

Agnico-Eagle Mines Ltd. (AEM)- Meadowbank Division was issued a Fisheries and Oceans Canada (DFO) Authorization for Works or Undertakings Affecting Fish Habitat (NU-03-0191) under the Fisheries Act for the Meadowbank Gold Project on 30 July 2008. The No-Net-Loss Plan (NNLP) (Azimuth, 2006) for the project, quantified the harmful alteration, disruption or destruction (HADD) of fish habitat and documented a habitat compensation strategy to comply with DFO's No-Net-Loss of habitat policy. The Aquatic Effects Management Plan Targeted Monitoring – Habitat Compensation Monitoring Plan (HCMP; Azimuth, 2008) describes the physical and ecological monitoring requirements and decision criteria for evaluating the success of habitat compensation features (HCFs). This report addresses the water quality and ecological monitoring component for 2011. The main HCFs planned for the Meadowbank Gold Project include:

- Dike Faces – in addition to their primary purposes supporting mining activities, all dikes have been designed to serve as productive fish habitat.
- Finger Dikes – these features are extensions built off the dikes; their only purpose is to serve as fish habitat. These have not been constructed to date.

The East Dike rock fill placement was completed during the open water season of 2008, and followed by the completion of the cut-off wall thereafter; the habitat monitoring for construction plus one year (C+1) of this dike was conducted in 2009 as per the HCMP. Bay-Goose dike construction was completed in two phases: phase 1 (the north portion) was completed to Bay-Goose island in 2009 and phase two was completed in 2010. As per the HCMP, habitat monitoring was to be completed along the Bay-Goose dike one year following the completion of its construction (C+ 1). This report presents the results of the Bay-Goose (C+1) dike face HCF and (C+3) of East Dike HCF monitoring in accordance with the HCMP (Azimuth, 2008).

1.2 OBJECTIVE

The objective of 2011 monitoring under the HCMP was to conduct the first year monitoring (Construction +1) along the Bay-Goose dike and construction + 3 year monitoring along the East Dike HCF. Based on the HCMP habitat monitoring and recommendations in Azimuth (2010) the Tier 1 evaluation consists of:

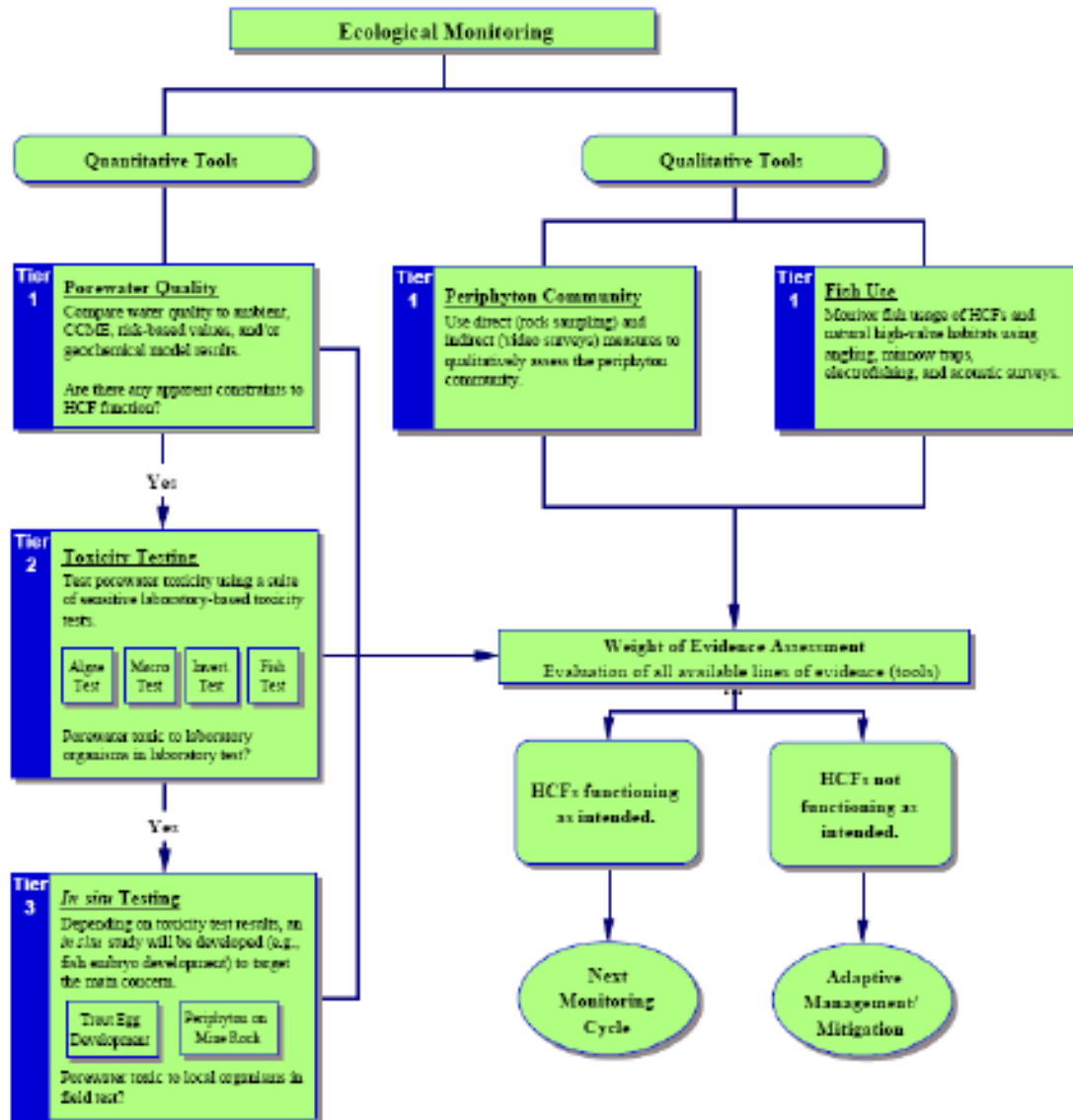
- Interstitial water quality

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- Periphyton community analysis (qualitative underwater camera work and quantitative periphyton biomass and richness)
- Fish use (index gill net sets)

The habitat monitoring program uses a *weight of evidence* approach to assess the functionality of the HCFs by evaluating the interstitial water quality, periphyton community and qualitatively evaluates the fish use of the dike faces. If the results of the pore water analysis (more accurately referred to as Interstitial Water Sampling) indicate potential effects, additional Tier 2 testing may be required (See Figure 1). Habitat compensation monitoring is a long-term program designed to evaluate the capability of the designed and constructed HCFs to function as fish habitat. Although some of the data in this report is compared to 2009 East Dike monitoring and data collected at reference areas, these data are intended to contribute to long term monitoring and evaluation of the HCFs, not solely for short-term assessment (Azimuth, 2008a).

Figure 1: Ecological Monitoring Strategy for Habitat Compensation Features (HCFs)
Meadowbank Mine Site (Adapted from HCMP, Azimuth, 2008)



SECTION 2 • METHODOLOGY

2.1 INTERSTITIAL WATER QUALITY

2.1.1 Sample Collection

The East Dike and Bay-Goose face HCF were constructed with the intention of providing sloped, boulder and cobble substrate of high value fish habitat. These habitats were intended to provide potential lake trout (*Salvelinus namaycush*), arctic char (*Salvelinus alpinus*) and round whitefish (*Prosopium cylindraceum*), spawning, nursery and foraging habitat in depths greater than 2 m. As reported in Golder (2009) non- potentially acid generating rock was used to construct the east dike face; the same is for bay-goose dike face HCFs. The aim of interstitial water sampling was to provide an evaluation of the water quality, suitability for periphyton colonization and fish use (specifically to evaluate the water and habitat quality during incubation and nursery as juveniles). During the predevelopment hearings there were concerns that dike material may leach metals and cause impacts to periphyton colonization or salmonid incubating eggs. Although unlikely, due to the rock material used, the objectives of the interstitial water quality sampling are to document the water quality in these habitat niches as it pertains to these concerns.

To determine water quality within the interstitial water spaces along the East dike, five (5) evenly spaced independent water samples, one reference water sample and one field duplicate were collected along the HCF dike face (See Figure 2.1). To determine the water quality within the interstitial spaces along the Bay-Goose Dike, six (6) stations evenly spaced independent water samples (three along BG phase I and three along BG phase II portion), one reference and one field duplicate were collected along the HCF dike face. The water samples were collected following the methods outlined in Azimuth (2010) standard operating procedure (SOP) for interstitial dike water sampling provided in Appendix C (identical to 2009 sampling program), and photos of the procedure can be found in Appendix B.

Water quality was analyzed by ALS Environment (Winnipeg, MB) for conventional parameters (hardness, conductivity, pH, and total dissolved and suspended solids), anions (alkalinity, chloride and sulfate), nutrients (ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate and total phosphate), organic parameters (chlorophyll-a, dissolved and total organic carbon) and total and dissolved metals.

Table 2.1 Interstitial Water Quality Sample Locations

Station ID	UTM 14W	
	Easting	Northing
ED-PW-1	639461	7210907
ED-PW-2	639384	7214254
ED-PW-3	639405	7214039
ED-PW-4	639400	7213756
ED-PW-5	639383	7213850
SP-Ref	640513	7213193
PW-BG-1	639111	7101915
PW-BG-2	638993	7212783
PW-BG-3	639007	7212783
PW-BG-4	639007	7212508
PW-BG-5	638951	7212193
PW-BG-6	638592	7211821
TPL-Ref	638389	7212062

2.1.2 QA/QC

The objective of quality assurance and quality control (QA/QC) for water quality monitoring is to ensure that the chemical and field data collected are representative of the material sampled. Data quality is assured throughout the collection and analysis of samples using standard procedures, certified laboratories and by staffing of trained technicians (AEM, 2008).

Field QA/QC duplicate results were assessed using the relative percent difference (RPD) between measurements: The equation used to calculate a RPD is:

$$RPD = [(A-B)/((A+B)/2)] \times 100$$

As outlined in AEM (2008) RPDs were considered unacceptable when the RPD value of 50% for concentrations that were greater than 10x the Method Detection Limits (MDL) were exceeded. RPD values may be either positive or negative and ideally should provide a mix of the two, with values clustered around zero. Biases may be evident if there are consistently positive or negative values. Large variations in RPD values will often occur when duplicate sample concentrations are low and near the analytical detection limit. A target of 10% field duplicates or at least one sample per event were submitted for QA/QC analysis to assess the variability and sample homogeneity for this monitoring program. In this study field two duplicates were collected; once along the east dike HCF and another collected along the bay-geese HCF.

2.2 FISH USE OF HCFS

Ecologically, arctic lakes are low in species diversity and the foodwebs consist of top predatory salmonids such as lake trout (*Salvelinus namaycush*) and arctic char (*Salvelinus alpinus*), chironomids and basal resources with low species diversity and abundance (Chetelat et al. 2010, McDonald et al. 1992). As previously been described by McDonald (1992), the project lakes have low productivity and short food chains where limited availability of resources results in a bimodal distribution of fish sizes with large lake trout and landlocked arctic char which outcompete and force small and medium sized fish into different habitat. The dominant fish species in the study lakes, and in much of the surrounding region are lake trout, landlocked arctic char, round whitefish (*Prosopium cylindraceum*), with small numbers of burbot (*Lota lota*), ninespine stickleback (*Pungitius pungitius*) and slimy sculpin (*Cottus cognatus*) (Cumberland, 2005). Arctic grayling (*Thymallus arcticus*) are not found within the study lakes as there are only small ephemeral streams and poorly connected lakes that limit the available habitat within these headwater lakes. Diversity of species at lower trophic levels is low. Most abundant are copepods within the zooplankton community, chironomid insects dominate the macroinvertebrate benthic community, and bivalve clams, oligochaetes, amphipods and mites are less abundant (Cumberland, 2005).

Fish use of HCFs data is used in the monitoring to qualitatively support the assessment of presence near HCF and provide a weight of evidence to support that the dike faces are functioning as originally intended. The dike faces were designed to function as spawning, nursery, shelter and foraging for lake trout, arctic char and round whitefish as part of the No Net Loss of habitat which compensated for habitat lost due to mine development. Based on the recommendations in Azimuth (2009), only fine mesh index gill nets were used to evaluate fish presence in 2011. Snorkelling was not approved by mine operations health and safety and may be revisited as a fish presence evaluation tool in the future.

Fine mesh gill nets were used to quantitatively determine the species composition, size and catch-per-unit-effort (CPUE; # fish/100 m/hr) of fish along the East Dike and Bay-Goose Dike HCFs relative to reference HVH habitats in Second Portage Lake and Third Portage Lake. Panels of 25, 38, 51, 76, 102 and 126 mm stretch mesh gill nets were attached to one another in this order to create gangs of nets. Gangs were set with varying set times and durations. Procedures were nearly identical on all dates.

Nets were set along the East Dike face HCF, Bay-Goose dike face HCF and HVH reference areas in Second Portage Lake and Third Portage Lake where water depths were between 2 and 7 m. This is consistent with the 2009 work (Azimuth 2010). Index gill nets were set by boat, with the start time, depth and UTM coordinate of the beginning and end of the set recorded. Dike net sets were positioned perpendicular to the dike face, to cover the full range of depths where dike face material was present. The nets set in the reference locations were set near HVH habitat areas, along a length of shoreline with similar depth

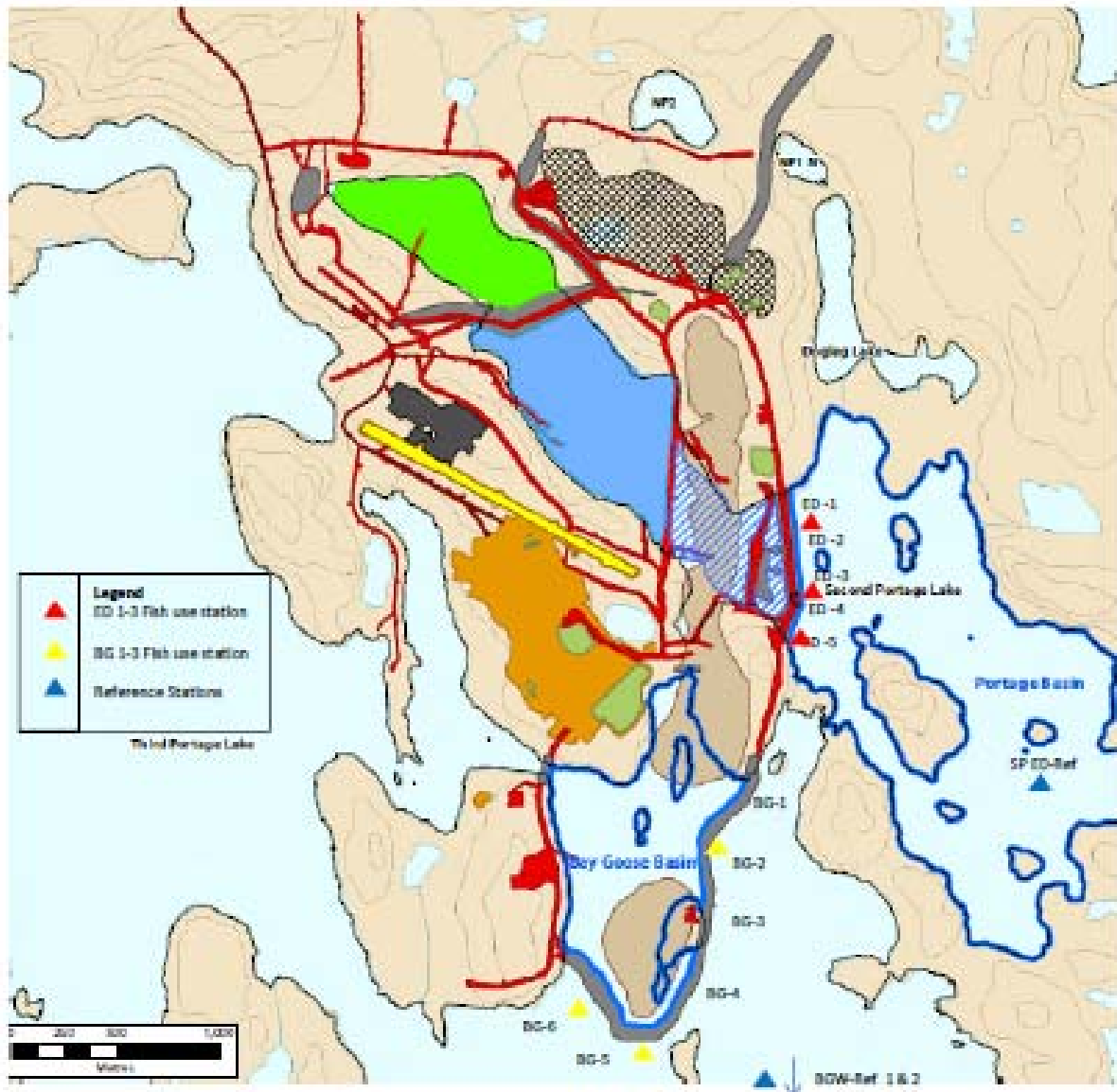
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and substrate as the dike locations. Nets were left for less than one day to provide daytime and overnight capture, after which time they were pulled and re-set. Most of the locations had a total of two sets within the two days of monitoring. Fish captured were identified by species, measured for fork length (mm), weighed, floy- tagged and returned to the lake. The DFO Animal Use Protocols and License to Fish for Scientific Purposes authorizations for these studies are presented in Appendix E. Sampling stations were spread evenly along the dike faces (See Figure 2.1). GPS locations are presented in Table 2.2.

Table 2.2 Fish Use Sampling Locations in Third Portage and Second Portage Lake

Start Date	Finish Date	Lake ID	GPS – Start		GPS - End		Depth Range
10-Aug-11	11-Aug-11	BGW1	639066	7212705	638994	7212725	3.6 - 6.0m
11-Aug-11	12-Aug-11	BGW1	639711	7212666	638991	7212709	8.4 - 10 - 2.1m
10-Aug-11	11-Aug-11	BGW2	638537	7211676	638560	7211764	2.5 - 6.0 - 5.0m
11-Aug-11	12-Aug-11	BGW2	638537	7211676	638560	7211764	3.5- 4.0- 2.0m
10-Aug-11	11-Aug-11	BGW3	638448	7211751	638486	7211808	2.8 - 6.0m
11-Aug-11	12-Aug-11	BGW3	638448	7211751	638486	7211808	4.9 - 6.0 - 2.5m
10-Aug-11	11-Aug-11	BGWREF	639289	7210860	639387	7210958	2.8 - 4.0m
11-Aug-11	12-Aug-11	BGWREF2	639298	7210860	639386	7210964	3.7- 4.0- 2.5
12-Aug-11	13-Aug-11	ED1	639375	7213859	639422	7213813	2.1 - 6.5 - 5.2m
13-Aug-11	14-Aug-11	ED1	639363	7213853	639418	7213799	2.1 - 6.5m
12-Aug-11	13-Aug-11	ED2	639377	7213916	639430	7213909	2.5 - 6.0 - 4.9m
13-Aug-11	14-Aug-11	ED2	639385	7213933	639433	7213926	3.8 - 6.4m
12-Aug-11	13-Aug-11	ED3	639364	7214282	639429	7214290	3.3 - 7.4 - 5.3m
13-Aug-11	14-Aug-11	ED3	639365	7214289	639435	7213417	2.1- 6.5m
12-Aug-11	13-Aug-11	EDREF1	640444	7213368	640355	7213422	1.5 - 5.0 - 4.7m
13-Aug-11	14-Aug-11	EDREF2	640535	7213255	640559	7213206	1.5 - 5.0 - 4.7m

Figure 2.1- General Locations of Interstitial Water Sampling and Fish Use



2.3 PERIPHYTON ASSESSMENT

2.3.1 Quantitative Assessment – Shallow Zone

Periphyton density (cells/cm²) and biomass (µg/cm²) was measured based on quantitative samples of periphyton collected from 3 areas in Second Portage Lake (East Dike, CREMP far-field) and Drilltrail Arm (reference area)) and four areas in Third Portage Lake (Bay-Goose Dike- North Section, Bay-Goose Dike- South Section, CREMP far-field location, and a TPL reference area) at approximately 0.5m depth (See Figure 2)

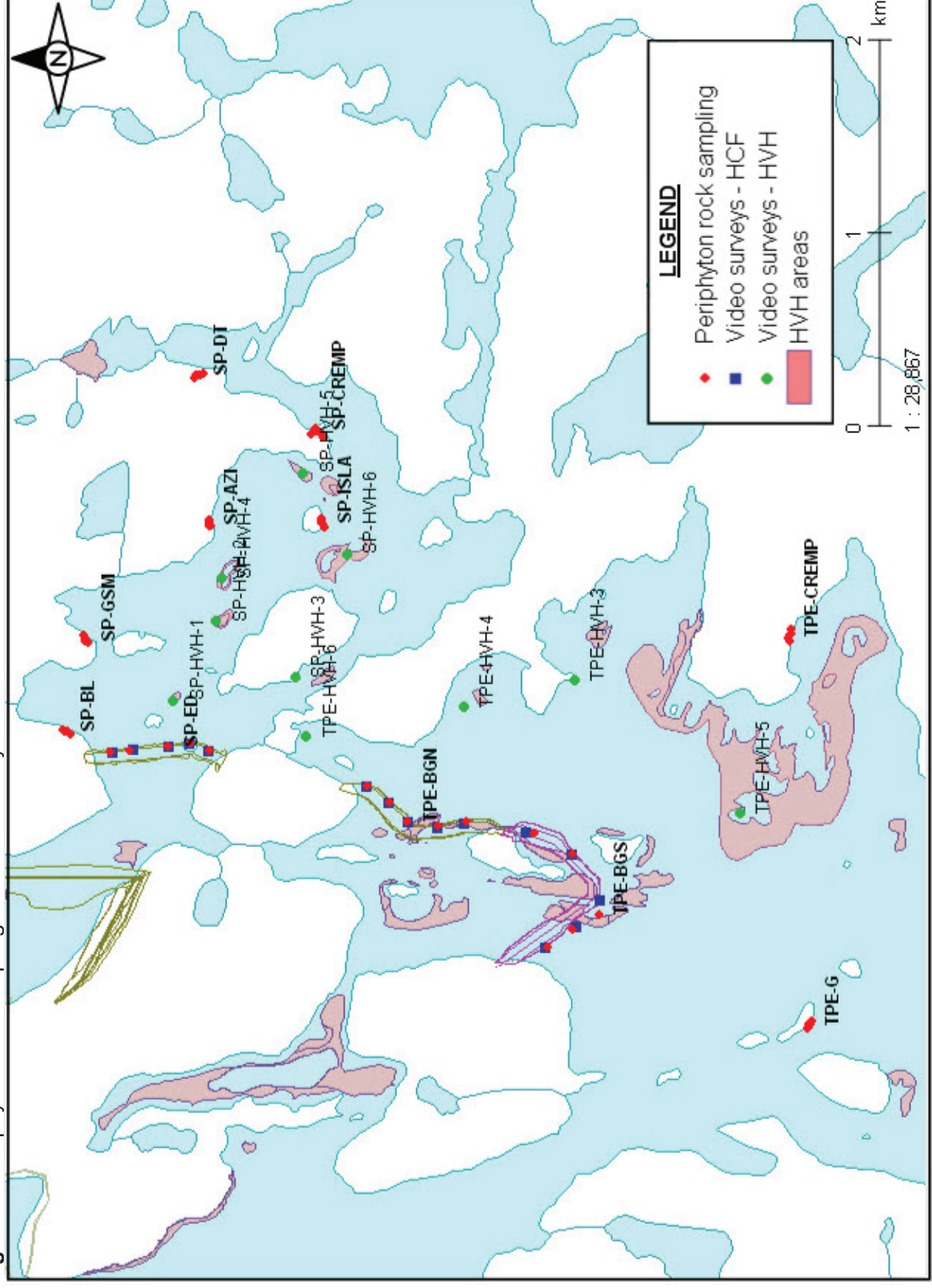
According to Azimuth (2010), five replicate samples were collected from each dike face area and analyzed independently. Sampling locations were chosen according to the following criteria: a sufficient number of large, flat rocks from a water depth of 0.5 m with a flat surface facing upwards as much as possible, and with uniform algal coverage (i.e., not uniformly dense or sparse and representative of the area). Samples were analyzed for diversity using Simpson's diversity index and a QA/QC procedure was followed to ensure consistency and sample variation. The procedures for collecting the periphyton samples are outlined in Appendix A.

2.3.2 Qualitative Assessment using Video Surveys – Deep Zone

Underwater video was used to document and describe periphyton coverage of rocks on the East Dike and Bay-Goose Dike face HCF relative to natural coverage in deep zones in Second Portage Lake and Third Portage Lake that cannot be captured during periphyton sampling (target range of 1 to 4 m depth). This portion of the study was intended to confirm the functionality of the HFC by qualitatively assess the progress in periphyton colonization over time, relative to natural high-value habitats. Stations identified in 2009 along the East Dike and reference areas (six stations) were selected in this study. Six reference areas were selected for Third Portage Lake east basin (BG HVH 3 to 6, TPE-G and TPE BGE) for comparison to Bay Goose North and Bay-Goose South areas along the Bay-Goose HCF. Imagery of rocks at different depths and distances along the dike HCF are compared to rocks at similar depths in both Second and Third Portage lakes.

As in Azimuth (2009), video imagery was acquired using a 'Deep Blue Pro' underwater camera system manufactured by Ocean Systems, Inc. (Everett, Washington). The camera was deployed from a boat at various locations along the East Dike and Bay-Goose Dike face HCF and at other HVH locations in Second and Third Portage Lake. To gauge rock size, a section of rebar was marked with 0.5 m increments and lowered over the side of the boat to provide scale. A complete description of the methods used for periphyton assessments are presented in Appendix A.

Figure 2. Periphyton rock sampling and video survey locations.



SECTION 3 • RESULTS AND DISCUSSION

3.1 INTERSTITIAL WATER QUALITY

3.1.1 Water Chemistry

Interstitial water (referred to as pore water in HCMP) were collected from between rock spaces along the East Dike and Bay-Goose Dike face from at least 2 m water depth below the ice freeze zone following the 2009 SOP in Appendix C. Results of the interstitial water quality and chemistry are presented in Table 3.1.1. Underwater photos are presented in Appendix B. During sampling, care was taken to ensure the sampling pole and tube did not disturb sediment that may have deposited along the dike face during dike construction. During sampling there was no indication that turbidity or TSS were stirred up and the water chemistry data supports these observations as TSS and turbidity were not elevated nor exceeded TSS guidelines at any of the stations.

Total phosphorus concentrations exceeded CCME (2007) trigger for phosphorus in ultra-oligotrophic lakes (0.004 mg/L). However, given that total reactive phosphate (also referred to as orthophosphate, the form of phosphorus used by aquatic biota) was near or below detection limits it is unlikely to be a potential concern. No other parameters exceeded CCME guidelines.

These results indicate that the water quality in the interstitial spaces along the East Dike and Bay-Goose Dike are suitable for egg incubation and periphyton growth and do not differ from intra and inter-lake reference stations and demonstrate a slight improvement from the 2009 interstitial water sampling.

3.1.2 QA/QC

All laboratory analysis was completed by ALS Laboratories: Winnipeg, Manitoba which is an accredited laboratory by the Canadian Association for Laboratories Accreditation (CALA) Inc. The results met laboratory QA/QC internal data quality objectives for precision and completeness. The certificate of analyses from ALS is presented in Appendix D.

During the interstitial water quality sampling, one duplicate sample was taken per lake, meeting the QA/QC requirement as outlined in the QA/QC objectives.

The field QA/QC results are summarized in Table 3.1.2. The results of this evaluation indicate a high consistency between the original field sample and the field duplicate sample. During the 2011 interstitial water quality analysis, none of the samples exceeded the RPD of 50% for concentrations that were greater than 10x the Method Detection Limits (MDL).

Table 3.1.1 Interstitial Water Chemistry Analysis for HCFs
RESULTS OF ANALYSIS

Sample ID	CCME 2007 ¹	Detection Limits	Units	BG PW-1	BG PW-2	BG PW-3	BG PW-4	BG PW-5	BG PW-6	BG PW REF
Date Sampled				11-AUG-11	11-AUG-11	11-AUG-11	12-AUG-11	12-AUG-11	12-AUG-11	12-AUG-11
Time Sampled				16:30	16:52	17:00	15:46	16:11	16:32	16:49
ALS Sample ID				L1047229-2	L1047229-2	L1047229-3	L1047229-3	L1047229-5	L1047229-6	L1047229-7
Matrix				Water	Water	Water	Water	Water	Water	Water
Water Quality Guidelines										
Physical Tests										
Conductivity	NG	0.40	umhos/cm	21.5	22.1	22.2	21.7	21.4	21.6	21.3
Hardness (as CaCO3)	NG	0.30	mg/L	7.67	7.53	7.53	7.48	7.48	7.33	7.30
pH	6.5 - 9.0	7.19	pH units	7.19	7.24	7.25	7.28	7.22	7.25	7.23
Total Suspended Solids	6	4.0	mg/L	<4.0	<4.0	5.6	4.8	4.0	<4.0	<4.0
Turbidity	NG	0.10	NTU	0.31	0.27	0.30	0.32	0.33	0.30	0.27
Anions and Nutrients										
Alkalinity, Total (as CaCO3)	NG	1.0	mg/L	8.0	Rep	8.2	8.1	7.8	7.8	7.9
Ammonia (as N)	See fact sheet	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Bicarbonate (HCO3)	NG	2.0	mg/L	9.8	9.9	10.0	9.8	9.5	9.6	9.6
Carbonate (CO3)	NG	0.60	mg/L	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60
Chloride	NG	0.20	mg/L	0.49	0.49	0.48	0.49	0.49	0.49	0.49
Fluoride	NG	0.020	mg/L	0.066	0.066	0.066	0.066	0.066	0.065	0.066
Hydroxide (OH)	NG	0.40	mg/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Nitrate and Nitrite as N	290000	0.070	mg/L	<0.070	<0.070	<0.070	<0.070	<0.070	<0.070	<0.070
Nitrate-N	NG	0.0050	mg/L	0.0233	0.0243	0.0249	0.0248	0.0207	0.0241	0.0211
Nitrite-N	NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	NG	0.050	mg/L	0.067	0.065	0.067	0.126	0.085	0.051	0.065
Phosphorus (P) Total Reactive	NG	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phosphorus (P) Total	0.004	0.010	mg/L	0.0255	0.0043	0.0047	0.0170	0.0056	0.0062	0.0062
Sulfate	NG	0.50	mg/L	2.11	2.13	2.10	2.12	2.12	2.19	2.09
Organic / Inorganic Carbon										
Dissolved Organic Carbon	NG	1.0	mg/L	2.0	2.1	1.7	1.7	2.0	1.8	1.8
Total Organic Carbon	NG	1.0	mg/L	2.0	2.0	1.8	1.8	2.0	2.0	1.9
Total Metals										
Aluminum (Al)-Total	0.1 @ pH>6.5	0.0050	mg/L	0.0130	0.0140	0.0151	0.0155	0.0249	0.0157	0.0143
Antimony (Sb)-Total	NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Arsenic (As)-Total	0.005	0.0010	mg/L	0.00110	0.00120	0.00120	0.00092	0.00075	0.00095	0.00075
Barium (Ba)-Total	NG	0.0020	mg/L	0.00257	0.00251	0.00262	0.00263	0.00267	0.00264	0.00274
Beryllium (Be)-Total	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron (B)-Total	NG	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
0.00017 (Co)-Total	0.00017	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Calcium (Ca)-Total	NG	0.10	mg/L	2.22	2.25	2.22	2.17	2.01	1.97	2.02
Cesium (Cs)-Total	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Chromium (Cr)-Total	0.001	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.002 @ hrds <120mg/L	0.002 @ hrds <120mg/L	0.0020	mg/L	0.0049	0.0049	0.0062	0.0062	0.0067	0.0067	0.0066
Iron (Fe)-Total	0.1	0.10	mg/L	0.012	0.015	0.011	0.026	0.021	0.039	0.013
Lead (Pb)-Total	0.001 @ hrds <63 mg/L	0.000090	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Lithium (Li)-Total	NG	0.020	mg/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Magnesium (Mg)-Total	NG	0.010	mg/L	0.783	0.809	0.816	0.779	0.780	0.754	0.764
Manganese (Mn)-Total	NG	0.00020	mg/L	0.00155	0.00157	0.00155	0.00163	0.00170	0.00207	0.00148
Mercury (Hg)-Total	NG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	0.073	0.00020	mg/L	0.00024	0.00025	0.00025	0.00025	<0.00020	0.00024	0.00022
Nickel (Ni)-Total	0.025 @ hrds <60mg/L	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Phosphorus (P)-Total	NG	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Potassium (K)-Total	NG	0.020	mg/L	0.513	0.517	0.524	0.499	0.496	0.515	0.511
Rubidium (Rb)-Total	NG	0.0020	mg/L	0.00073	0.00073	0.00073	0.00078	0.00072	0.00074	0.00074
Selenium (Se)-Total	0.001	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total	NG	0.050	mg/L	0.135	0.127	0.122	0.125	0.121	0.125	0.128
Silver (Ag)-Total	0.0001	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium (Na)-Total	NG	0.030	mg/L	0.620	0.607	0.636	0.578	0.610	0.640	0.610
Strontium (Sr)-Total	NG	0.0010	mg/L	0.00025	0.00025	0.00025	0.00025	0.00025	0.00017	0.00001
Tellurium (Te)-Total	NG	<0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	0.0008	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thorium (Th)-Total	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium (Ti)-Total	NG	0.00020	mg/L	0.00022	0.00021	0.00021	0.00039	0.00031	0.00031	0.00029
Tungsten (W)-Total	NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium (U)-Total	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Vanadium (V)-Total	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Zinc (Zn)-Total	0.03	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zirconium (Zr)-Total	NG	0.00040	mg/L	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Dissolved Metals										
Aluminum (Al)-Dissolved	NG	0.0020	mg/L	0.0049	0.0052	0.0051	0.0058	0.0045	0.0049	0.0047
Antimony (Sb)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Arsenic (As)-Dissolved	NG	0.00020	mg/L	0.00096	0.00105	0.00100	0.00074	0.00057	0.00063	0.00054
Boron (B)-Dissolved	NG	0.00020	mg/L	0.00023	0.00029	0.00029	0.00025	0.00021	0.00022	0.00019
Beryllium (Be)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Boron (B)-Dissolved	NG	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)-Dissolved	NG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Dissolved	NG	0.050	mg/L	1.98	1.98	1.98	1.81	1.81	1.81	1.81
Cesium (Cs)-Dissolved	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Chromium (Cr)-Dissolved	NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Cobalt (Co)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Copper (Cu)-Dissolved	NG	0.00020	mg/L	0.00033	0.00039	0.00032	0.00033	0.00030	0.00030	0.00034
Iron (Fe)-Dissolved	NG	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved	NG	0.000090	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
Lithium (Li)-Dissolved	NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Magnesium (Mg)-Dissolved	NG	0.010	mg/L	0.696	0.700	0.690	0.690	0.679	0.681	0.676
Manganese (Mn)-Dissolved	NG	0.00010	mg/L	0.00111	0.00100	0.00097	0.00086	0.00088	0.00105	0.00084
Molybdenum (Mo)-Dissolved	NG	0.00010	mg/L	0.00021	0.00020	0.00020	0.00020	0.00017	0.00018	0.00018
Nickel (Ni)-Dissolved	NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Dissolved	NG	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium (K)-Dissolved	NG	0.020	mg/L	0.448	0.438	0.437	0.443	0.440	0.443	0.436
Rubidium (Rb)-Dissolved	NG	0.00020	mg/L	0.00064	0.00064	0.00063	0.00064	0.00063	0.00066	0.00065
Selenium (Se)-Dissolved	NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Dissolved	NG	0.050	mg/L	0.107	0.112	0.109	0.104	0.099	0.105	0.099
Silver (Ag)-Dissolved	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium (Na)-Dissolved	NG	0.020	mg/L	0.586	0.558	0.550	0.575	0.578	0.585	0.562
Strontium (Sr)-Dissolved	NG	0.00010	mg/L	0.00047	0.00059	0.00057	0.00081	0.00022	0.00074	0.00018
Tellurium (Te)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium (Tl)-Dissolved	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Thorium (Th)-Dissolved	NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Titanium (Ti)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tungsten (W)-Dissolved	NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Uranium (U)-Dissolved	NG	0.00010	mg/L	<0.00010	<0.00010	<0.0				

NG = no guideline

¹ Canadian Water Quality Guidelines for the Protection of Aquatic Life, CCME, Update 7.0, September 2007.

² Cadmium guideline calculated using measured hardness concentration per sample

³ Chromium guideline is for Cr VI, which yields the most conservative guideline

⁴ Trigger Range for Total Phosphorus (see guidance Framework for Phosphorus factsheet): ultra-oligotrophic <4 ug/l

^b Maximum monthly mean for suspended sediments based on Meadowbank NWB License A for dike construction monitoring (5mg/L above background)

Highlighted concentrations exceed the CCME guideline.

Water Chemistry Analysis for HCFs

CCME 2007 ¹	Detection Limits	Units	BG DUP-1 11-AUG-11 00:00	ED PW-1 13-AUG-11 16:30	ED PW-2 13-AUG-11 16:42	ED PW-3 13-AUG-11 17:00	ED PW-4 13-AUG-11 17:20	ED PW-5 13-AUG-11 17:34	ED DUP -1 13-AUG-11 00:00	SP REF 13-AUG-11 17:50
			L1047229-8 Water	L1047229-9 Water	L1047229-10 Water	L1047229-11 Water	L1047229-12 Water	L1047229-13 Water	L1047229-14 Water	L1047229-15 Water
Water Quality Guidelines										
NG	0.40	umhos/cm	22.1	26.4	26.3	25.9	26.8	25.9	26.0	25.2
NG	0.30	mg/L	7.45	9.96	9.98	9.72	10.2	9.79	9.90	9.24
6.5 - 9.0	0.10	pH units	7.28	7.39	7.38	7.35	7.40	7.37	7.41	7.35
6	0.10	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NG	0.40	NTU	0.30	0.37	0.38	0.28	0.42	0.36	0.32	0.33
NG	1.0	mg/L	8.2	10.4	10.4	10.2	10.6	10.1	10.3	9.8
See fact sheet	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NG	2.0	mg/L	10.0	12.7	12.7	12.4	13.0	12.4	12.5	12.0
NG	0.60	mg/L	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60
NG	0.20	mg/L	0.49	0.50	0.49	0.49	0.49	0.50	0.50	0.49
NG	0.020	mg/L	0.066	0.059	0.059	0.059	0.060	0.059	0.058	0.058
NG	0.40	mg/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
290000	0.070	mg/L	<0.070	<0.070	<0.070	<0.070	<0.070	<0.070	<0.070	<0.070
NG	0.0050	mg/L	0.0264	0.0087	0.0054	0.0059	0.0084	0.0082	0.0060	<0.0050
NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
NG	0.050	mg/L	0.063	0.086	0.079	0.081	0.113	0.114	0.124	0.156
NG	0.010	mg/L	0.0032	0.0044	0.0014	0.0014	<0.0010	0.0014	0.0011	0.0035
0.004	0.010	mg/L	0.0045	0.0074	0.0101	0.0065	0.0052	0.0057	0.0056	0.0051
NG	0.50	mg/L	2.13	2.22	2.21	2.21	2.23	2.21	2.21	2.18
NG	1.0	mg/L	1.7	2.3	2.2	2.3	2.1	2.2	2.1	2.1
NG	1.0	mg/L	1.8	2.3	2.2	2.4	2.1	2.4	2.3	2.3
0.1 @ pH=6.5	0.0050	mg/L	0.0154	0.0142	0.0115	0.0151	0.0124	0.0109	0.0118	0.0103
NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
0.005	0.00020	mg/L	0.00121	0.00038	0.00036	0.00039	0.00036	0.00039	0.00038	0.00032
NG	0.00020	mg/L	0.00264	0.00286	0.00273	0.00279	0.00263	0.00260	0.00273	0.00248
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.00017	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
0.00017	0.000010	mg/L	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
NG	0.10	mg/L	2.86	2.97	2.66	2.76	2.67	2.63	2.78	2.48
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
0.001	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
0.00020	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.002 @ hrdrns <120mg/L	0.00020	mg/L	0.00063	0.00071	0.00063	0.00069	0.00069	0.00070	0.00084	0.00070
0.3	0.10	mg/L	0.021	0.022	0.024	0.027	0.025	0.020	0.020	0.022
0.001 @ hrdrns <60 mg/L	0.000090	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
NG	0.010	mg/L	0.775	0.933	0.866	0.887	0.836	0.830	0.884	0.821
NG	0.00030	mg/L	0.00170	0.00207	0.00222	0.00235	0.00199	0.00218	0.00227	0.00245
NG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
0.073	0.00020	mg/L	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.025 @ hrdrns <60mg/L	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
NG	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
NG	0.020	mg/L	0.510	0.449	0.424	0.438	0.430	0.422	0.434	0.396
NG	0.00020	mg/L	0.00077	0.00072	0.00064	0.00065	0.00066	0.00068	0.00066	0.00062
0.001	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
NG	0.050	mg/L	0.128	0.259	0.237	0.259	0.238	0.243	0.246	0.245
0.0001	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.030	mg/L	0.616	0.525	0.526	0.550	0.515	0.527	0.547	0.513
NG	0.00010	mg/L	0.00081	0.00124	0.00120	0.00120	0.00121	0.00115	0.00115	0.00115
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.0008	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	0.00028	0.00025	0.00023	0.00041	0.00031	0.00020	0.00029	0.00028
NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
0.03	0.0050	mg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0074	<0.0050
NG	0.00040	mg/L	0.00155	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
NG	0.0020	mg/L	0.0051	0.0048	0.0051	0.0044	0.0050	0.0058	0.0049	0.0044
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	0.00099	<0.00020	<0.00020	<0.00020	<0.00020	0.00021	<0.00020	<0.00020
NG	0.00020	mg/L	0.00252	0.00242	0.00255	0.00253	0.00248	0.00260	0.00262	0.00230
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.010	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
NG	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
NG	0.050	mg/L	1.87	2.63	2.63	2.57	2.68	2.58	2.62	2.39
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	0.00031	0.00047	0.00048	0.00044	0.00049	0.00059	0.00050	0.00097
NG	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
NG	0.000090	mg/L	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090	<0.000090
NG	0.0020	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
NG	0.010	mg/L	0.675	0.824	0.827	0.804	0.845	0.813	0.817	0.793
NG	0.00010	mg/L	0.00098	0.00039	0.00042	0.00043	0.00039	0.00041	0.00051	0.00065
NG	0.00010	mg/L	0.00019	<0.00010	<0.00010	<0.00010	0.00010	0.00011	0.00011	<0.00010
NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
NG	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
NG	0.020	mg/L	0.424	0.404	0.407	0.398	0.421	0.419	0.404	0.382
NG	0.00020	mg/L	0.00063	0.00060	0.00063	0.00063	0.00066	0.00063	0.00060	0.00060
NG	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
NG	0.050	mg/L	0.104	0.224	0.219	0.218	0.222	0.212	0.224	0.222
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.020	mg/L	0.539	0.497	0.502	0.492	0.507	0.491	0.492	0.482
NG	0.00010	mg/L	0.00850	0.0120	0.0123	0.0123	0.0126	0.0120	0.0120	0.0114
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
NG	0.00020	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NG	0.00020	mg/L	<0.00020	<						

Table 3.1.2: Quality Assurance and Quality Control Relative Percent Difference

Sample ID	Detection Limits	Units	BG PW-3 11-AUG-11 17:00 L1047229-3 Water	BG DUP-1 11-AUG-11 00:00 L1047229-8 Water	RPD	ED PW-3 13-AUG-11 17:00 L1047229-11 Water	ED DUP -1 13-AUG-11 00:00 L1047229-14 Water	RPD
Physical Tests								
Conductivity	0.40	umhos/cm	22.2	22.1	0.45	25.9	26.0	-0.39
Hardness (as CaCO3)	0.30	mg/L	7.53	7.45	1.07	9.72	9.90	-1.83
pH	0.10	pH units	7.25	7.28	-0.41	7.35	7.41	-0.81
Total Suspended Solids	4.0	mg/L	5.6	<4.0	-	<4.0	<4.0	-
Turbidity	0.10	NTU	0.30	0.30	0.00	0.28	0.32	-13.33
Anions and Nutrients								
Alkalinity, Total (as CaCO3)	1.0	mg/L	8.2	8.2	0.00	10.2	10.3	-0.98
Ammonia as N	0.010	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
Bicarbonate (HCO3)	2.0	mg/L	10.0	10.0	0.00	12.4	12.5	-0.80
Carbonate (CO3)	0.60	mg/L	<0.60	<0.60	-	<0.60	<0.60	-
Chloride	0.20	mg/L	0.48	0.49	-2.06	0.49	0.50	-2.02
Fluoride	0.020	mg/L	0.065	0.066	-1.53	0.059	0.059	0.00
Hydroxide (OH)	0.40	mg/L	<0.40	<0.40	-	<0.40	<0.40	-
Nitrate and Nitrite as N	0.070	mg/L	<0.070	<0.070	-	<0.070	<0.070	-
Nitrate-N	0.0050	mg/L	0.0249	0.0264	-5.85	0.0059	0.0060	-1.68
Nitrite-N	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Total Kjeldahl Nitrogen	0.050	mg/L	0.067	0.063	6.15	0.081	0.124	-41.95
Phosphorus (P)-Total Reactive	0.010	mg/L	0.0017	0.0032	-61.22	0.0014	0.0011	24.00
Phosphorus (P)-Total	0.010	mg/L	0.0047	0.0045	4.35	0.0065	0.0056	14.88
Sulfate	0.50	mg/L	2.10	2.13	-1.42	2.21	2.21	0.00
Organic / Inorganic Carbon								
Dissolved Organic Carbon	1.0	mg/L	1.7	1.7	0.00	2.3	2.1	9.09
Total Organic Carbon	1.0	mg/L	1.8	1.8	0.00	2.4	2.3	4.26
Total Metals								
Aluminum (Al)-Total	0.0050	mg/L	0.0151	0.0154	-1.97	0.0151	0.0118	24.54
Antimony (Sb)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Arsenic (As)-Total	0.00020	mg/L	0.00120	0.00121	-0.83	0.00039	0.00038	2.60
Barium (Ba)-Total	0.00020	mg/L	0.00262	0.00264	-0.76	0.00279	0.00273	2.17
Beryllium (Be)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Bismuth (Bi)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Boron (B)-Total	0.010	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)-Total	0.000010	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Calcium (Ca)-Total	0.10	mg/L	2.22	2.86	-25.20	2.76	2.78	-0.72
Cesium (Cs)-Total	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Chromium (Cr)-Total	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Cobalt (Co)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Copper (Cu)-Total	0.00020	mg/L	0.00062	0.00063	-1.60	0.00070	0.00064	-18.18
Iron (Fe)-Total	0.01	mg/L	0.011	0.021	-62.50	0.027	0.020	29.79
Lead (Pb)-Total	0.000090	mg/L	<0.000090	<0.000090	-	<0.000090	<0.000090	-
Lithium (Li)-Total	0.0020	mg/L	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Magnesium (Mg)-Total	0.010	mg/L	0.816	0.775	5.15	0.887	0.884	0.34
Manganese (Mn)-Total	0.00030	mg/L	0.00155	0.00170	-9.23	0.00236	0.00227	3.89
Mercury (Hg)-Total	0.000010	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Molybdenum (Mo)-Total	0.00020	mg/L	0.00025	0.00024	4.08	<0.00020	<0.00020	-
Nickel (Ni)-Total	0.0020	mg/L	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Phosphorus (P)-Total	0.020	mg/L	<0.020	<0.020	-	<0.020	<0.020	-
Potassium (K)-Total	0.020	mg/L	0.524	0.510	2.71	0.438	0.434	0.92
Rubidium (Rb)-Total	0.00020	mg/L	0.00077	0.00077	0.00	0.00065	0.00066	-1.53
Selenium (Se)-Total	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)-Total	0.050	mg/L	0.122	0.128	-4.80	0.259	0.246	5.15
Silver (Ag)-Total	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Sodium (Na)-Total	0.030	mg/L	0.636	0.616	3.19	0.550	0.547	0.55
Strontium (Sr)-Total	0.00010	mg/L	0.00971	0.00981	-1.02	0.0120	0.0121	-0.83
Tellurium (Te)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Thallium (Tl)-Total	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Thorium (Th)-Total	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Titanium (Ti)-Total	0.00020	mg/L	0.00021	0.00028	-28.57	0.00041	0.00029	34.29
Tungsten (W)-Total	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Uranium (U)-Total	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Vanadium (V)-Total	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Zinc (Zn)-Total	0.0050	mg/L	<0.0050	0.00155	-	<0.0050	0.0074	-
Zirconium (Zr)-Total	0.00040	mg/L	<0.00040	-	-	<0.00040	<0.00040	-
Dissolved Metals								
Aluminum (Al)-Dissolved	0.0020	mg/L	0.0051	0.0051	0.00	0.0044	0.0049	-10.75
Antimony (Sb)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Arsenic (As)-Dissolved	0.00020	mg/L	0.00100	0.00099	1.01	<0.00020	<0.00020	-
Barium (Ba)-Dissolved	0.00020	mg/L	0.00259	0.00252	2.74	0.00253	0.00262	-3.50
Beryllium (Be)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Bismuth (Bi)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Boron (B)-Dissolved	0.010	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)-Dissolved	0.000010	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Calcium (Ca)-Dissolved	0.050	mg/L	1.88	1.87	0.53	2.57	2.62	-1.93
Cesium (Cs)-Dissolved	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Chromium (Cr)-Dissolved	0.0020	mg/L	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Cobalt (Co)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Copper (Cu)-Dissolved	0.00020	mg/L	0.00032	0.00031	3.17	0.00044	0.00050	-12.77
Iron (Fe)-Dissolved	0.10	mg/L	<0.010	<0.010	-	<0.010	<0.010	-
Lead (Pb)-Dissolved	0.000090	mg/L	<0.000090	<0.000090	-	<0.000090	<0.000090	-
Lithium (Li)-Dissolved	0.0020	mg/L	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Magnesium (Mg)-Dissolved	0.010	mg/L	0.690	0.675	2.20	0.804	0.817	-1.60
Manganese (Mn)-Dissolved	0.00010	mg/L	0.00097	0.00098	-1.03	0.00043	0.00051	-17.02
Molybdenum (Mo)-Dissolved	0.00010	mg/L	0.00020	0.00019	5.13	<0.00010	0.00011	-
Nickel (Ni)-Dissolved	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Phosphorus (P)-Dissolved	0.10	mg/L	<0.10	<0.10	-	<0.10	<0.10	-
Potassium (K)-Dissolved	0.020	mg/L	0.437	0.424	3.02	0.398	0.404	-1.50
Rubidium (Rb)-Dissolved	0.00020	mg/L	0.00063	0.00063	0.00	0.00063	0.00060	4.88
Selenium (Se)-Dissolved	0.0010	mg/L	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)-Dissolved	0.050	mg/L	0.102	0.104	-1.94	0.218	0.224	-2.71
Silver (Ag)-Dissolved	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Sodium (Na)-Dissolved	0.020	mg/L	0.550	0.539	2.02	0.492	0.491	0.20
Strontium (Sr)-Dissolved	0.00010	mg/L	0.00857	0.00850	0.82	0.0123	0.0120	2.47
Tellurium (Te)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Thallium (Tl)-Dissolved	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Thorium (Th)-Dissolved	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Titanium (Ti)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Tungsten (W)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Uranium (U)-Dissolved	0.00010	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Vanadium (V)-Dissolved	0.00020	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	-
Zinc (Zn)-Dissolved	0.0020	mg/L	<0.0020	<0.0020	-	<0.0020	<0.0020	-
Zirconium (Zr)-Dissolved	0.00040	mg/L	<0.00040	<0.00040	-	<0.00040	<0.00040	-

Notes:

Highlighted concentrations exceeded the 50% RPD for concentrations that were greater than 10x the Method Detection Limits (MDL)

SECTION 4 • FISH USE

In 2011 index gill nets were set at three locations along the east dike, three locations along the Bay-Goose dike and one reference locations in Second Portage and Third Portage Lake with similar depth ranges (between ~2 and 7m) and substrate (boulder-cobble shorelines that transition to mixed substrate of sediment/boulder-cobble zones). In total 206 fish were collected, 179 of the fish were collected along dike faces and 27 of those were collected in reference areas. These data are presented in Table 3.2.1.

Table 3.2.1 Summary of Fish Collection along East Dike and Bay-Goose Habitat Compensation Features

Station ID	Lake Trout	Arctic Char	Round Whitefish	Totals
BGW1	18	1	9	28
BGW2	15	1	7	23
BGW3	15	2	2	19
Bay Goose Dike HCF Total	48	4	18	70
ED1	34	4	18	56
ED2	9	4	16	29
ED3	14	0	10	24
East Dike HCF Total	57	8	44	109
SPL Ref	12	0	3	15
TPL Ref	10	2	0	12
Reference Total	22	2	3	27

Similar to baseline data collection and fishout data, species assemblages differed between locations. The total dike faces had 60% lake trout, 34% round whitefish and 7% Arctic char. Fewer round whitefish were collected at the reference stations with the same amount of arctic char. Figure 3.2.1 presents the species assemblages as percentages by station. These data suggest that lake trout and round whitefish are preferentially selecting the HCF for foraging and refugia. Many of the round whitefish collected were juveniles (~years 2-3) which commonly feed in littoral areas.

Length frequencies of lake trout and round whitefish collected at East dike and Bay-goose HCF are presented in Figure 3.2.2. Length mean and ranges for lake trout, arctic char and round whitefish by HCF are presented in Table 3.2.2. The average length for lake trout and round whitefish was slightly lower at East Dike HCF compared to the other stations. The mean length appeared to be lower for lake trout in the 2011 monitoring (296 mm, n=58) compared to 2009 East dike HCF monitoring (413 mm, n=9). Fish collected along the Bay-Goose dike HCF appears to be collected in shallower depths than the other stations,

however there is no verifiable trend between collection by species or location and depth. Weight data in 2011 monitoring was not accurate as the lower weight range of the field scale did not have high precision for measurements less than 250g. Similar to the 2009 report, condition factor (K) was not presented in these results. This study limitation will be improved in subsequent years with the use of a low range scale. The adult fish collected were tagged; these numbers are presented in the raw fish field data and are presented in Appendix F.

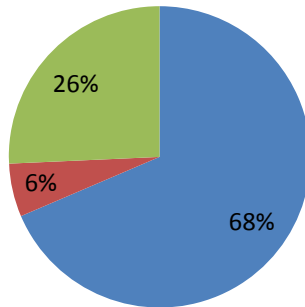
The greatest number of lake trout caught along the East dike HCF were in the 200-300mm length class with an consistent number of individuals caught were greater than 300mm. The east dike HCF length frequency histogram illustrates higher numbers in the year 2-3 length class among lake trout and round white fish indicating a high success of recruitment for species collected near the East dike HCF and a consistent number across all length classes along the Bay-Goose dike HCF.

Catch per unit effort (CPUE) for index gill net sets are presented in Table 3.2.3. The mean CPUE for: Bay-Goose HCF was 12.75 (n=6), East Dike was 21.44 (n=6) and the Reference locations was 6.96 (n=4). The data passed statistical assumptions for normality and homogeneity. Alpha was $p \leq 0.05$ for these statistical tests. One-way ANOVA indicated a statistically significant difference between stations ($P=0.004$). A Tukey's pairwise comparison found a statistically significant difference between the East Dike HCF and the High Value Habitat Reference Stations ($p=0.003$) and no significant difference between Bay-Goose and the high value habitat reference stations ($p=0.1$). There was a significant difference between the East Dike and Bay-Goose Dike ($p=0.046$). The comparison of the East Dike to reference stations is consistent with the 2009 data which found an average CPUE of 28.5 (n=15) along the East Dike compared to 4.6 (n=9) at High Value Reference stations in Second Portage Lake.

Overall, the data indicates a greater number of fish are using the East Dike HCF and the Bay-Goose Dike HCF than high value habitat reference areas in Second Portage Lake and Third Portage Lake. Based on the total abundance and CPUE data, lake trout, arctic char and round whitefish of all sizes are using the HCF areas with recruitment of juveniles greater along the East dike HCF than the high value habitat reference areas and Bay-Goose dike HCF. Given the relative age of the East Dike and Bay-Goose HCF, expectations for fish use in the short-term were fairly low since it will take time for periphyton and invertebrates to colonize the structure and attract fish for foraging. Thus these results are encouraging and consistent with the findings in 2009 monitoring of the East Dike which suggest that the compensation structures appear to be functioning as intended and fish are evidently using this area for foraging and likely nursery.

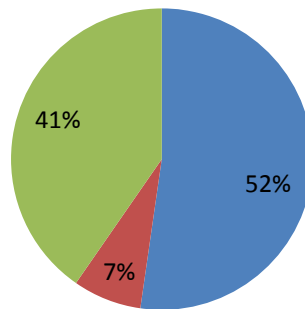
Bay Goose Dike HCF

■ Lake Trout ■ Arctic Char ■ Round Whitefish



East Dike HCF

■ Lake Trout ■ Arctic Char ■ Round Whitefish



Reference Location

■ Lake Trout ■ Arctic Char ■ Round Whitefish

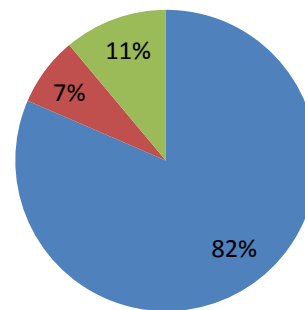


Figure 3.2.1: Fish Species Assemblage by Habitat Compensation Feature Compared to Reference Location

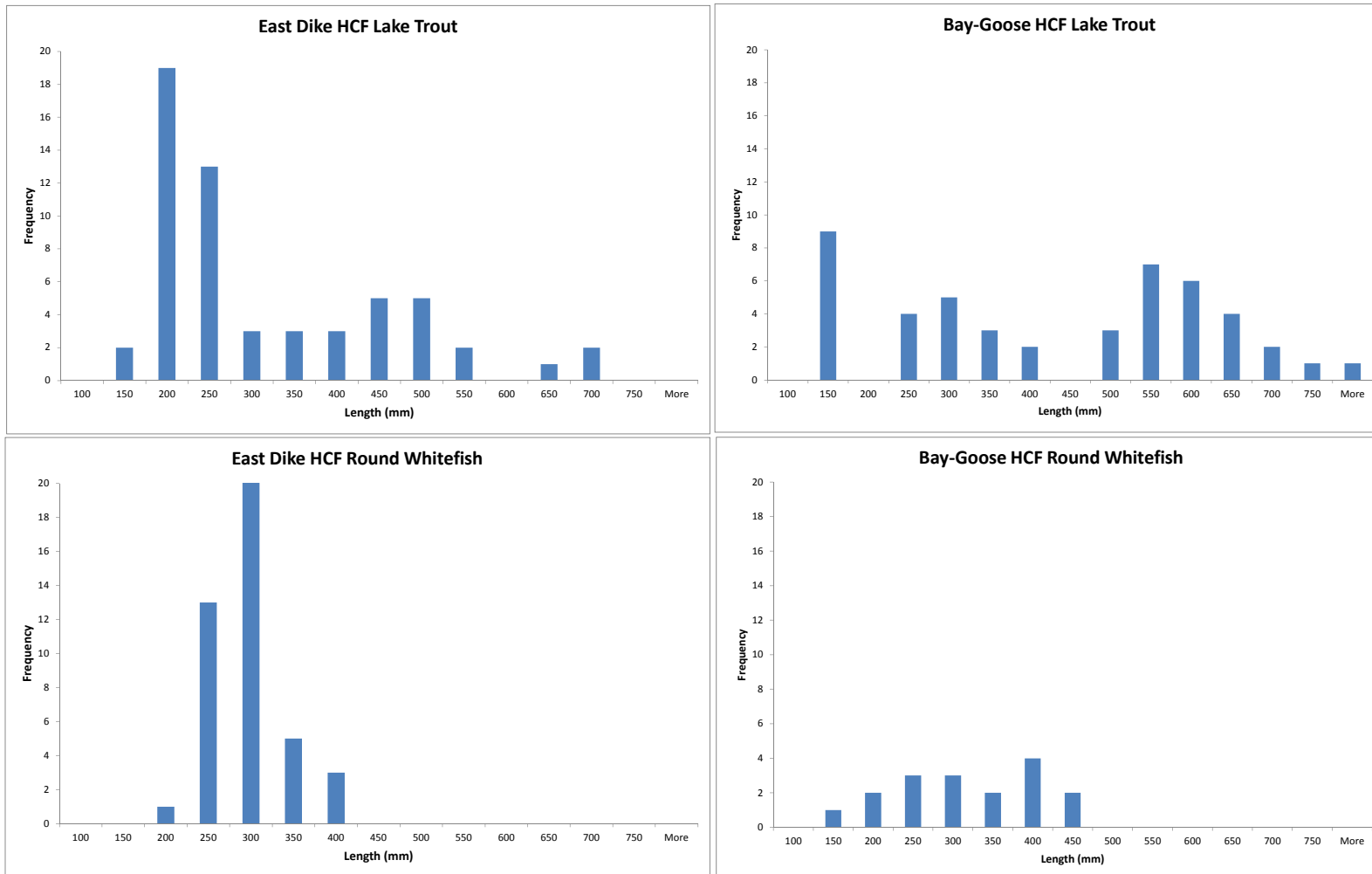


Figure 3.2.2: Length Frequency Histograms for Round Whitefish and Lake Trout at East Dike HCF and Bay-Goose HCF

Table 3.2.2: Average and Range of Fork Length, Weight and Depth Caught by Species at East Dike HCF, Bay-Goose HCF and Pooled Reference Stations in SPL and TPL

	Lake Trout							Arctic Char							Round Whitefish						
	Fork Length (mm)		Weight (g)		Depth (m)		n	Fork Length (mm)		Weight (g)		Depth (m)		n	Fork Length (mm)		Weight (g)		Depth (m)		n
	Avg	Range	Avg	Range	Avg	Range		Avg	Range	Avg	Range	Avg	Range		Avg	Range	Avg	Range	Avg	Range	
East Dike HCF	296.64	118-700	538.79	100-3900	4.61	1.8-8.2	58	295.38	186-458	366.25	100-1105	4.56	2.5-6.4	8	265.84	195-380	233.14	100-600	4.88	2.8-6.5	43
Bay Goose Dike HCF	411.22	123-760	1203.60	100-4200	3.77	1.9-6.5	46	243.25	201-290	193.75	100-300	3.125	2-4.3	4	290.47	132-405	428.24	100-880	3.27	1.5-5.1	17
Reference Location	370.64	110-764	1242.11	100-5000	4.00	1.8-7.5	22	248.00	-	250.00	-	3.7	-	2	343.00	296-394	550.00	400-750	4.23	3.8-4.9	3

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2011 HABITAT COMPENSATION MONITORING

Table 3.2.3 Catch-Per-Unit-Effort Comparison Between Stations

Station	Date		# of Fish Caught	CPUE	CPUE
	Start	Finish		# of fish/index net/ day	# of fish/150m net/ day
BG1	10-Aug-11	11-Aug-11	17.00	16.32	8.16
BG1	11-Aug-11	12-Aug-11	11.00	13.71	6.86
BG2	10-Aug-11	11-Aug-11	11.00	12.28	6.14
BG2	11-Aug-11	12-Aug-11	12.00	14.05	7.02
BG3	10-Aug-11	11-Aug-11	8.00	8.93	4.47
BG3	11-Aug-11	12-Aug-11	11.00	11.23	5.62
		Mean	11.67	12.75	6.38
ED1	12-Aug-11	13-Aug-11	31.00	36.74	18.37
ED1	13-Aug-11	14-Aug-11	26.00	29.71	14.86
ED2	12-Aug-11	13-Aug-11	15.00	18.46	9.23
ED2	13-Aug-11	14-Aug-11	14.00	15.63	7.81
ED3	12-Aug-11	13-Aug-11	11.00	15.09	7.54
ED3	13-Aug-11	14-Aug-11	13.00	13.00	6.50
		Mean	18.33	21.44*	10.72
SPL REF	12-Aug-11	13-Aug-11	5.00	6.15	3.08
SPL REF	13-Aug-11	14-Aug-11	10.00	8.81	4.40
TPL REF	10-Aug-11	11-Aug-11	6.00	6.40	3.20
TPL REF	11-Aug-11	12-Aug-11	6.00	6.47	3.24
		Mean	6.75	6.96	3.48

*ANOVA followed by Tukey's pairwise test determined a statistically significant difference ($p < 0.05$) between ED HCF and Reference/ BG HCF.

4.1 PERIPHYTON ASSESSMENT

4.1.1 Quantitative Assessment- Shallow Zone

Refer to Appendix A for detailed results of quantitative assessment of periphyton community in the shallow zones (<0.5m).

4.1.1.1 East Dike HCF

Although total density and total biomass were about seven times higher at reference stations compared to East Dike HCF, the periphyton community has nearly doubled in total biomass since 2009 sampling (Azimuth, 2010). The community composition and density were similar along the East Dike HCF to reference stations in the 2011 sampling.

4.1.1.2 Bay-Goose HCF

The Bay-Goose Dike HCF periphyton community sampling demonstrated a difference in composition with respect to density and biomass, with approximately 10 times less density and 30 times less biomass compared to reference areas. This is not unexpected given that the Bay-Goose HCF was recently constructed; that these results are similar to the 2009 East Dike HCF (1 year post construction) results.

4.1.2 Qualitative Assessment using Video Surveys- Deep Zone

For detailed results of the qualitative assessment of periphyton community using video surveys in deep zones (1 to 4m target zones), please see Appendix A

4.1.2.1 East Dike HCF

Under water video surveys showed that the substrate along the deeper zones of the East Dike HCF had angular boulders with variable degrees of sediment coverage. The mid-section of the East Dike HCF appeared to have the thickest periphyton coverage with less periphyton coverage to the south. The video surveys indicated a low-moderate coverage of periphyton on the surfaces and sides of substrate. The 2009 video documented light or no coverage of periphyton thus demonstrating an increase in periphyton growth over two years from C+1 to C+3. These results corroborate with the quantitative analysis of periphyton along the East Dike HCF.

4.1.2.2 Bay-Goose HCF

Substrate composition and rock coverage from the video surveys showed that substrate along the Bay-Goose Dike HCF was dominated by large angular boulders with a mix of cobble, pebble and fines dispersed along the boulders. Periphyton coverage on the rocks appeared denser in protected areas, with less developed periphyton coverage compared to reference areas. Despite these differences, rock surfaces show the beginning stages of community development with evidence of growth and periphyton colonization along the entire Bay-Goose HCF.

SECTION 5 • CONCLUSIONS AND RECOMMENDATIONS

Interstitial water sampling (referred in the HCMP as pore water) was completed to address the issue of potential metal leaching from dike construction material as identified in the prehearing and environmental assessment process. A suite of water quality parameters were collected in areas between rocks (interstitial water) along the East Dike HCF and Bay-Goose Dike HCF following the standard operating procedure of the 2009 HCF monitoring. Only total phosphorus was elevated relative to a CCME trigger for ultra-oligotrophic waters at all stations including the reference locations in both Second Portage Lake and Third Portage Lake. These interstitial water sampling results supplement the 2009 results and do not indicate any concerns for leaching or likely to cause any reduction in periphyton growth or impact fish egg incubation.

The periphyton qualitative and quantitative analysis found successful colonization of periphyton along the Bay-Goose Dike HCF and continued improved colonization of periphyton (density and biomass) since the 2009 study (C+1) along the East Dike HCF. These results are consistent with other studies that have found periphyton communities to be resilient to different conditions with slow community growth in arctic lakes. Species composition and biomass along the HCFs continue to become more comparable to reference areas, which is consistent with interstitial water quality results.

Index gill netting results indicate that fish were present in and around the vicinity of the East Dike and Bay-Goose Dike HCFs at densities or frequencies that were greater than reference high value habitat areas elsewhere in Second Portage Lake and Third Portage Lake. Recruitment of year 2-3 was greater along the East Dike HCF than high value habitat reference stations and CPUE was statistically significantly different along the East Dike HCF than both Bay-Goose Dike HCF and high value habitat reference stations.

These data are intended to contribute to long term monitoring and evaluation of the HCFs and overall indicate that the compensation structures are functioning as intended. Specifically, the results indicate comparable water quality to reference stations and improvements from 2009 sampling, periphyton communities are developing and/or improving along the HCFs, and fish are evidently using the areas near HCFs for foraging and likely nursery.

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APPENDIX A:

TECHNICAL MEMORANDUM: HABITAT COMPENSATION MONITORING 2011: EAST DIKE AND BAY-GOOSE DIKE PERIPHYTON

MARCH 8, 2012



Technical Memorandum

Date: March 8, 2012

To: Ryan VanEngen – AEM Meadowbank Gold Mine

Cc:

From: Maggie McConnell, Gary Mann, Randy Baker and Jennifer Trowell

RE: Habitat Compensation Monitoring 2011: East Dike and Bay-Goose
Dike Periphyton

OVERVIEW

Under terms of the Department of Fisheries and Oceans Canada *Fisheries Act* Authorization (NU-03-0191), long-term monitoring following the Habitat Compensation Monitoring Program (HCMP) is designed to document the functionality of habitat compensation features (HCFs) constructed to offset habitat losses associated with development of the Meadowbank Mine. The monitoring strategy of the HCMP (Azimuth, 2008) describes both the physical and ecological monitoring requirements, and presents the schedule for monitoring implementation and decision criteria for evaluating the success of HCF functionality. The monitoring strategy for ecological components follows a tiered framework consisting of both quantitative and qualitative tools (**Figure 1**). The first tier focuses on identifying constraints to HCF functionality (e.g., metals release); higher tiers involve more specialized tools that are only triggered if the success criteria specified in the HCMP are not met.

In 2011, tier 1 quantitative and qualitative ecological components were monitored for both the East Dike HCF (year C+3) and for the Bay-Goose Dike HCF (year C+1). Note that C denotes year of construction completion; 2008 for the East Dike and 2010 for the Bay-Goose Dike. Azimuth was contracted to support AEM by conducting the periphyton component of the program (i.e., qualitative periphyton community monitoring in shallow [rock sampling] and deeper [video surveys] zones); the results of which are documented herein.

OBJECTIVES

Periphyton species composition and biomass are indirect indicators of lake productivity, reflecting nutrient concentrations in the lake, and are sometimes indicators of the presence of contaminants. This community serves as the base of the hard-bottom benthic food chain, which ultimately leads up to fish. As described in the HCMP (Azimuth, 2008), success criteria for periphyton monitoring focus on the capability of

HCFs to function as fish habitat. The HCFs are expected to provide good substrate for periphyton to colonize. The intent of this component is to document periphyton community colonization and development on the dike face HCFs. As per the HCMP, methods for periphyton assessment differ by depth zone:

- *Shallow (0 – 1 m)* – direct methods (described below) are used to sample periphyton on rocks (“Rock Sampling”). Samples are analyzed for density (cells/cm²) and biomass (µg/cm²), but a greater emphasis is placed on the latter as it is more ecologically relevant and is derived from the density counts (see methods). The results are compared to the baseline community data to determine whether there are any gross differences in composition.
- *Deeper (1 – 4 m)* – qualitative assessment of video surveys (described below) are used to indirectly evaluate periphyton. The results are compared to reference areas in either Second or Third Portage Lake (i.e., high-value habitats) and qualitatively assessed for differences in cover thickness.

METHODS

Rock Sampling – *Shallow Zone*

Periphyton samples were collected in the following areas in relation to each dike HCF (sampling locations are shown in **Figure 2**):

East Dike HCF (Second Portage Lake)

- East Dike (SP-ED)
- CREMP far-field location (SP-CREMP)
- Drilltrail Arm reference area (SP-DT)

Bay-Goose Dike HCF (Third Portage Lake – East basin)

- Bay-Goose Dike – North section (TPE-BGN)
- Bay-Goose Dike – South section (TPE-BGS)
- CREMP far-field location (TPE-CREMP)
- Reference area (TPE-G)

Five replicate samples were collected from each area and analyzed independently. UTM coordinates for each replicate sample are presented in **Table 1**. Sampling locations were chosen according to the following criteria: a sufficient number of large, flat rocks from a water depth of approximately 0.5 m with a flat surface facing upwards as much as possible, and with uniform algal coverage, not particularly dense or sparse. Periphyton growth is naturally variable due to differences in wave action, aspect to sun, water depth and clarity, nutrient availability, rock type, water temperature and other factors.

Periphyton samples were collected using a specially designed algae ‘scrubber’. The procedures for collecting the samples are outlined in detail in the SOP for Periphyton Sampling (**Appendix A**). In general, the scrubbers were used to clear and retain periphyton from a 20 cm² area on each rock; three rocks were composited for each replicate sample (i.e., each of the 5 replicates at a sampling area consisted of 3 rocks).

Periphyton samples were preserved in the field with a small amount of Lugol's solution and sent to Plankton Resources Inc. (Winnipeg, MB) for taxonomic identification and biomass ($\mu\text{g}/\text{cm}^2$) estimation.

In the laboratory, each periphyton sample was well mixed and 2 mL sub-samples of suspension were sonicated for 10 to 20 seconds using a Sonifer Cell Disruptor (model w140) and gravity settled for 24 h in an Utermohl chamber (Findlay et al., 1999). Counts were performed on an inverted microscope at magnifications of 125X, 400X, and 1200X with phase contrast illumination. Cells were identified, counted and measured from random fields until 100 cells of the dominant species were found. Cell counts were converted to wet weight biomass by approximating cell volume. Estimates of cell volume for each species were obtained by measurements of up to 50 cells of an individual species and applying the geometric formula best fitted to the shape of the cell (Vollenweider, 1968; Rott, 1981). Data were reported in terms of density (cells/ cm^2) and biomass ($\mu\text{g}/\text{cm}^2$).

Simpson's diversity index was calculated for each replicate sample to quantify periphyton species diversity among areas and replicates (Washington, 1984). Simpson's diversity (D) is calculated as follows:

$$D = 1 - \sum \frac{n_i(n_i - 1)}{N(N - 1)}$$

where: N is the total number of organisms/replicate sample; n_i is the total number of organisms of the i th taxa/replicate sample. The number of species occurring per replicate sample was calculated to measure the species richness among replicates, areas and sampling events.

In terms of field quality assurance and control (QA/QC), one field duplicate was collected and field replicates (5 per area) were collected for periphyton to test consistency in field methods and to determine natural variability and spatial heterogeneity within and among areas. When collection of each replicate sample was completed, the 'scrubber' was rinsed in lake water to ensure that no debris remained in the bristles. We target a RPD of 50% for total density and total biomass, but acknowledge the high natural variability. As a measure of laboratory QA/QC on the enumeration method, replicate counts were performed on 10% of the samples. Laboratory replicate samples were chosen at random and processed at different times from the original analysis to reduce biases. The laboratory replicate is a new aliquot (10 ml) from the sample jar and is counted from the start in the same manner as the original aliquot (10 ml) taken from the jar. An RPD of 25% for density and biomass concentrations is considered acceptable.

Video Surveys – Deeper Zone

Video surveys were conducted in the following areas in relation to each dike HCF (sampling locations are shown in **Figure 2**):

East Dike HCF (Second Portage Lake)

- East Dike (SP-ED)
- Second Portage High-Value Habitat Areas (SP-HVH-1 through -6)

Bay-Goose Dike HCF (Third Portage Lake – East basin)

- Bay-Goose Dike – North section (TPE-BGN)
- Bay-Goose Dike – South section (TPE-BGS)
- Third Portage East High-Value Habitat Areas (TPE-HVH-3 through -6)

Underwater video was used to document and describe periphyton cover on rocks in deeper water along the dike faces relative to natural coverage in high-value habitats (HVH). The East Dike HCF was also surveyed in 2009 (year C+1) and the same replicate locations were surveyed this year. Each dike face area was surveyed in five video segments, each corresponding to same locations (but different depth zones) sampled for rock scrubbing above. UTM coordinates for survey locations are presented in **Table 1** and locations are mapped in **Figure 2**.

Video imagery was acquired using a 'Deep Blue Pro' underwater camera system manufactured by Ocean Systems, Inc. (Everett, Washington). The camera was deployed from a boat at each replicate location along the dike face HCFs (and at each HVH area). Approximately 30 to 60 seconds in length, each video segment slowly panned the substrate surrounding a reference gauge (to help determine rock size; a metal square with green tape denoting 10 inch increments). The gauge was typically set at 2m depth, although target depth was anywhere between 1 – 4 m. The procedures for video work are outlined in detail in the SOP for Underwater Video Survey (**Appendix B**).

RESULTS

QAI/QC

Periphyton samples collected from prescribed areas of rock surface were quantified by density (cells/cm²) and biomass (µg/cm²). A single field duplicate sample was collected from a random location and randomly chosen laboratory duplicates were run on 10% of the samples (n = 4). Both field and laboratory duplicates showed high within-taxa variability in some cases; however, the quality of the data is evaluated here based on *total* density and *total* biomass. RPDs for *total* density and *total* biomass consistently met the DQOs for laboratory duplicates (i.e., <25%), but slightly exceeded the field DQO (50%) for total biomass in the field duplicate (**Table 2**). The latter result is not uncommon for periphyton and should not affect data quality given that this study is concerned with qualitatively assessing community composition. Overall, while certain elements of the community may be variable, RPDs for *total* density, *total* biomass, taxa richness, and Simpson's diversity were all well within the range of acceptability.

East Dike HCF – Shallow Zone

Periphyton samples were collected from rock surfaces at 5 locations each along the East Dike face (SP-ED), at a far-field location (SP-CREMP) and at a reference location (SP-DT) during August 27–28, 2011 (**Table 1**, **Figure 2**). Results show that periphyton along the shallow zone of the East Dike face were different from the other areas in terms of density and biomass and in terms of composition. Total density and total biomass were each about 7 times higher at SP-CREMP and SP-DT compared to the East Dike samples (**Table 3**). However, since 2009 the mean total periphyton biomass (and density) has almost doubled at the East Dike (i.e., from 23 to 43 µg/cm²), despite some

decreases in mean total biomass at both SP-CREMP and SP-DT areas over the 2 years (**Table 4, Figure 3**).

As for community composition (i.e., the main HCMP metric) the shallow zone along the East dike was dominated by diatoms (nearly 100% by biomass) in 2009, but has since been colonized by cyanobacteria and chlorophytes (80% diatoms, 13% cyanobacteria and 7% chlorophytes in 2011; **Table 3, Figure 3**). This recent shift in composition makes the East Dike shallow zone community more similar to both the SP-CREMP and SP-DT reference areas, although continued succession is expected. Periphyton at SP-CREMP and SP-DT was almost equally composed of cyanobacteria (40-43% by biomass) and diatoms (43-47% by biomass), mixed with some chlorophytes (10-16%) in 2011, which is similar to composition at these areas in 2009 (relative biomass in **Figure 3**). A full list of periphyton species with a presence/absence matrix is appended to this report (**Appendix C**).

Community diversity indices were fairly similar at all sampling areas. Taxa count was slightly lower for the East Dike shallow zone, while Simpson's Diversity was similar to the two reference areas (**Table 3**).

East Dike HCF – Deeper Zone

Periphyton community in deeper water was surveyed at 5 locations along the East Dike (SP-ED-1 through -5) and at 6 high-value habitat (HVVH) reference locations in Second Portage Lake (SP-HVVH-1 through -6) on August 29, 2011 (**Table 1, Figure 2**). Substrate composition and rock coverage for each video location along the East Dike and in SP-HVVH areas are described in **Table 5**. Video captures (i.e., still photos “captured” from the video) were used to identify features of the periphyton communities and are provided for reference in **Appendix D**.

Video surveys showed that the substrate along the deeper zone of the East Dike face was generally dominated by angular boulders, with variable degrees of sediment coverage (**Table 5**). The northern portion of the dike is quite shallow and dike material is intermixed with natural boulders; this zone generally had less sediment present, likely due to greater wave action in this depth zone. The middle section of the dike appeared to have the thickest periphyton coverage. At the south end of the dike (SP-ED-5), periphyton coverage was more limited (**Photos D.1-9 and D.1-10**). This general trend was also evident in the rock sampling data, where total biomass was 20 µg/cm² at SP-ED-5 in the south compared to 63 µg/cm² at SP-ED-1 at the northern end of the dike (**Table 3**).

The substrate at HVVH areas in Second Portage Lake generally consisted of an even mix of natural boulders, cobbles, pebbles and fines (**Table 5**). This substrate was covered on all surfaces with moderate to thick periphyton with raised fronds, and generally thin and sparse sediment coverage (**Photos D.4-1 through -6**). Despite the differences in periphyton coverage between the East Dike and the SP-HVVH areas, the video survey of the East Dike in 2009 noted very minimal periphyton coverage, with almost no coverage on angular rocks, and heavy sediment deposition (see 2009 video summary tables in **Appendix E**). In 2011, rock surfaces along the East Dike had low-moderate coverage of periphyton on the surfaces and sides of substrate, mats were typically thin and flat but in some cases were raised, and there was less evidence of dense sediment coverage

(Table 5). Note that **Appendix F** is a key for interpreting sediment and periphyton coverage from video surveys.

Bay-Goose Dike HCF – Shallow Zone

Periphyton samples were collected from rock surfaces at 5 locations each along the north and south sections of the Bay-Goose Dike face (TPE-BGN; TPE-BGS), at a far-field location (TPE-CREMP) and at a reference location (TPE-G) during August 25–27, 2011 (Table 1, Figure 2). As expected for this initial monitoring event, periphyton measurements along the shallow zone of the Bay-Goose Dike face were quite different from the other areas both compositionally and in terms of density and biomass. Total periphyton density was about 10 times lower along the Bay-Goose Dike face compared to the reference area (TPE-G), and about 30 times lower by total biomass (Table 6). Periphyton density and biomass at the far-field area (TPE-CREMP) were even higher than at TPE-G; however, mean total biomass at TPE-CREMP was twice as much in 2011 as it was in 2007 and 2008 (Table 4, Figure 4). To put these results into perspective, periphyton density and biomass in the shallow zone of the East Dike face at one year post-construction were 10 times and 20 times, respectively, lower than reference areas in 2009 (Figure 3).

Periphyton on the rocks along the north and south sections of the Bay-Goose Dike were composed mainly of diatoms (74% and 86% by biomass, respectively), whereas rocks at TPE-CREMP and TPE-G were composed of about 50% by biomass of cyanobacteria and 30% and 40% by biomass of diatoms, respectively (Table 6, Figure 4). This is again similar to results from rock sampling at one year post-construction of the East Dike, which showed a predominance of diatoms (Figure 3), suggesting that diatoms are early colonizing periphyton. Interestingly, TPE-BGN samples had a substantial proportion of chlorophytes, particularly at the most northern replication location (TPE-BGN-1; biomass $12 \mu\text{g}/\text{cm}^2$), perhaps due to being the most sheltered part of the north dike, but also this section was constructed first and has had more time to establish a periphyton community (Table 6, Figure 4). A full list of periphyton species with a presence/absence matrix is appended to this report (Appendix C).

Community diversity measures were also different in the shallow zone of the Bay-Goose Dike. Mean taxa counts at TPE-BGN (11 taxa) and TPE-BGS (11 taxa) were noticeably lower than those at TPE-CREMP (16 taxa) and TPE-G (17 taxa) (Table 6). However, about 3 of the 5 replicate samples along each section of the dike had more typical taxa counts and the other 2 replicate samples were more depressed. Simpson's Diversity index was also lower at Bay-Goose Dike (0.6) compared to reference areas (0.8).

Bay-Goose Dike HCF – Deeper Zone

Periphyton community in deeper water was surveyed at 5 locations each along the Bay-Goose Dike north and south sections (TPE-BGN-1 through -5; TPE-BGS-1 through -5), and at the 4 remaining¹ high-value habitat (HVH) reference locations in the east basin of Third Portage Lake (TPE-HVH-3 through -6) on August 28–29, 2011 (Table 1, Figure 2). Substrate composition and rock coverage for each video location along the Bay-Goose Dike and in TPE-HVH areas are described in Table 7. Video captures were used to identify features of the periphyton communities and can be viewed in Appendix D.

¹ Two of the six initial HVH areas (TPE-HVH-1 and -2) in the east basin of Third Portage Lake were lost due to Bay-Goose Dike construction.

Video surveys showed that the substrate along both sections of the Bay-Goose Dike face was generally dominated by large angular boulders, but still consisted of a mix of cobble, pebble and fines dispersed among and beneath the boulders (**Table 7**). Periphyton coverage on the rocks appeared denser and thicker in the most protected sections of the dike (i.e., mainly at TPE-BGN-1 and TPE-BGS-5; **Photos D.2-1 and D.3-9**). Correspondingly, total biomass from rock sampling is also highest at the replicate locations on the dike ends ($38 \mu\text{g}/\text{cm}^2$ at both TPE-BGN-1 and TPE-BGS-5) (**Table 6**).

The substrate at HVH areas in Third Portage Lake generally consisted of an even mix of natural boulders, cobbles, pebbles and fines (**Table 7**). This substrate was covered on all surfaces by thick periphyton with raised fronds and thin and sparse sediment cover (**Photos D.5-1 through -4**). The deeper water periphyton community is clearly younger and less developed along the Bay-Goose Dike than at TPE-HVH areas. Despite these differences, rock surfaces show clear evidence of periphyton growth along the Bay-Goose Dike, and there is even a noticeable difference in periphyton development between the somewhat older north section compared to the younger south section.

OVERALL DISCUSSION AND CONCLUSIONS

Periphyton community colonization was documented for the Bay-Goose Dike HCF (early stage) and the East Dike HCF (early to mid-stage). The early stage communities (i.e., East Dike HCF in 2009 and Bay-Goose Dike HCF in 2011) were dominated by diatoms and had very low biomass. The early to mid-stage community at East Dike HCF in 2011 had undergone significant successional changes (community was colonized by cyanobacteria and chlorophytes) and doubled in biomass since 2009. Diversity metrics of the early to mid-stage East Dike HCF community (i.e., Simpson's Diversity and taxa richness based on the number of taxa present) were more similar to reference areas. Increasing diversity is typical of progressing successional stages of community development and is a good indicator of a healthy community. Deeper zone video survey results corroborated the shallow rock sampling results in that a developing periphyton mat was visible, but less advanced than seen in the high-value habitat reference areas. These results show continued colonization and development into productive fish habitat, albeit at a slow pace in this ultra-oligotrophic system.

In 2009, we concluded that it was plausible that the periphyton community could fully colonize (i.e., comparable to baseline in terms of composition, density and biomass) the new barren rock surfaces in as few as 3 to 5 years. This conclusion was based on relevant studies (e.g., Turner et al., 1995 and 2005) and expert opinion (D. Findlay, Pers. Comm.), which described periphyton communities as extremely resilient in varying locals and nutrient regimes (see Azimuth, 2010 for more detail on these studies). However, algal growth is ultimately driven by nutrient concentrations (particularly carbon, nitrogen and phosphorus) and light. In the case of the Meadowbank lakes in general, nutrients are extremely low and one would expect algal growth to be very slow (D. Findlay, Pers. Comm., Mar. 2012). Findlay et al. (2009) reported low periphyton growth in a lake system where total phosphorus was 2.5 times higher than in Second Portage Lake. Additionally, residual sediment present after dike construction could have further slowed the colonization process. Two studies have focused on the effects of fine sediment deposition on the periphyton community. Izagirre et al. (2009), studying an artificial channel, and Yamada and Nakamura (2002), studying a natural environment,

both concluded that accumulation of fine sediment resulted in lowered periphyton biomass and community composition. However, Vadeboncoeur et al. (2006) studied periphyton chlorophyll content and productivity on various substrates and found the highest area-specific biomass and productivity on sediments (i.e., epipelton), relative to rocks (epilithon), wood (epixylon), macrophytes (epiphyton), or the water column (phytoplankton); they hypothesize that this was due to higher nutrient concentrations in sediment porewater compared to nutrients in the open water column.

Species composition and biomass on the HCFs continue to become more comparable to baseline conditions (reference areas) over time. The relatively slow colonization trajectory is likely due to nutrient limitations in the Meadowbank lakes.

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TABLES:

Table 1. Periphyton rock sampling and video survey locations.

HCF or Lake	Sampling Area ID	Date	Replicate #	Rock Sampling		Date	Video Surveys	
				Easting	Northing		Easting	Northing
East Dike HCF	SP-ED	28-Aug-11	1	14 W 639366	7214361	29-Aug-11	14 W 639371	7214344
			2	14 W 639380	7214257		14 W 639382	7214237
			3	14 W 639400	7214057		14 W 639399	7214051
			4	14 W 639413	7213948		14 W 639415	7213942
			5	14 W 639378	7213846		14 W 639380	7213844
	SP-CREMP	27-Aug-11	1	14 W 641010	7213319			
			2	14 W 641023	7213295			
			3	14 W 641038	7213293			
			4	14 W 641008	7213267			
			5	14 W 640996	7213258			
	SP-DT	27-Aug-11	1	15 W 358677	7213877			
			2	15 W 358680	7213891			
			3	15 W 358683	7213901			
			4	15 W 358683	7213917			
			5	15 W 358696	7213925			
Second Portage Lake	SP-HVH-1					29-Aug-11	14 W 639638	7214029
	SP-HVH-2						14 W 640045	7213806
	SP-HVH-3						14 W 639755	7213397
	SP-HVH-4						14 W 640269	7213780
	SP-HVH-5						14 W 640816	7213356
	SP-HVH-6						14 W 640395	7213130
Bay-Goose Dike HCF	TPE-BGN	26-Aug-11	1	14 W 639195	7213027	28-Aug-11	14 W 639193	7213029
			2	14 W 639110	7212917		14 W 639106	7212917
			3	14 W 639012	7212819		14 W 639011	7212817
			4	14 W 638985	7212664		14 W 638982	7212663
			5	14 W 639006	7212520		14 W 639002	7212523
	TPE-BGS	27-Aug-11	1	14 W 638950	7212166	29-Aug-11	14 W 638953	7212204
			2	14 W 638845	7211965		14 W 638843	7211967
			3	14 W 638529	7211831		14 W 638603	7211819
			4	14 W 638453	7211967		14 W 638469	7211945
			5	14 W 638361	7212098		14 W 638357	7212107
	TPE-CREMP	25-Aug-11	1	14 W 639938	7210848			
		25-Aug-11	2	14 W 639956	7210849			
		26-Aug-11	3	14 W 639969	7210847			
		26-Aug-11	4	14 W 639982	7210836			
		26-Aug-11	5	14 W 640006	7210834			
	TPE-G	25-Aug-11	1	14 W 637940	7210751			
			2	14 W 637947	7210747			
			3	14 W 637960	7210745			
			4	14 W 637967	7210740			
			5	14 W 637975	7210732			
Third Portage Lake	TPE-HVH-3					29-Aug-11	14 W 639741	7211954
	TPE-HVH-4						14 W 639604	7212527
	TPE-HVH-5						14 W 639053	7211097
	TPE-HVH-6						14 W 639451	7213341

Table 2. QA / QC data for periphyton rock sampling.

	East Dike HCF Area			Bay-Goose Dike HCF Area			East Dike HCF Area			Bay-Goose Dike HCF Area			East Dike HCF Area		
	SP-CREMP-3	Field	RPD	TPE-G-4	Lab	RPD	SP-CREMP-4	Lab	RPD	TPE-BGS-2	Lab	RPD	SP-ED-1	Lab	RPD
	27-Aug-11	Duplicate	(%)	26-Aug-11	Duplicate	(%)	27-Aug-11	Duplicate	(%)	27-Aug-11	Duplicate	(%)	28-Aug-11	Duplicate	(%)
Phytoplankton Density (cells/cm²)															
Cyanobacteria	1119724	380419	99	511413	502440	1.8	771605	753661	2.4	2871	4307	-40	266772	253613	5.1
Chlorophyte	14355	64600	-127	17944	17944	0	50842	56824	-11	2153	1436	40	2393	2393	0
Diatom	283520	581395	-69	352905	343932	2.6	230285	230285	0	35889	34453	4.1	88525	93310	-5.3
Total	1417600	1026414	32	882262	864317	2.1	1052732	1040769	1.1	40913	40195	1.8	357690	349316	2.4
Phytoplankton Biomass (ug/cm²)															
Cyanobacteria	142	240	-51	457	480	-4.8	123	106	15	0.2	0.4	-67	13	13	-3.8
Chlorophyte	68.8	149	-73	29.8	29.8	0	93.9	71.7	27	0.2	0.1	67	0.2	0.2	0
Diatom	115	203	-56	166	165	0.5	120	188	-44	3.9	3.7	5.3	50	64	-25
Total	326	591	-58	653	675	-3.3	337	366	-8.4	4.3	4.2	2.4	63	78	-21
# Taxa	20	14	35	11	12	-9	19	20	-5	7	6	15	15	16	-6
Simpsons Diversity	0.76	0.76	0	0.77	0.77	0	0.76	0.77	-1.9	0.42	0.45	-6.3	0.71	0.73	-2.4

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Shaded RPDs exceed 50% (field duplicates) or 25% (lab duplicates).

NA = Not Applicable for rare species.

Table 3. Density (cells/cm²), biomass (µg/cm²) and diversity of major periphyton taxa groups for East Dike HCF sampling areas.

Area-Replicate ID	Date	Cyanobacteria	Chlorophyte	Chrysophyte	Diatom	Dinoflagellate	Total	# Taxa	Simpsons Diversity
Periphyton Density (cells/cm ²)									
SP-ED-1	28-Aug-11	266772	2393	0	88525	0	357690	15	0.71
SP-ED-2	28-Aug-11	129199	0	0	61011	0	190210	13	0.70
SP-ED-3	28-Aug-11	35889	8613	0	48091	0	92593	14	0.82
SP-ED-4	28-Aug-11	36606	3589	0	94028	0	134223	17	0.73
SP-ED-5	28-Aug-11	17227	2871	0	48091	0	68188	14	0.75
station mean		97138	3493	0	67949	0	168581	15	0.74
as %		58%	2%	0%	40%	0%			
SP-CREMP-1	27-Aug-11	1019236	0	0	287109	0	1306345	17	0.76
SP-CREMP-2	27-Aug-11	1087425	14355	0	305053	0	1406833	19	0.79
SP-CREMP-3	27-Aug-11	1119724	14355	0	283520	7178	1424778	20	0.76
SP-CREMP-4	27-Aug-11	771605	50842	0	230285	0	1052732	19	0.76
SP-CREMP-5	27-Aug-11	583190	29907	0	218322	0	831419	17	0.74
station mean		916236	21892	0	264858	1436	1204421	18	0.76
as %		76%	2%	0%	22%	0%			
SP-DT-1	27-Aug-11	820952	0	0	233276	0	1054228	17	0.66
SP-DT-2	27-Aug-11	910673	0	0	331970	0	1242643	16	0.71
SP-DT-3	27-Aug-11	777586	23926	0	209350	0	1010862	19	0.74
SP-DT-4	27-Aug-11	843382	11963	0	337951	0	1193296	19	0.80
SP-DT-5	27-Aug-11	1046751	41870	0	290100	0	1378721	21	0.74
station mean		879869	15552	0	280529	0	1175950	18	0.73
as %		75%	1%	0%	24%	0%			
Periphyton Biomass (µg/cm ²)									
SP-ED-1	28-Aug-11	13	0.2	0	50	0	63		
SP-ED-2	28-Aug-11	11	0	0	34	0	45		
SP-ED-3	28-Aug-11	2.0	5.3	0	40	0	47		
SP-ED-4	28-Aug-11	1.8	6.0	0	33	0	41		
SP-ED-5	28-Aug-11	1.4	3.7	0	15	0	20		
station mean		5.8	3.0	0	34	0	43		
as %		13%	7.0%	0%	80%	0%			
SP-CREMP-1	27-Aug-11	127	0	0	144	0	271		
SP-CREMP-2	27-Aug-11	131	25	0	185	0	341		
SP-CREMP-3	27-Aug-11	142	69	0	115	22	348		
SP-CREMP-4	27-Aug-11	123	94	0	120	0	337		
SP-CREMP-5	27-Aug-11	111	59	0	118	0	287		
station mean		127	49	0	136	4.4	316		
as %		40%	16%	0%	43%	1.4%			
SP-DT-1	27-Aug-11	221	0	0	189	0	410		
SP-DT-2	27-Aug-11	184	0	0	84	0	268		
SP-DT-3	27-Aug-11	112	76	0	90	0	278		
SP-DT-4	27-Aug-11	90	20	0	170	0	279		
SP-DT-5	27-Aug-11	78	59	0	205	0	343		
station mean		137	31	0	148	0	316		
as %		43%	10%	0%	47%	0%			

Table 4. Mean total ($\pm$ SD) periphyton biomass ($\mu\text{g}/\text{cm}^2$) at both dike HCF areas since 2007.

Year	East Dike HCF Areas			Bay-Goose Dike HCF Areas			
	SP-ED	SP-CREMP	SP-DT	TPE- BGN	TPE-BGS	TPE-CREMP	TPE-G
2007	-	628 $\pm$ 352	-	-	-	482 $\pm$ 235	-
2008	-	546 $\pm$ 183	-	-	-	372 $\pm$ 148	-
2009	23 $\pm$ 13	549 $\pm$ 256	438 $\pm$ 265	-	-	-	-
2010	-	270 $\pm$ 98	308 $\pm$ 113	-	-	-	-
2011	43 $\pm$ 16	316 $\pm$ 35	316 $\pm$ 61	16 $\pm$ 13	16 $\pm$ 15	855 $\pm$ 332	480 $\pm$ 138

Table 5. Qualitative characteristics of the periphyton community from video surveys for East Dike face and SP-HVH areas.

Site Info			Periphyton and Substrate Description			
Area-Replicate ID	Location	Depth (m)	Substrate Composition	Periphyton Cover	Description of Cover	Sediment Cover
SP-ED-1	North end of East Dike	1.6	Round and Angular Boulders (100%)	Low-moderate coverage on surface and sides	Thin and flat periphyton mats with continuous coverage	Thin sediment coverage
SP-ED-2	Near North end of East Dike	2.0	Round and Angular Boulders (100%)	Low coverage on surface and sides	Thin and flat periphyton mats with sparse coverage	Thin and sparse sediment coverage
SP-ED-3	Middle of East Dike	2.0	Angular Boulders (100%)	Low-moderate coverage on surface and sides	Thicker periphyton mats with some raised fronds; sparse coverage	Moderate sediment coverage in some areas
SP-ED-4	Near South end of East Dike	2.0	Angular Boulders (80%), Fines (20%)	Low-moderate coverage on surface and sides	Thicker periphyton mats with some raised fronds; sparse coverage	Moderate sediment coverage in some areas
SP-ED-5	South end of East Dike	2.0	Angular Boulders (80%), Fines (20%)	Low coverage on surface and sides	Thin, flat and sparse periphyton coverage	Thin sediment coverage
SP-HVH-1	see Figure 2	3.2 to 3.7	Boulder (30%), Cobble (10%), Fines (60%)	High coverage on surface and sides	Thick periphyton mats with raised fronds on surface and sides; somewhat dense coverage	Thin sediment coverage
SP-HVH-2	see Figure 2	2.2 to 2.3	Boulder (45%), Cobble (45%), Pebble (5%), Fines (5%)	Moderate-high coverage on surface and sides	Thick periphyton mats with raised fronds on surface and sides; sparse coverage	Thin and sparse sediment coverage
SP-HVH-3	see Figure 2	1.3 to 3.7	Boulder (40%), Cobble & Pebble (30%), Fines (40%)	Moderate coverage on surface and high on sides	Thin, flat and somewhat patchy coverage on surface; thick, raised and dense coverage on sides	Thin and sparse sediment coverage
SP-HVH-4	see Figure 2	1.6 to 2.3	Boulder (48%), Cobble (48%), Fines (2%)	High coverage on surface and sides	Thick periphyton mats with raised fronds on surface and sides; somewhat dense coverage	Thin and sparse sediment coverage
SP-HVH-5	see Figure 2	2.4 to 3.8	Boulder (40%), Cobble & Pebble (30%), Fines (40%)	High coverage on surface and sides	Thick and raised periphyton with dense coverage on all surfaces	Thin sediment coverage
SP-HVH-6	see Figure 2	2.1 to 2.9	Boulder (5%), Cobble (45%), Fines (45%)	Moderate coverage on surface and high on sides	Thin, flat and somewhat patchy coverage on surface; thick, raised and dense coverage on sides	Thin sediment coverage

Notes:

Periphyton cover: low (0-30%); moderate (35-70%); high (75-100%) coverage.

Table 6. Density (cells/cm²), biomass (µg/cm²) and diversity of major periphyton taxa groups at Bay-Goose Dike HCF sampling areas.

Area-Replicate ID	Date	Cyanobacteria	Chlorophyte	Chrysophyte	Diatom	Dinoflagellate	Total	# Taxa	Simpsons Diversity
Periphyton Density (cells/cm ²)									
TPE-BGN-1	26-Aug-11	2153	5024	0	66753	0	73931	16	0.46
TPE-BGN-2	26-Aug-11	2153	8613	0	61011	0	71777	9	0.42
TPE-BGN-3	26-Aug-11	3589	718	0	23687	0	27993	8	0.56
TPE-BGN-4	26-Aug-11	5024	1436	0	45220	0	51680	10	0.58
TPE-BGN-5	26-Aug-11	7178	1436	0	33018	0	41631	13	0.77
	station mean	4020	3445	0	45937	0	53402	11	0.56
	as %	8%	6%	0%	86%	0%			
TPE-BGS-1	27-Aug-11	8613	1436	0	7178	0	17227	6	0.72
TPE-BGS-2	27-Aug-11	2871	2153	0	35889	0	40913	7	0.42
TPE-BGS-3	27-Aug-11	1436	0	0	45220	0	46655	10	0.63
TPE-BGS-4	27-Aug-11	9331	3589	0	101924	0	114844	12	0.64
TPE-BGS-5	27-Aug-11	11664	2692	0	146246	0	160602	19	0.61
	station mean	6783	1974	0	67291	0	76048	11	0.60
	as %	9%	3%	0%	88%	0%			
TPE-CREMP-1	25-Aug-11	345428	40375	0	374587	0	760390	17	0.78
TPE-CREMP-2	25-Aug-11	419897	82544	0	617284	0	1119724	14	0.77
TPE-CREMP-3	26-Aug-11	1583585	0	0	480010	0	2063595	15	0.75
TPE-CREMP-4	26-Aug-11	1166380	14355	0	333764	0	1514499	14	0.76
TPE-CREMP-5	26-Aug-11	850560	111255	0	455785	0	1417600	19	0.85
	station mean	873170	49706	0	452286	0	1375162	16	0.78
	as %	63%	4%	0%	33%	0%			
TPE-G-1	25-Aug-11	412719	17944	0	251220	0	681883	18	0.81
TPE-G-2	25-Aug-11	231282	3988	0	346923	0	582193	19	0.77
TPE-G-3	25-Aug-11	388793	0	0	430663	0	819456	19	0.83
TPE-G-4	25-Aug-11	511413	17944	0	352905	0	882262	11	0.77
TPE-G-5	25-Aug-11	540893	46143	0	271728	0	858763	18	0.80
	station mean	417020	17204	0	330688	0	764911	17	0.80
	as %	55%	2%	0%	43%	0%			
Periphyton Biomass (µg/cm ²)									
TPE-BGN-1	26-Aug-11	0.2	12	0	26	0	38		
TPE-BGN-2	26-Aug-11	0.2	2.3	0	7.7	0	10		
TPE-BGN-3	26-Aug-11	0.4	0.1	0	3.3	0	3.7		
TPE-BGN-4	26-Aug-11	2.2	0	0	12	0	14		
TPE-BGN-5	26-Aug-11	0.8	1.7	0	10	0	13		
	station mean	0.8	3.3	0	12	0	16		
	as %	4.8%	21%	0%	74%	0%			
TPE-BGS-1	27-Aug-11	0.8	0.1	0	1.4	0	2.3		
TPE-BGS-2	27-Aug-11	0.2	0.2	0	3.9	0	4.3		
TPE-BGS-3	27-Aug-11	6.6	0	0	7.4	0	14		
TPE-BGS-4	27-Aug-11	1.1	0.3	0	22	0	23		
TPE-BGS-5	27-Aug-11	1.3	0.7	0	36	0	38		
	station mean	2.0	0.3	0	14	0	16		
	as %	12%	1.6%	0%	86%	0%			
TPE-CREMP-1	25-Aug-11	83	93	0	261	0	437		
TPE-CREMP-2	25-Aug-11	388	180	0	222	0	789		
TPE-CREMP-3	26-Aug-11	821	0	0	313	0	1134		
TPE-CREMP-4	26-Aug-11	467	29	0	175	0	671		
TPE-CREMP-5	26-Aug-11	576	458	0	210	0	1244		
	station mean	467	152	0	236	0	855		
	as %	55%	18%	0%	28%	0%			
TPE-G-1	25-Aug-11	174	29	0	142	0	346		
TPE-G-2	25-Aug-11	117	16	0	234	0	366		
TPE-G-3	25-Aug-11	200	0	0	239	0	439		
TPE-G-4	25-Aug-11	457	30	0	166	0	653		
TPE-G-5	25-Aug-11	323	104	0	167	0	595		
	station mean	254	36	0	190	0	480		
	as %	53%	7.5%	0%	40%	0%			

Table 7. Qualitative characteristics of the periphyton community from video surveys for Bay-Goose Dike face and TPE-HVH areas.

Site Info			Periphyton and Substrate Description			
Area-Replicate ID	Location	Depth (m)	Substrate Composition	Periphyton Cover	Description of Cover	Sediment Cover
TPE-BGN-1	North end of BGN	1.5	Angular Boulders (90%), Cobble (10%)	Low-moderate coverage on surface and sides	Thin and flat periphyton mats; moderate coverage	Moderate sediment coverage
TPE-BGN-2	Near North end of BGN	2.1	Angular Boulders (50%), Cobble (50%)	Low coverage on surface; moderate coverage on sides	Thin and slightly raised but sparse periphyton coverage in some areas	Thin sediment coverage
TPE-BGN-3	Middle of BGN	2.0	Angular Boulders (25%), Cobble (75%)	Low coverage on surface; moderate coverage on sides	Thin, flat and sparse on rock surfaces; some raised fronds on rock sides	Moderate sediment coverage
TPE-BGN-4	Near South end of BGN	2.0	Angular Boulders (50%), Cobble (50%)	Low-moderate coverage on surface and sides	Thin periphyton mats but somewhat raised fronds; moderate coverage	Thin and sparse sediment coverage
TPE-BGN-5	South end of BGN	2.0	Angular Boulders (90%), Cobble (10%)	No coverage	No periphyton visible	Light sediment dusting
TPE-BGS-1	North end of BGS	2.0	Angular Boulders (10%), Cobble (90%)	Low-moderate coverage on surface	Thin and flat layer of periphyton; somewhat patchy coverage	Thin sediment coverage
TPE-BGS-2	Near North end of BGS	2.0	Angular Boulders (70%), Cobble (30%)	Low-moderate coverage on surface	Thin and flat layer of periphyton; patchy coverage	Thin and sparse sediment coverage
TPE-BGS-3	Middle of BGS	2.0	Angular Boulders (90%), Cobble (10%)	Low-moderate coverage on surface and sides	Thin and slightly raised but sparse periphyton coverage in some areas	Thin sediment coverage
TPE-BGS-4	Near SouthWest end of BGS	2.0	Angular Boulders (90%), Cobble (10%)	Low coverage on surface	Very thin and flat layer of periphyton; patchy coverage	Light sediment dusting
TPE-BGS-5	SouthWest end of BGS	2.0	Angular Boulders (75%), Cobble (25%)	Low-moderate coverage on surface and sides	Thin and flat periphyton mats; moderate coverage	Thin sediment coverage
TPE-HVH-3	see Figure 2	1.4 to 2.4	Boulder (100%)	Moderate coverage on surface and high on sides	Thin, flat and somewhat patchy coverage on surface; thick, raised and dense coverage on sides	Thin and sparse sediment coverage
TPE-HVH-4	see Figure 2	3.2 to 3.3	Boulder (25%), Cobble (25%), Pebble (25%), Fines (25%)	High coverage on surface and sides	Thick mats of periphyton with raised fronds; dense coverage on all surfaces	Thin and sparse sediment coverage
TPE-HVH-5	see Figure 2	1.5 to 2.1	Boulder (100%)	High coverage on surface and sides	Thick mats of periphyton with raised fronds; dense coverage on all surfaces	Thin and sparse sediment coverage
TPE-HVH-6	see Figure 2	1.6 to 3.1	Boulder (40%), Cobble & Pebble (30%), Fines (30%)	Moderate coverage on surface and high on sides	Thick, flat and somewhat dense coverage on surface; thick, raised and dense coverage on sides	Thin and sparse sediment coverage

Notes:

Periphyton cover: low (0-30%); moderate (35-70%); high (75-100%) coverage.

FIGURES:

Figure 1. Ecological monitoring strategy for habitat compensation features (HCFs), Meadowbank Mine (taken from HCMP; Azimuth, 2008).

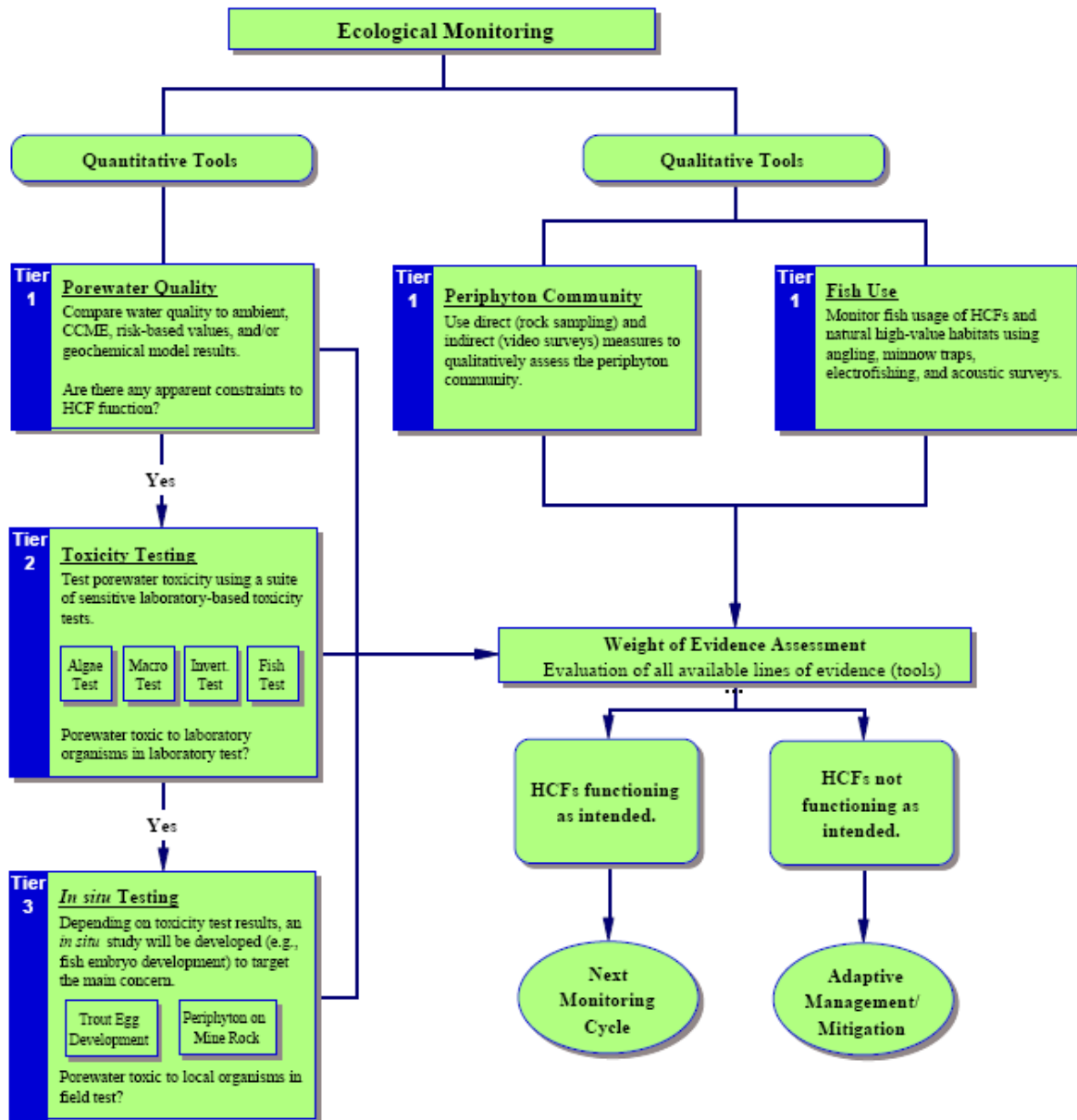


Figure 2. Periphyton rock sampling and video survey locations.

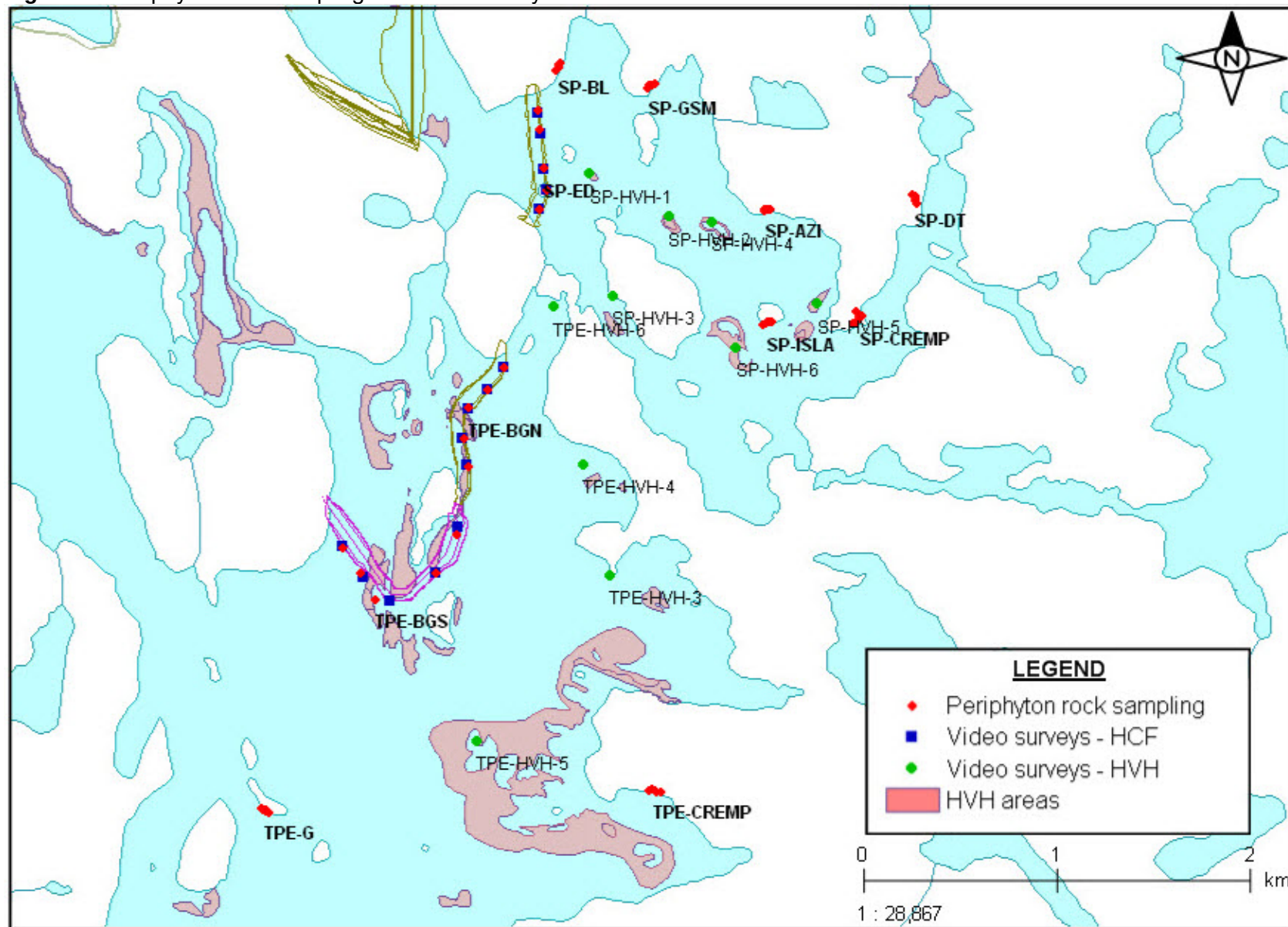


Figure 3. Mean and relative periphyton biomass ($\mu\text{g}/\text{cm}^2$) and density (cells/cm^2) for major taxa groups at East Dike HCF sampling areas.

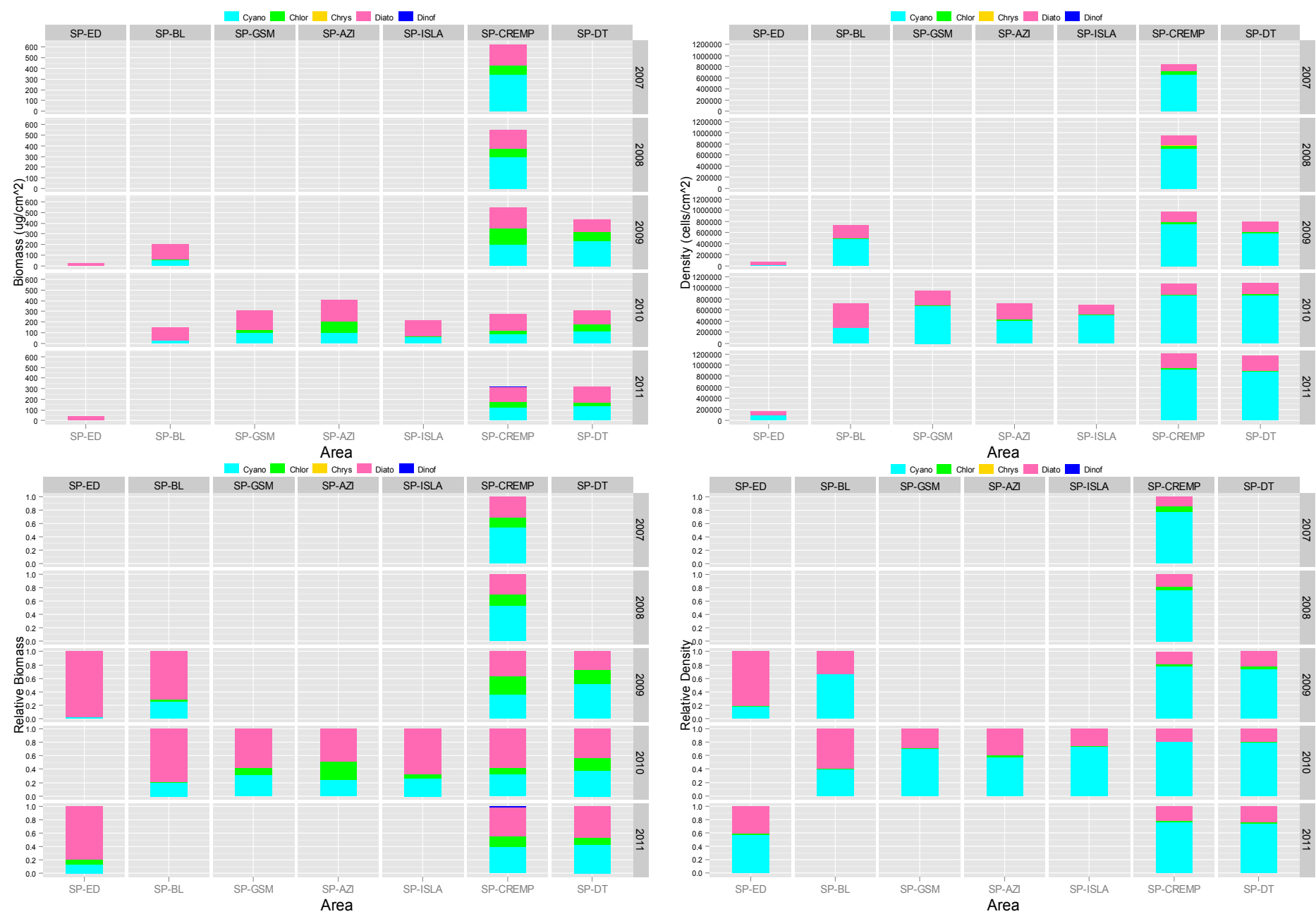
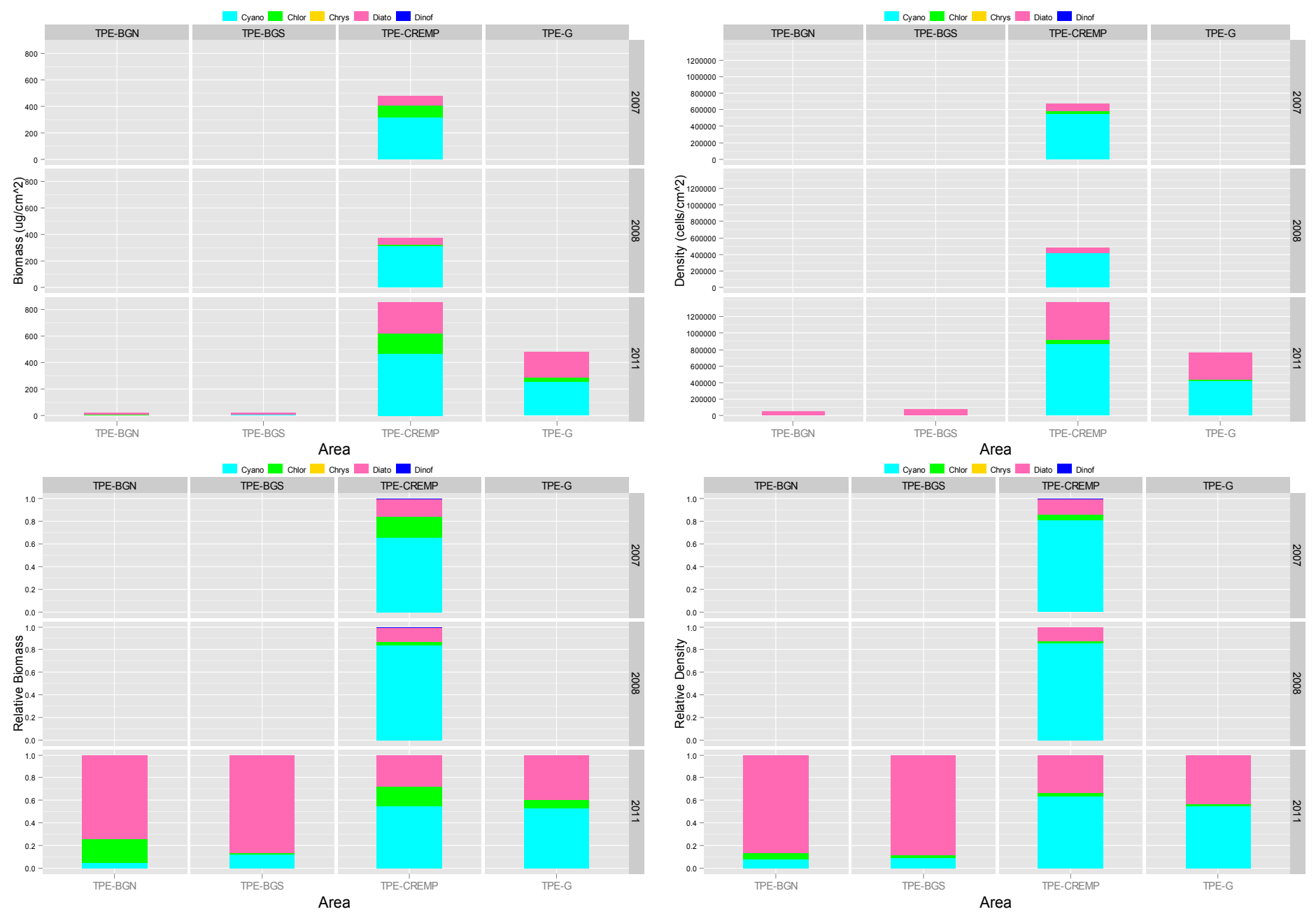


Figure 4. Mean and relative periphyton biomass ($\mu\text{g}/\text{cm}^2$) and density (cells/cm^2) for major taxa groups at Bay-Goose Dike HCF sampling areas.



APPENDICES:

Appendix A. SOP EAS & HCM Periphyton Sampling

Appendix B. SOP EAS & HCM Underwater Video Survey

Appendix C. Presence (+) / Absence (-) Matrix of Periphyton Species

Appendix D. Photos of Periphyton Community from Underwater Video Imagery

Appendix E. Qualitative characteristics table of the periphyton community from video surveys conducted in 2009 (Azimuth, 2010).

Appendix F. Key for interpreting sediment and periphyton coverage from video surveys of the periphyton community.

Standard Operating Procedure Meadowbank Project Lakes EAS & HCM Periphyton Sampling

Equipment:

- Field collection data forms, pencils, waterproof markers & clipboard
- GPS unit, batteries
- Periphyton sampler, syringes & plastic tubes
- Binder clips (to pinch tubes on periphyton sampler)
- Shoulder gloves (with 5 cm increments marked from fingertip to shoulder)
- Scraping tools
- Large tote
- Field sample bottles & preservative (per replicate):
 - 1 – 500 mL plastic jar (if scrubbing)
 - 1 syringe & Lugol's solution
 - 1 – 125 mL glass jar (if scraping)
- Cooler(s) or action packer(s) (for storing and shipping samples)
- Address labels for cooler(s)/action packer(s)
- Chain-of-custody forms
- Large Ziploc bag (for sending chain-of-custody form in cooler)
- Packing tape (for sealing cooler)

General Procedures:

- Before going into the field, **label** all **sampling containers**. Using a permanent waterproof marker, print the following information directly onto both the jar and jar lid:
 - Azimuth company name
 - Station abbreviation (e.g. SP-CREMP) and replicate number (e.g. SP-CREMP -1, TPE-CREMP-2)
 - Date of sample collection
- Before and during sampling fill in the requested information on the **field data form**. Forms are made of waterproof paper; **print** all information on the form using a **lead pencil** or write-in-the-rain pen.
- Access to the area may be by boat or foot; in either event, ensure the sampling area is not impacted by boat (launch) or other anthropogenic activities. Record the **UTM coordinates** for each sampling station, measured using a GPS unit in NAD 83, on the field data form. In future sampling events, sample periphyton from the same locations.

Appendix A. SOP EAS & HCM periphyton sampling.

- **Select a rock** with a **flat surface**, no more than 0.5 meter below the water surface, with the following criteria:
 - Facing up as much as possible; if not, with a small slope
 - Uniform algal coverage, not uniformly dense or sparse
- The periphyton sampler is a specially designed **scrubber**, consisting of a plexiglass tube with a plunger that fits snugly inside and a distal wire brush that is in direct contact with the rock surface. Press the tube against the rock to form a tight seal. To **detach** the **periphyton colonies**, depress the plunger and twist for approximately 30 half turns. The periphyton mixture is suspended (i.e. by opening the plunger approximately ¼ of the device volume) and drawn into a syringe that is attached to the tube (pinch intake tube closed when drawing suspension into syringe). Empty the syringe (pinch output tube closed prior to detaching the syringe) into the pre-labeled replicate 1 sampling container (i.e. TPE-CREMP-1). Continue scraping and syringing (approximately 2 times: another 20 half turns of the sampler, then 10 half turns, then a final rinse of sampler) until all visible periphyton are completely removed from the rock surface. This procedure works well with two people; one to scrape the rocks and clamp the intake tube, the other to operate the syringe and clamp the output tube. The number of turns in this SOP errs on the side of caution and may be too many for the average sampling site. Use discretion and examine each sampled rock to ensure it has been fully cleaned where the scrubber was used.
- **Repeat** rock selection and scrubbing steps **two more times**, selecting undisturbed flat rocks in less than 0.5 meter of water. Put the collected periphyton samples from each rock into the same pre-labeled replicate 1 sampling container (i.e. TPE-1) as above. These 3 rocks are composited into one replicate sample; approximately 500 mL of water/periphyton are collected in total.
- **Repeat** above steps for each replicate required at the station. For every 125 mL of periphyton mixture in each sampling container, **add 1 mL of Lugol's solution** to preserve the sample (the sample should look the colour of weak tea). Seal the sampling containers and store in a cooler at **room temperature**.
- For **periphyton scraping** the periphyton sampler is used to scribe a circle onto the chosen rock. Any same diameter item could be used instead if that is easier. Using two spatulas the circle can be carefully scraped. The rock choice should match those outlined above, in fact if one of the rocks used in scrubbing has enough undisturbed space the same rock could be used for scraping. The sample is placed into a 125 mL glass sampling jar which had been pre-labeled with the station ID. The sample is placed in a **freezer** at the end of the sampling day. It is not preserved.
- Fill out a **chain-of-custody** form completely and place into a sealed ziploc plastic bag inside the shipping container. If using digital COC form, print 2 copies of the document in the field (one for the laboratory, one for Azimuth). Questions about COCs can be directed to Maggie McConnell.

Appendix A. SOP EAS & HCM periphyton sampling.

EAS Periphyton Scraping

- Collect periphyton scraping samples from up to **20 stations** within SP and TPE
- Stations in SP that will be revisited are: SP-CREMP, SP-DT, SP-BL and SP-ED
- Stations in Third Portage Lake will include: TPE-CREMP, TPN-CREMP, TPS-CREMP, TPE-BGN and TPE-BGS
- 11 additional stations in TPE will also be collected (rough locations are provided on a field map with the intent of getting adequate spatial representation)
- Each station consists of 5 replicate samples (these are close together for most stations but spread out for the 3 dike stations)
- Each replicate will be placed in 1 x 125mL jar and frozen until shipped
- Ship samples and COC to ALS Environmental

ALS Environmental
101-8081 Lougheed Hwy.
Burnaby, BC, Canada
V5A 1W9
Tel: 604-253-4188
Attn: Brent Mack

HCM Periphyton Scrubbing

- Collect periphyton scrubbing samples from **7 stations** within SP and TPE
- Stations in SP that will be revisited are: SP-CREMP, SP-DT and SP-ED
- Stations in TPE will include: TPE-CREMP, TPE-BGN, TPE-BGS and one other reference site (which will coincide with one of the 11 TPE stations chosen for scraping)
- Each station consists of 5 replicate samples (these are close together for 4 stations but spread out for the 3 dike stations)
- Each replicate will consist of scrubblings from 3 rocks and will be placed in 1 x 500mL jar and preserved with Lugol's solution
- Ship samples and COC to David Findlay at Plankton R Us

David Findlay
Plankton R Us Inc.
39 Alburg Drive
Winnipeg, MB
R2N 1M1
Tel: 204-254-7952

NOTE: Along the dike face it may be necessary to set up a tote to receive the rock. If the aspect of the dike face is too steep to safely or properly sample in-situ place the rock in the tote in the boat. It must hold enough water to cover the sampled rock so that the plunger works properly. Make sure the tote is clean after each sample.

Standard Operating Procedure Meadowbank Project Lakes EAS & HCM Underwater Video Survey

Equipment:

- Video Camera
- Lowrance depth sounder (Recording sonar with GPS is required for Bathymetry)
- Note book/clip board with data sheets
- Reference tool
- GPS/spare batteries
- Underwater Viewer
- Anchor with a good long line

General Procedures:

Underwater video sampling was completed in 2009 for both EAS high value habitat (HVH) and for Habitat Compensation Monitoring (HCM). Most of these operating procedures are based on the procedures that were in place for those sampling events, some changes have been made to accommodate changes in circumstance or due to 2009 experiences.

- To provide a frame of reference for the underwater video, a rebar frame can be fabricated (50 cm square, marked with electrical tape at desired intervals) and featured in each video clip. The frame will then be attached to a line so that it can be lowered with or before the video camera (care must be taken to avoid tangling or knocking the camera with this device).
- DVDs should not be left in the DVR when the machine is being moved because it is possible to scratch the disc and loss the data. At each site, and after all replicates are complete, the DVD should be removed, labeled and stored.
- This equipment should not be operated in rain or spray.
- Always closely follow the setup and dismantling instructions for the camera equipment (make sure all connections are solid; tape if necessary).
- Previously three people were recommended for completing video survey work, however, for 2011 two people should be sufficient (n.b. there may be students available who could help out).
- One person will be responsible for the DVR, viewscreen, and note taking. Note taking will include the station name and replicate, time stamp, coordinates, and notes on substrate size, features, and the impression of periphyton conditions. After each site has been visited, and all replicates have been completed, this person will remove the DVD from the DVR, record the station name on the DVD, then place the DVD into a protective case.
- The other person will operate the camera, reference tool, and underwater viewer.

Appendix B. SOP EAS & HCM underwater video survey.

EAS HVH Video Survey

- Follow the video survey general procedures and visit the HVH stations in TPE
- If time allows (strongly recommended) visit the HVH stations in SP
- All surveyed sites should match those from 2009 as closely as possible

Objectives

- The intent of the survey is to document the status of HVH relative to potential increased sediment loadings on rock surfaces related to East Dike & Bay-Goose Dike construction
- Document and qualitatively describe substrate composition and periphyton coverage at HVH sites in TPE and SP (revisit the sites from 2009)

These sites are spread throughout Second Portage (SP) and the east basin of Third Portage Lake (TPE). Initial video survey work was completed to assess HVH areas in Third Portage prior to dike construction also providing a reference to HVH areas that were potentially impacted by sedimentation from the East Dike construction. By revisiting these sites it may be possible to view the deposition of sediment in TPE that might have resulted from the construction of the Bay Goose Dike. In SP it may be possible to gather more data on post construction recovery/changes to the periphyton growth.

For both lakes, notes must be taken that include station name, depth, and substrate (see data sheets); and which *record* the %cover of periphyton including any noted sediment coverage, mat density, colour, any snap shots, distinctive features such as ice scour, and any other relevant notes.

Station Locations

There are six (6) stations in each lake; however, two of the TPE stations may have been lost due to BGD construction. Target locations are available in a Garmin file that can be uploaded onto the GPS before going into the field. Station naming is as follows:

- VID-2PL-HVH-1 through HVH-6 (for SP stations)
- VID-3PL-HVH-1 through HVH-6 (for TPE stations)

Each of the 12 stations has 5 replicates, with a target depth range of 1-4 meters. Replicates should be about 3 meters apart and will be determined by letting the anchor line out. Depths should be recorded for each replicate, but only one set of coordinates needs to be recorded for each station. The time stamp should be for start of first replicate to end of the last replicate. Each video segment should target 30 seconds in length.

Appendix B. SOP EAS & HCM underwater video survey.

HCM Video Survey and Bathymetry

- Following the video survey general procedures revisit ED video sites from 2009
- Complete a similar video survey at BGD stations
- Complete video transects at each of the replicates on each dike
- Video work would ideally be completed before periphyton work along dike faces
- Gather bathymetry information from Bay Goose Dike

(1) Video for Deeper Periphyton

Objective

- Make inferences regarding periphyton community development in deeper zones, close to where periphyton communities will be sampled (scrubbing)

Description & Station Locations

The focus will be on substrate, sedimentation, and periphyton standing crop (community). The area of focus will be the lake side faces of both dikes. The East Dike was studied in 2009 and will be revisited in this year (2011). The Bay Goose Dike will be separated into North and South portions; this makes a total of three 3 stations – East Dike, Bay-Goose Dike North and South. Each of the 3 stations has 5 replicates. Replicates should be evenly spaced to cover the entire station (i.e., the dike or portion of the dike).

Station naming is as follows:

- VID-ED (for East Dike stations)
- VID-BGN (for Bay-Goose Dike N stations)
- VID-BGS (for Bay-Goose Dike S stations)

Target depth range is 1-4 meters. Depth and coordinates should be recorded for *each* replicate. The time stamp should be for start to end of *each* replicate. There is no target length for each video segment. The sample locations should match with periphyton scrubbing (both dikes) and porewater quality (BGD only). It is important to coordinate with these two other sample types to match locations.

(2) Video for Physical

Objective

- Inform physical monitoring aspects of habitat compensation plan

Description & Station Locations

A video record of habitat features particularly substrate size and composition will be conducted. Start the video in shallow water near the dike face at each of the dike station replicates (same as for “deeper periphyton”; if short on time, ED stations can be dropped). Move the video camera slowly into deeper water recording the physical structures on the dike face (i.e., make a transect perpendicular to the dike face). The camera will descend down the dike face to the lake bottom or the maximum length of the camera cable, whichever comes first. Notes should include a record of site name and replicate, date, and time stamp. It may be difficult to lower both the camera and reference object at the same time.

Appendix B. SOP EAS & HCM underwater video survey.

(3) Bathymetry

Objective

- Map out depth intervals encircling both portions of the BGD

Description & Station Locations

Bathymetry data will only be collected along the Bay-Goose Dike face because bathymetry data has already collected for the East Dike in 2009. The time stamps for both the sonar and video camera should be the same because the time information is received from the internal GPS units (double check this). Conduct slow transects parallel to each portion of the BGD. Conduct transects at 3 meter intervals out from the dike face (i.e., 3m, 6m, 9m, etc.) Be sure to record bathymetric data in the sonar's memory card.

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		SP-ED-1 28-Aug-11	SP-ED-2 28-Aug-11	SP-ED-3 28-Aug-11	SP-ED-4 28-Aug-11	SP-ED-5 28-Aug-11	SP-CREMP-1 27-Aug-11	SP-CREMP-2 27-Aug-11	SP-CREMP-3 27-Aug-11	SP-CREMP-4 27-Aug-11	SP-CREMP-5 27-Aug-11	SP-DT-1 27-Aug-11	SP-DT-2 27-Aug-11
Cyanobacteria													
1014	<i>Chroococcus limneticus</i> Lemmermann	-	-	-	-	-	-	-	-	-	-	+	-
1015	<i>Chroococcus turgidus</i> (Kutzing) Nageli	-	+	-	-	-	-	-	-	-	-	-	-
1033	<i>Rhabdogloea lineare</i> Schmidle and Lauterborn	-	-	-	-	-	-	-	-	-	-	-	-
1070	<i>Anabaenopsis</i>	-	-	-	+	-	+	+	-	+	-	-	+
1077	<i>Pseudoanabaena</i>	+	+	-	+	+	+	+	+	+	-	+	-
1084	<i>Gloeocapsa punctata</i>	+	+	+	-	-	+	+	+	+	+	+	+
1102	<i>Gloeotheca</i>	-	-	-	-	-	-	-	-	-	-	-	-
1122	<i>Phormidium autumnale</i> Agardh	-	-	-	-	-	-	-	-	-	-	-	-
1124	<i>Petalonema alatum</i> Berk	-	-	-	-	-	+	+	+	+	+	+	+
1131	<i>Heteroleibeinia profunda</i> Komarek	-	-	-	-	-	-	-	+	-	-	-	-
1135	<i>Anabaena mendotae</i>	-	-	-	-	-	-	-	-	-	-	-	-
1136	<i>Lyngbya mucicola</i> Lemmermann	+	+	+	+	+	+	+	+	+	+	+	+
1219	<i>Stigonema mamillosum</i> Gardner	-	-	-	-	-	-	-	-	-	-	-	-
1220	<i>Rivularia dura</i> Roth	-	-	-	-	-	-	-	-	+	+	-	-
Chlorophyte													
2105	<i>Chlamydomonas</i>	-	-	-	-	-	-	-	-	-	-	-	-
2138	<i>Monoraphidium komarkovae</i> (Nyg.) Komarkova-Legner	+	-	+	-	+	-	-	-	-	-	-	-
2178	<i>Cosmarium</i>	-	-	-	+	-	-	-	-	-	-	-	-
2182	<i>Euastrum</i>	-	-	-	+	-	-	-	-	-	-	-	-
2186	<i>Xanthidium</i>	-	-	-	-	-	-	-	-	-	-	-	-
2205	<i>Mougeotia</i>	-	-	-	-	+	-	-	+	-	-	-	-
2216	<i>Zygnema</i>	-	-	-	-	-	-	+	-	+	+	-	-
2228	<i>Oedogonium</i>	-	-	+	-	-	-	-	-	+	-	-	-
Diatom													
5507	<i>Cyclotella stelligera</i> Cleve and Grunow	-	+	+	+	-	+	-	-	-	+	-	-
5509	<i>Cyclotella ocellata</i> Pant.	-	-	-	-	-	-	-	-	-	-	-	-
5513	<i>Tabellaria fenestrata</i> (Lyngbye) Kutzing	-	-	-	-	-	-	-	-	-	-	+	-
5514	<i>Tabellaria flocculsa</i> (Roth) Kutzing	+	+	+	+	+	+	+	+	+	+	+	+
5516	<i>Fragilaria construens</i> (Ehrenberg) Grunow	-	-	-	-	-	-	-	-	-	-	-	-
5518	<i>Synedra acus</i> Kutzing	-	-	+	-	-	-	+	-	-	+	-	-
5523	<i>Synedra ulna</i> (Nitzsch) Ehrenberg	-	-	-	-	-	-	-	-	-	-	-	+
5524	<i>Asterionella formosa</i> Hassall	-	+	-	-	-	-	-	-	-	-	-	-
5545	<i>Nitzschia</i>	-	-	-	-	-	-	-	-	-	-	-	-

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		SP-ED-1 28-Aug-11	SP-ED-2 28-Aug-11	SP-ED-3 28-Aug-11	SP-ED-4 28-Aug-11	SP-ED-5 28-Aug-11	SP-CREMP-1 27-Aug-11	SP-CREMP-2 27-Aug-11	SP-CREMP-3 27-Aug-11	SP-CREMP-4 27-Aug-11	SP-CREMP-5 27-Aug-11	SP-DT-1 27-Aug-11	SP-DT-2 27-Aug-11
5546	<i>Gyrosigma</i>	-	-	+	-	+	+	+	+	+	-	-	-
5547	<i>Frustulia rhomboides</i> (Ehrenberg) de Toni	+	-	-	-	-	+	+	+	+	-	+	-
5551	<i>Cyclotella michiganiana</i> Skvortzow	+	+	+	+	+	+	+	+	-	+	+	+
5702	<i>Achnanthes minutissima</i> Kutzing	+	+	+	+	+	+	+	+	+	+	+	+
5720	<i>Cyclotella bodanica</i> Eulenst	-	-	-	-	-	-	-	-	-	-	-	-
5726	<i>Eucocconeis</i>	+	+	-	-	-	-	-	-	-	-	+	-
5728	<i>Epithemia argus</i> Kutzing	-	-	-	-	-	-	-	-	-	-	-	-
5733	<i>Eunotia pectinalis</i> (Kutzing) Rabenhorst	-	-	-	-	-	-	-	-	-	-	-	-
5767	<i>Nitzschia fonticola</i> Grunow	-	-	-	-	-	-	-	-	-	-	-	-
5778	<i>Stauroneis anceps</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-	-
5792	<i>Neidium iridis</i> (Ehrenberg) Cleve	-	-	-	-	-	-	-	-	-	-	-	+
5805	<i>Cocconies</i>	-	-	-	+	+	-	-	-	-	-	-	-
5825	<i>Fragilaria pinata</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-	-
5834	<i>Cymbella microcephala</i> Grunow	+	+	+	+	+	-	-	-	-	-	-	+
5836	<i>Encyonema silesiacum</i> (Bleisch) D.G. Mann	+	-	+	+	+	+	+	+	+	-	+	+
5854	<i>Pinnularia borealis</i> Ehrenberg	-	-	-	-	-	+	-	-	-	-	-	-
5857	<i>Nitzschia filiformis</i> (W. Smith) Hustedt	-	-	-	-	-	-	-	-	-	-	-	-
5860	<i>Diatoma vulgare</i> Bory	-	-	-	-	-	-	+	+	+	+	+	-
5864	<i>Neidium gracile</i> Hustedt	-	-	-	-	-	-	-	-	+	-	-	-
5865	<i>Cymbella prostata</i> (Berkeley) Cleve	-	-	-	-	-	-	+	+	-	+	+	-
5866	<i>Surirella ovata</i> Kutzing	-	-	-	-	-	-	-	-	-	-	-	-
5870	<i>Navicula radiosa</i> Kutzing	-	-	-	-	-	-	-	-	-	-	-	-
5871	<i>Cymbella lapponica</i>	-	-	-	+	-	+	-	+	+	-	-	+
5873	<i>Gomphonema minutum</i>	+	-	-	+	-	-	-	+	-	-	+	-
5874	<i>Nitzschia palea</i> (Kutzing) W. Smith	+	-	-	+	+	-	+	-	-	+	-	+
5881	<i>Diatoma elongatum</i> Agardh	-	-	-	-	-	-	-	-	-	-	-	-
5882	<i>Anomoenies vitrea</i> Ross	+	+	+	+	+	+	+	+	+	+	+	+
5884	<i>Gomphonema angustum</i> Agardh	-	-	-	-	-	-	-	-	+	+	-	-
5887	<i>Navicula pupula</i> Kutzing	-	-	-	-	-	+	+	+	-	+	-	-
5908	<i>Diatoma tenue</i> Agardh	-	-	-	-	-	-	-	-	-	-	-	-
5916	<i>Fragilaria capucina</i> Grunow	+	+	+	+	+	+	+	+	+	+	+	+
Dinoflagellate													
7777	<i>Dinoflagellate</i> cysts	-	-	-	-	-	-	-	+	-	-	-	-

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		SP-DT-3 27-Aug-11	SP-DT-4 27-Aug-11	SP-DT-5 27-Aug-11	TPE-BGN-1 26-Aug-11	TPE-BGN-2 26-Aug-11	TPE-BGN-3 26-Aug-11	TPE-BGN-4 26-Aug-11	TPE-BGN-5 26-Aug-11	TPE-BGS-1 27-Aug-11	TPE-BGS-2 27-Aug-11	TPE-BGS-3 27-Aug-11	TPE-BGS-4 27-Aug-11
Cyanobacteria													
1014	<i>Chroococcus limneticus</i> Lemmermann	-	-	+	-	-	-	-	-	-	-	-	-
1015	<i>Chroococcus turgidus</i> (Kutzing) Nageli	-	-	-	-	-	-	-	-	-	-	-	-
1033	<i>Rhabdogloea lineare</i> Schmidle and Lauterborn	+	-	-	-	-	-	-	-	-	-	-	-
1070	<i>Anabaenopsis</i>	-	+	-	-	-	-	-	-	-	-	-	-
1077	<i>Pseudoanabaena</i>	-	-	-	+	-	+	-	-	+	-	+	+
1084	<i>Gloeocapsa punctata</i>	+	+	+	-	-	-	-	-	-	-	-	-
1102	<i>Gloeotheca</i>	-	-	-	-	-	-	-	-	-	-	-	-
1122	<i>Phormidium autumnale</i> Agardh	-	-	-	-	-	-	-	-	-	-	+	-
1124	<i>Petalonema alatum</i> Berk	+	+	+	-	-	-	-	-	-	-	-	-
1131	<i>Heteroleibeinia profunda</i> Komarek	-	-	-	-	-	-	-	-	-	-	-	-
1135	<i>Anabaena mendotae</i>	-	-	-	-	-	-	-	-	-	+	-	-
1136	<i>Lyngbya mucicola</i> Lemmermann	+	+	+	+	+	+	+	+	+	-	-	+
1219	<i>Stigonema mamillosum</i> Gardner	-	-	+	-	-	-	-	-	-	-	-	-
1220	<i>Rivularia dura</i> Roth	+	+	-	-	-	-	+	-	-	-	-	-
Chlorophyte													
2105	<i>Chlamydomonas</i>	-	-	-	-	-	-	-	-	-	-	-	-
2138	<i>Monoraphidium komarkovae</i> (Nyg.) Komarkova-Legner	-	-	-	+	+	+	+	+	+	+	-	+
2178	<i>Cosmarium</i>	-	-	-	+	-	-	-	-	-	-	-	-
2182	<i>Euastrum</i>	-	-	-	-	-	-	-	-	-	-	-	-
2186	<i>Xanthidium</i>	-	-	-	+	-	-	-	-	-	-	-	-
2205	<i>Mougeotia</i>	+	+	-	+	-	-	-	+	-	-	-	-
2216	<i>Zygnema</i>	-	-	-	-	-	-	-	-	-	-	-	-
2228	<i>Oedogonium</i>	-	-	+	-	+	-	-	-	-	-	-	-
Diatom													
5507	<i>Cyclotella stelligera</i> Cleve and Grunow	+	-	-	+	+	-	-	-	-	-	-	-
5509	<i>Cyclotella ocellata</i> Pant.	-	-	-	-	-	-	-	-	-	-	-	-
5513	<i>Tabellaria fenestrata</i> (Lyngbye) Kutzing	-	+	+	-	-	-	-	-	-	-	-	-
5514	<i>Tabellaria flocculsa</i> (Roth) Kutzing	+	+	+	+	-	-	+	+	+	-	-	-
5516	<i>Fragilaria construens</i> (Ehrenberg) Grunow	-	-	-	-	-	-	-	-	-	-	-	+
5518	<i>Synedra acus</i> Kutzing	-	-	-	-	+	-	+	+	-	+	+	+
5523	<i>Synedra ulna</i> (Nitzsch) Ehrenberg	-	-	-	-	-	-	-	-	-	-	-	-
5524	<i>Asterionella formosa</i> Hassall	-	-	-	-	-	-	-	-	-	-	-	-
5545	<i>Nitzschia</i>	-	-	-	-	-	-	-	-	-	-	-	-

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		SP-DT-3 27-Aug-11	SP-DT-4 27-Aug-11	SP-DT-5 27-Aug-11	TPE-BGN-1 26-Aug-11	TPE-BGN-2 26-Aug-11	TPE-BGN-3 26-Aug-11	TPE-BGN-4 26-Aug-11	TPE-BGN-5 26-Aug-11	TPE-BGS-1 27-Aug-11	TPE-BGS-2 27-Aug-11	TPE-BGS-3 27-Aug-11	TPE-BGS-4 27-Aug-11
5546	<i>Gyrosigma</i>	-	-	+	-	-	-	-	+	-	-	-	-
5547	<i>Frustulia rhomboides</i> (Ehrenberg) de Toni	-	-	+	-	-	-	-	-	-	-	-	-
5551	<i>Cyclotella michiganiana</i> Skvortzow	+	-	+	+	+	+	+	+	-	+	+	-
5702	<i>Achnanthes minutissima</i> Kutzling	+	+	+	+	+	+	+	+	+	+	+	+
5720	<i>Cyclotella bodanica</i> Eulenstein	-	-	-	+	-	-	-	-	-	-	-	-
5726	<i>Eucocconeis</i>	+	+	+	+	-	-	-	-	-	-	-	-
5728	<i>Epithemia argus</i> Kutzling	+	+	+	-	-	-	-	-	-	-	-	-
5733	<i>Eunotia pectinalis</i> (Kutzling) Rabenhorst	-	-	-	+	-	-	-	-	-	-	-	-
5767	<i>Nitzschia fonticola</i> Grunow	-	-	-	-	-	-	-	-	+	-	-	-
5778	<i>Stauroneis anceps</i> Ehrenberg	-	-	+	-	-	-	-	-	-	-	-	-
5792	<i>Neidium iridis</i> (Ehrenberg) Cleve	+	-	-	-	-	-	-	-	-	-	-	-
5805	<i>Cocconeis</i>	-	-	-	-	-	-	-	-	-	-	-	-
5825	<i>Fragilaria pinata</i> Ehrenberg	-	+	-	-	-	-	-	-	-	-	-	-
5834	<i>Cymbella microcephala</i> Grunow	+	+	+	-	-	-	+	+	-	-	+	+
5836	<i>Encyonema silesiacum</i> (Bleisch) D.G. Mann	+	+	+	-	-	-	-	+	-	-	+	+
5854	<i>Pinnularia borealis</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-	-
5857	<i>Nitzschia filiformis</i> (W. Smith) Hustedt	-	-	+	-	-	-	-	-	-	-	-	-
5860	<i>Diatoma vulgare</i> Bory	-	+	-	-	-	-	-	-	-	-	+	+
5864	<i>Neidium gracile</i> Hustedt	-	-	-	-	-	-	-	-	-	-	-	-
5865	<i>Cymbella prostata</i> (Berkeley) Cleve	-	+	-	-	-	-	-	-	-	-	-	-
5866	<i>Surirella ovata</i> Kutzling	-	-	-	-	-	-	-	-	-	-	-	-
5870	<i>Navicula radiosa</i> Kutzling	-	-	-	-	-	-	-	-	-	-	-	-
5871	<i>Cymbella lapponica</i>	-	-	-	-	-	-	-	-	-	-	-	-
5873	<i>Gomphonema minutum</i>	+	-	-	-	-	-	-	-	-	-	-	-
5874	<i>Nitzschia palea</i> (Kutzling) W. Smith	+	+	+	+	-	+	-	-	-	+	-	+
5881	<i>Diatoma elongatum</i> Agardh	-	-	-	-	-	-	-	-	-	-	-	-
5882	<i>Anomoenies vitrea</i> Ross	+	+	+	+	+	+	+	+	-	+	+	+
5884	<i>Gomphonema angustum</i> Agardh	-	-	-	-	-	-	-	-	-	-	-	-
5887	<i>Navicula pupula</i> Kutzling	-	-	-	-	-	-	-	-	-	-	-	-
5908	<i>Diatoma tenue</i> Agardh	-	-	-	-	-	-	-	+	-	-	-	-
5916	<i>Fragilaria capucina</i> Grunow	+	+	+	+	+	+	+	+	-	-	+	+
Dinoflagellate													
7777	<i>Dinoflagellate cysts</i>	-	-	-	-	-	-	-	-	-	-	-	-

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		TPE-BGS-5	TPE-CREMP-1	TPE-CREMP-2	TPE-CREMP-3	TPE-CREMP-4	TPE-CREMP-5	TPE-G-1	TPE-G-2	TPE-G-3	TPE-G-4	TPE-G-5
		27-Aug-11	25-Aug-11	25-Aug-11	26-Aug-11	26-Aug-11	26-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11
Cyanobacteria												
1014	<i>Chroococcus limneticus</i> Lemmermann	-	-	-	-	-	-	-	-	-	-	-
1015	<i>Chroococcus turgidus</i> (Kutzing) Nageli	-	-	-	+	-	-	-	-	-	-	-
1033	<i>Rhabdogloea lineare</i> Schmidle and Lauterborn	-	-	-	-	-	-	-	-	-	-	-
1070	<i>Anabaenopsis</i>	-	-	-	-	-	+	-	-	-	-	-
1077	<i>Pseudoanabaena</i>	+	+	+	+	+	+	+	+	+	+	+
1084	<i>Gloeocapsa punctata</i>	-	-	-	-	-	-	-	-	-	-	-
1102	<i>Gloeotheca</i>	-	-	-	+	+	-	+	-	+	-	+
1122	<i>Phormidium autumnale</i> Agardh	-	-	-	-	-	-	+	-	-	-	-
1124	<i>Petalonema alatum</i> Berk	-	+	+	+	+	+	-	+	+	+	+
1131	<i>Heteroleibeinia profunda</i> Komarek	-	-	-	-	-	+	+	-	+	-	-
1135	<i>Anabaena mendotae</i>	-	-	-	-	-	-	-	-	-	-	-
1136	<i>Lyngbya mucicola</i> Lemmermann	+	+	+	+	+	+	+	+	+	+	+
1219	<i>Stigonema mamillosum</i> Gardner	-	+	-	-	-	+	-	-	-	-	-
1220	<i>Rivularia dura</i> Roth	-	+	+	+	+	+	+	+	+	+	+
Chlorophyte												
2105	<i>Chlamydomonas</i>	-	-	-	-	-	-	-	-	-	-	+
2138	<i>Monoraphidium komarkovae</i> (Nyg.) Komarkova-Legner	-	-	-	-	-	-	-	-	-	-	-
2178	<i>Cosmarium</i>	-	-	-	-	-	-	-	+	-	-	-
2182	<i>Euastrum</i>	-	-	-	-	-	-	-	-	-	-	-
2186	<i>Xanthidium</i>	-	-	-	-	-	-	-	-	-	-	-
2205	<i>Mougeotia</i>	-	+	+	-	-	+	+	+	-	-	+
2216	<i>Zygnema</i>	-	+	+	-	+	+	+	-	-	+	-
2228	<i>Oedogonium</i>	+	-	-	-	-	-	-	-	-	-	-
Diatom												
5507	<i>Cyclotella stelligera</i> Cleve and Grunow	-	-	-	+	-	+	+	+	-	-	-
5509	<i>Cyclotella ocellata</i> Pant.	-	-	-	-	-	-	-	-	-	-	+
5513	<i>Tabellaria fenestrata</i> (Lyngbye) Kutzing	-	-	+	+	+	+	-	+	+	-	+
5514	<i>Tabellaria flocculsa</i> (Roth) Kutzing	-	+	+	+	+	+	+	+	+	+	+
5516	<i>Fragilaria construens</i> (Ehrenberg) Grunow	-	+	-	-	-	-	-	-	-	-	-
5518	<i>Synedra acus</i> Kutzing	+	-	-	-	-	+	-	+	-	-	-
5523	<i>Synedra ulna</i> (Nitzsch) Ehrenberg	-	-	-	-	-	-	-	-	+	-	-
5524	<i>Asterionella formosa</i> Hassall	+	-	-	-	-	-	-	-	-	-	-
5545	<i>Nitzschia</i>	-	-	-	-	-	-	+	-	-	-	-

Appendix C. Presence (+) / absence (-) matrix of periphyton species 2011.

<i>Species & Code</i>		TPE-BGS-5	TPE-CREMP-1	TPE-CREMP-2	TPE-CREMP-3	TPE-CREMP-4	TPE-CREMP-5	TPE-G-1	TPE-G-2	TPE-G-3	TPE-G-4	TPE-G-5
		27-Aug-11	25-Aug-11	25-Aug-11	26-Aug-11	26-Aug-11	26-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11	25-Aug-11
5546	<i>Gyrosigma</i>	+	-	-	-	-	-	-	-	-	-	-
5547	<i>Frustulia rhomboides</i> (Ehrenberg) de Toni	-	-	+	-	-	-	-	-	-	-	+
5551	<i>Cyclotella michiganiana</i> Skvortzow	+	+	-	-	-	-	-	+	+	+	+
5702	<i>Achnanthes minutissima</i> Kutzling	+	+	+	+	+	+	+	+	+	+	+
5720	<i>Cyclotella bodanica</i> Eulenst	-	-	-	-	-	-	-	+	-	-	-
5726	<i>Eucocconeis</i>	+	-	+	+	+	+	+	+	+	-	+
5728	<i>Epithemia argus</i> Kutzling	-	-	-	-	-	-	-	-	-	-	-
5733	<i>Eunotia pectinalis</i> (Kutzling) Rabenhorst	-	-	-	-	-	-	-	-	-	+	+
5767	<i>Nitzschia fonticola</i> Grunow	+	+	-	-	-	-	+	-	-	-	-
5778	<i>Stauroneis anceps</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-
5792	<i>Neidium iridis</i> (Ehrenberg) Cleve	-	-	-	-	-	-	-	-	-	-	-
5805	<i>Cocconies</i>	-	+	-	-	-	-	-	-	-	-	-
5825	<i>Fragilaria pinata</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-
5834	<i>Cymbella microcephala</i> Grunow	+	-	-	-	-	+	-	-	-	-	-
5836	<i>Encyonema silesiacum</i> (Bleisch) D.G. Mann	+	-	-	+	+	+	+	+	+	-	-
5854	<i>Pinnularia borealis</i> Ehrenberg	-	-	-	-	-	-	-	-	-	-	-
5857	<i>Nitzschia filiformis</i> (W. Smith) Hustedt	-	-	-	-	-	-	-	-	-	-	-
5860	<i>Diatoma vulgare</i> Bory	+	-	-	-	-	-	-	-	-	-	-
5864	<i>Neidium gracile</i> Hustedt	-	-	-	-	-	-	-	-	-	-	-
5865	<i>Cymbella prostata</i> (Berkeley) Cleve	-	-	-	-	-	-	-	-	-	-	-
5866	<i>Surirella ovata</i> Kutzling	-	+	-	-	-	-	-	-	-	-	-
5870	<i>Navicula radiosa</i> Kutzling	-	-	+	+	-	-	-	-	-	-	-
5871	<i>Cymbella lapponica</i>	+	-	-	-	-	-	+	-	-	-	+
5873	<i>Gomphonema minutum</i>	+	+	-	-	-	-	-	+	-	-	-
5874	<i>Nitzschia palea</i> (Kutzling) W. Smith	+	+	-	-	+	+	-	+	+	+	+
5881	<i>Diatoma elongatum</i> Agardh	-	-	-	-	-	-	-	-	+	-	-
5882	<i>Anomoenies vitrea</i> Ross	+	+	+	+	+	+	+	+	+	+	+
5884	<i>Gomphonema angustum</i> Agardh	-	-	-	-	-	-	-	-	+	-	-
5887	<i>Navicula pupula</i> Kutzling	+	-	-	-	-	-	+	+	+	-	-
5908	<i>Diatoma tenue</i> Agardh	-	-	-	+	-	-	-	-	-	-	-
5916	<i>Fragilaria capucina</i> Grunow	+	-	+	-	+	-	-	-	-	-	-
Dinoflagellate												
7777	<i>Dinoflagellate cysts</i>	-	-	-	-	-	-	-	-	-	-	-

Appendix D. Photos of periphyton community from underwater video imagery.

D.1. East Dike HCF



Photo D.1-1. SP-ED-1; North end of East Dike. Thin and flat periphyton mats but continuous coverage.



Photo D.1-2. SP-ED-1; North end of East Dike. Thin layer of sediment on boulders is also evident.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.1-3. SP-ED-2; Near north end of East Dike. Thin sediment layer is evident as ruler (reference gauge) has scraped away an indent.



Photo D.1-4. SP-ED-2; Near north end of East Dike. Thin and sparse periphyton coverage.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.1-5. SP-ED-3; Middle of East Dike. Thick but mostly flat mats with sparse coverage; moderate sediment coverage in some areas.



Photo D.1-6. SP-ED-3; Middle of East Dike. Overview of angular boulders.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.1-7. SP-ED-4; Near south end of East Dike. Thin periphyton mats with some raised fronds sparsely covering boulders.



Photo D.1-8. SP-ED-4; Near south end of East Dike. Moderate sediment coverage is evident at depth, among fines.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.1-9. SP-ED-5; South end of East Dike. Low periphyton coverage on angular boulders.



Photo D.1-10. SP-ED-5; South end of East Dike. Thin sediment layer.

Appendix D. Photos of periphyton community from underwater video imagery.

D.2. Bay-Goose Dike HCF – North



Photo D.2-1. TPE-BGN-1; North end of Bay Goose Dike North. Thin and flat periphyton mats; moderate sediment coverage.



Photo D.2-2. TPE-BGN-1; North end of Bay Goose Dike North. Shallow substrate includes cobbles and gravel interspersed with boulders.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.2-3. TPE-BGN-2; Near North end of Bay Goose Dike North. Low periphyton coverage on angular boulders.



Photo D.2-4. TPE-BGN-2; Near North end of Bay Goose Dike North. Overview of substrate.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.2-5. TPE-BGN-3; Middle of Bay Goose Dike North. Moderate sediment coverage on all surfaces; periphyton limited to sides of boulders.



Photo D.2-6. TPE-BGN-3; Middle of Bay Goose Dike North. View of substrate composed of cobble, pebbles and boulders.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.2-7. TPE-BGN-4; Near South end of Bay Goose Dike North. Thin mats but somewhat raised fronds; thin and sparse sediment coverage.



Photo D.2-8. TPE-BGN-4; Near South end of Bay Goose Dike North. Overview of substrate.

Appendix D. Photos of periphyton community from underwater video imagery.

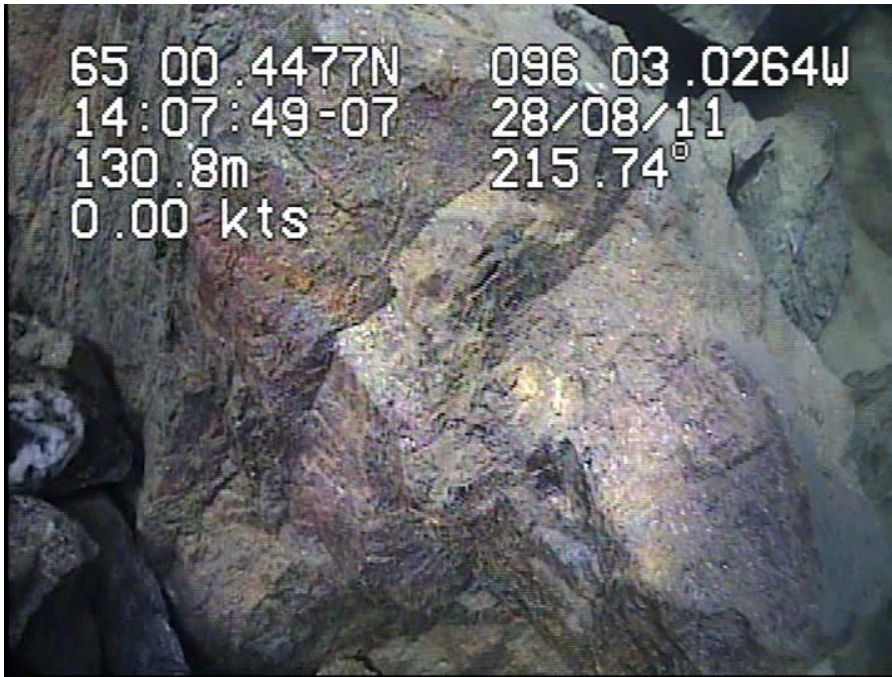


Photo D.2-9. TPE-BGN-5; South end of Bay Goose Dike North. No periphyton visible on any surfaces; light dusting of sediment.



Photo D.2-10. TPE-BGN-5; South end of Bay Goose Dike North. No periphyton visible on any surfaces; reference gauge along angular boulders.

Appendix D. Photos of periphyton community from underwater video imagery.

D.3. Bay Goose Dike HCF – South



Photo D.3-1. TPE-BGS-1; North end of Bay Goose Dike South. Thin, flat periphyton mat with somewhat patchy coverage; thin sediment layer.



Photo D.3-2. TPE-BGS-1; North end of Bay Goose Dike South. Overview of cobble substrate.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.3-3. TPE-BGS-2; Near North end of Bay Goose Dike South. Thin and flat layer of periphyton with patchy coverage; thin and sparse sediment coverage.



Photo D.3-4. TPE-BGS-2; Near North end of Bay Goose Dike South. Some sediment deposition is evident.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.3-5. TPE-BGS-3; Middle of Bay Goose Dike South. Thin and slightly raised but sparse periphyton coverage in some areas.



Photo D.3-6. TPE-BGS-3; Middle of Bay Goose Dike South. Substrate composed of angular boulders and cobble.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.3-7. TPE-BGS-4; Near Southwest end of Bay Goose Dike South. Very thin layer of periphyton with patchy coverage; light sediment dusting.



Photo D.3-8. TPE-BGS-4; Near Southwest end of Bay Goose Dike South. Substrate composed of boulders and cobble with a thin layer of sediment.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.3-9. TPE-BGS-5; Southwest end of Bay Goose Dike South. Thin and flat periphyton mats with moderate coverage.



Photo D.3-10. TPE-BGS-5; Southwest end of Bay Goose Dike South. Some sediment is evident on surfaces of angular boulders.

D.4. Second Portage Lake – High Value Habitat (HVH)



Photo D.4-1. SP-HVH-1. Thick coverage of periphyton on all substrates.



Photo D.4-2. SP-HVH-2. Thick coverage of periphyton on boulders and cobble; thin and sparse sediment coverage on surface of periphyton.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.4-3. SP-HVH-3. Thin and flat periphyton on rock surfaces but thick and raised coverage on sides. Thin and sparse sediment coverage.



Photo D.4-4. SP-HVH-4. Thick layer of periphyton on all surfaces (including fines); some sediment on surfaces of boulders.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.4-5. SP-HVH-5. Thick and raised periphyton with dense coverage on all surfaces; thin sediment coverage.



Photo D.4-6. SP-HVH-6. Thin and somewhat patchy coverage on surfaces (including fines); thick and raised periphyton on sides. Thin layer of sediment.

D.5. Third Portage Lake East – High Value Habitat (HVH)



Photo D.5-1. TPE-HVH-3. Thin and flat on surface but thick and raised coverage on sides; thin and sparse sediment coverage.



Photo D.5-2. TPE-HVH-4. All surfaces are densely covered by thick and raised periphyton; thin and sparse sediment coverage.

Appendix D. Photos of periphyton community from underwater video imagery.



Photo D.5-3. TPE-HVH-5. Thick mats of periphyton with raised fronds.



Photo D.5-4. TPE-HVH-6. Thick but flat coverage on surface; thick, raised and dense coverage on sides.

Appendix E. Qualitative characteristics of the periphyton community from video surveys conducted in 2009 (Azimuth, 2010).

Site Info			Periphyton and Substrate Description			
Area-Replicate ID	Location	Depth (m)	Substrate Composition	Periphyton Cover	Description of Cover	Sediment Cover
SP-ED-1	North end of East Dike	1.8 to 2.1	Boulder (75%), Cobble (25%), Fines (5%)	60-90% (varied)	Good coverage with dense mats apparent on rock sides with good volume though somewhat suppressed by settled sediment. Flat surfaces highly smothered, flattened.	Dense sediment coverage
SP-ED-2	Near North end of East Dike	3.0 to 3.3	Boulder (30-60%), Cobble (20%), Fines (20-50%)	30-70% (depending on substrate) moderate cover on boulders, little to no cover on fines and cobble	Sparse mats mainly on boulder and cobble sides, flat surfaces highly impacted. Flattened or destroyed.	Dense sediment coverage
SP-ED-3	Middle of East Dike	2.2 to 3.6	Boulder (60%), Cobble (40%)	no evidence of periphyton (~0%)	No periphyton visible on dike surface.	Sheltered areas have dense sediment coverage; exposed areas are completely bare
SP-ED-4	Near South end of East Dike	1.0 to 2.6	Angular Boulders (70%), Cobble (30%); natural rocks in deeper water	Some on natural substrate: cobble and boulders (40%). None (0%) on HCF material.	On natural substrate, mats are sparse, flat, and sporadic. Appear unhealthy. Covered in sediment.	Moderate sediment coverage on HCF material
SP-ED-5	South end of East Dike	3.3 to 3.6	Angular Boulders (70%), Cobble (30%); natural rocks in deeper water	Limited (10%) on natural substrate. None (0%) on HCF material.	Mats only on natural cobble and boulder substrate and only on rock sides. Fronds are weighted with sediment and mats appear sparse.	Yellow colouring on some moderately sedimented areas

Appendix E. Qualitative characteristics of the periphyton community from video surveys conducted in 2009 (Azimuth, 2010).

Site Info			Periphyton and Substrate Description			
Area-Replicate ID	Location	Depth (m)	Substrate Composition	Periphyton Cover	Description of Cover	Sediment Cover
SP-HVH-1	see Figure 2	3.0 to 3.9	Boulder (20%), Cobble (30%), Fines (50%)	80%	Denser/more luxuriant periphyton mats in shallow areas. Periphyton coverage on fines is continuous.	Moderate sediment coverage
SP-HVH-2	see Figure 2	2.2 to 2.4	Boulder (50%), Cobble (40%), Fines (10%)	80-100%	Mats are thick and highly luxuriant on protected rock sides, but less so on surfaces where sediment may be flattening periphyton	Some surfaces are more sparse due to thin sediment layer
SP-HVH-3	see Figure 2	1.0 to 3.0	Boulder (50%), Cobble (35%), Gravel (5%), Fines (10%)	80%	Denser/more luxuriant periphyton mats with raised fronds in shallow areas. Periphyton mats at depth are continuous but not thick.	Light dusting and very sparse sediment coverage
SP-HVH-4	see Figure 2	1.4 to 2.0	Boulder (70%), Cobble (30%)	95%	Patchy in places, very luxuriant in others, but generally all areas have raised fronds.	Some smothering due to thin sediment coverage
SP-HVH-5	see Figure 2	1.6 to 2.0	Boulder (60%), Cobble (35%), Fines (5%)	90%	Patchy in places, very luxuriant in others, but generally periphyton coverage appears thick and raised.	Very sparse sediment coverage
SP-HVH-6	see Figure 2	1.4 to 1.5	Boulder (100%)	70%	Mat is thick in places, but not continuous, highly patchy. In some areas sporadic long fronds are surrounded by bare rock.	Thin to moderate sediment coverage
TPE-HVH-1	see Figure 2	1.5 to 1.9	Boulder (100%)	75%	Most surfaces covered with mats of high density and luxurious, raised fronds. However, some areas appear to have ice scour where periphyton is absent or very thin.	Thin and sparse sediment coverage
TPE-HVH-2	see Figure 2	2.2 to 2.6	Boulder (40%), Cobble (40%), Fines (20%)	90-100%	Highly dense and thick mats with well developed and raised fronds. Mats are continuous on all substrates.	Light sediment dusting
TPE-HVH-3	see Figure 2	1.6 to 2.2	Boulder (100%)	75%	Generally thin-moderate density and thickness. Some protected areas are thick and dense with well raised fronds (sides of rocks and in crevices).	Thin and sparse sediment coverage
TPE-HVH-4	see Figure 2	3.2 to 3.6	Boulder (65%), Cobble (15%), Fines (20%)	70-90%	Periphyton covers all substrate, mats are mostly continuous, and of medium density and thickness. Periphyton on fines is highly textured. No areas of highly luxurious periphyton, even in crevices.	Thin and sparse sediment coverage
TPE-HVH-5	see Figure 2	1.7 to 2.3	Boulder (80%), Cobble (20%)	70%, but higher at depth	Not as thick or dense as HVH-2 but highly continuous, especially at depth. At depth, thick and luxurious periphyton covers all substrate.	Very light sediment dusting
TPE-HVH-6	see Figure 2	1.6 to 2.9	Boulder (60%), Cobble (30%), Fines (10%)	60-80%	Highly variable periphyton mats. Some areas on boulders and cobble (especially on sides) are very luxurious and dense, while other boulders and cobble have thin or no periphyton. Mats, where present are continuous, especially on fines.	Light sediment dusting

Note: HCF = Habitat Compensation Feature

Appendix F. Key for interpreting sediment and periphyton coverage from video surveys of the periphyton community. Includes 3 examples for each of 4 levels of sediment coverage.

Light Sediment Dusting

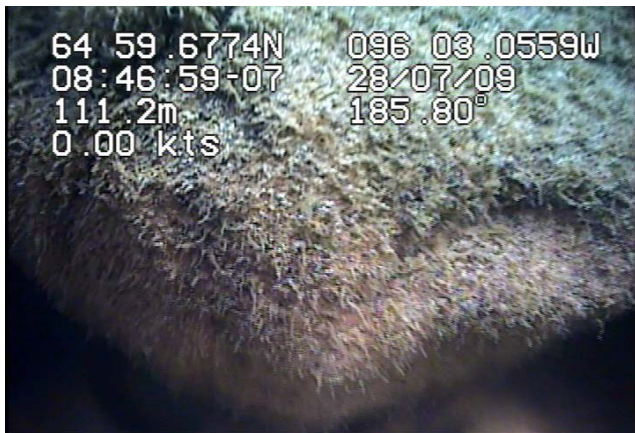


Photo 1. Light sediment dusting with moderate-high periphyton coverage on surfaces and sides (TPE-HVH-5, 2009).



Photo 2. Light and sparse sediment dusting with high periphyton coverage on surface and sides (SP-HVH-3, 2009).



Photo 3. Light sediment dusting on bare rock with no periphyton coverage (TPE-BGN-5, 2011).

Thin and Sparse Sediment Coverage



Photo 4. Thin and sparse sediment coverage with moderate-high periphyton coverage on surface and sides (SP-HVH-2, 2011).



Photo 5. Thin and sparse sediment coverage with moderate periphyton coverage on surface and high on sides (TPE-HVH-6, 2011).



Photo 6. Thin and sparse sediment coverage with low-moderate periphyton coverage on surface and sides (TPE-BGN-4, 2011).

Appendix F. Key for interpreting sediment and periphyton coverage from video surveys of the periphyton community. Includes 3 examples for each of 4 levels of sediment coverage.

Moderate Sediment Coverage



Photo 7. Moderate sediment coverage with high periphyton coverage on surface and sides (SP-HVH-1, 2009).



Photo 8. Moderate sediment coverage with low-moderate periphyton coverage on surface and sides (TPE-BGN-1, 2011).



Photo 9. Moderate sediment coverage in some areas with low-moderate periphyton coverage on surface and sides (SP-ED-3, 2011).

Dense Sediment Coverage



Photo 10. Dense sediment coverage with low periphyton coverage on surface and high on sides (SP-ED-1, 2009).



Photo 11. Dense sediment coverage with low periphyton coverage on surface and moderate on sides (SP-ED-2, 2009).

APPENDIX B:

PHOTOGRAPHIC PRESENTATION

FEBRUARY 2012



Photo No 1: Interstitial water sampling along the Bay-Goose Dike Habitat Compensation Feature (HCF) following Azimuth (2009) SOP with tubing attached to a 2 m pole at the front of the boat.



Photo No 2 : Underwater photo of interstitial sampling along East Dike HCF



Photo No 3: Under water photo of interstitial water sampling along Bay-Goose HCF

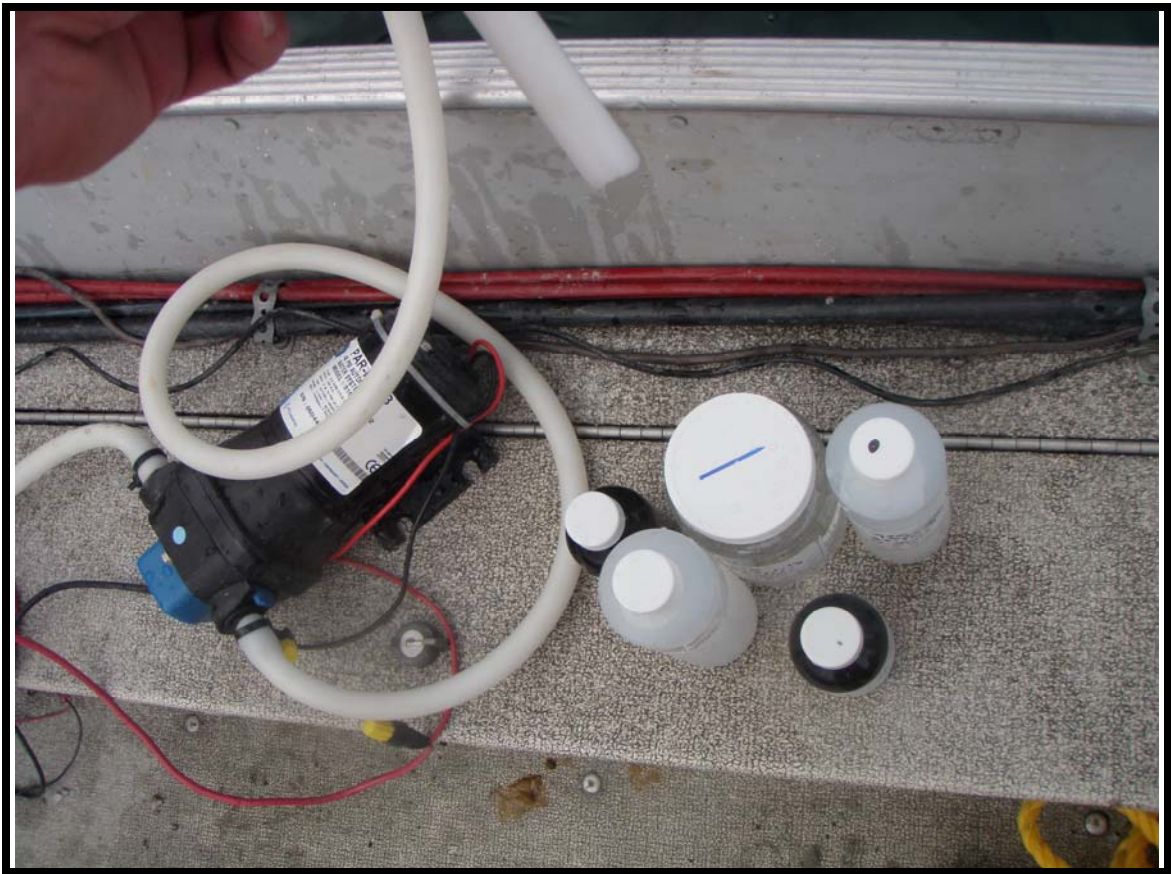


Photo No 4: Sample bottles and pump used to collect interstitial water samples



Photo No 5: Gill net sets along Bay-Goose Dike



Photo No 6: Released lake trout near Bay-Goose Dike



Photo No 7: Fish collected along East Dike- many round whitefish, lake trout and few char (<250mm)



Photo No 8: Fish collected along Bay-Goose; round white fish and lake trout (<250mm)



Photo No 9 : Measuring the fork length of a lake trout (<250mm)



Photo No 10: Weighing prior to tagging and releasing lake trout

APPENDIX C:

INTERSTITIAL WATER SAMPLING OPERATING PROCEDURE (AZIMUTH 2009)

FEBRUARY 2012

<i>Standard Operating Procedure</i> <i>Meadowbank Study Lakes & Baker Lake</i> <i>Habitat Monitoring Interstitial Dike Water Sampling 2009</i>
--

GENERAL:

Project Coordinator:

Maggie McConnell/Randy Baker

Azimuth Consulting Group Inc.

218-2902 West Broadway

Vancouver, BC, V6K 2G8

Telephone: 604-730-1220

Fax: 604-739-8511

Email: mmccconnell@azimuthgroup.ca, rbaker@azimuthgroup.ca

In case of **emergency**, contact Gary Mann (Azimuth telephone number 604-730-1220 or cell phone 604-908-0601).

OBJECTIVE:

In theory, the East Dike face has been designed to optimize its value as fish habitat, including the potential for serving as spawning habitat at depths greater than 2 m. Metals leaching from construction materials and impacting periphyton colonization or fish (largely by affecting incubating eggs) was raised as a potential concern during the environmental impact assessment process. Interstitial water quality, therefore, is included as a primary component of Tier 1 monitoring in the Habitat Compensation Monitoring Plan.

LOCATION AND TIMING FOR FIELD ACTIVITIES:

Five sampling stations have been chosen for interstitial water quality monitoring of the East Dike face in Second Portage Lake, and are named ED-PW-1 through ED-PW-5. The 5 stations are located at regular intervals of (approximately 150 m) along the East Dike face from the north (ED-PW-1) to south shore (ED-PW-5). Water sample collection should occur at water depths of no more than 4 m and sampling should occur in early August or as soon as practicable, in calm weather.

INTERSTITIAL PORE WATER SAMPLING:

Following is the procedure to collect interstitial water for chemical analysis from within dike pore spaces along the East Dike:

1. Prior to leaving camp gather the appropriate type and number of sampling vessels and acid vials for preservation. Prepare appropriate labels for containers and affix them to the appropriate bottle (see below). Put the same information on the lid. Use the following information:
 - Azimuth company name
 - Station abbreviation (e.g. TPE-S, INUG-INT)

- Date of sample collection
- Parameters to be measured from individual bottle (conventionals, total metals, etc.)

2. Gather **field collection materials**:

In the boat:

- Field collection data forms, pencils, waterproof markers & clipboard
- GPS unit, batteries
- Water pump & 12V battery
- Tubing & weight (& extra C-clamps and cable ties)
- YSI meter, batteries
- Secchi disk
- Hand held pH meter, batteries
- Depth meter, batteries
- Bucket
- Rope
- Sampling gloves
- Field sample bottles & preservatives (per sample):
 - ▶ 2 – 1 L plastic (TSS and Conventionals)
 - ▶ 1 – 250 mL amber glass (TKN, Ammonia)
 - ▶ 2 – 125 ml amber glass (TOC & DOC)
 - ▶ 2 – 250 mL plastic (total and dissolved metals)
 - ▶ 1 vial sulfuric acid
 - ▶ 2 vial hydrochloric acid
 - ▶ 2 vial nitric acid
 - ▶ 1 syringe & magnesium carbonate slurry
- Extra sample bottles in case of breakage or loss
- QA/QC field duplicate sampling containers & preservatives (same as above), at one randomly selected sampling station per sampling event
- Take one set of Travel Blank bottles into the field and transport and treat as other samples. Note that the Travel Blank bottles are not to be opened and no preservatives added.

In camp:

- Hand pump, filters, tweezers, tinfoil and magnesium carbonate for chlorophyll-a
- Coolers (for storing and shipping samples)
- Ice packs (for shipping samples to laboratories)
- Address labels for coolers
- Chain-of-custody forms
- Large Ziploc bags (for sending chain-of-custody form in cooler)
- Packing tape (for affixing labels to sampling containers & sealing cooler)

The following table lists the specific bottles to be filled, parameters to be measured and preservatives required for each. Affix the labels to the sampling containers and then prior to shipping, wrap packing tape around the labels to ensure a waterproof seal.

Sampling Container	Parameters to be Measured	Preservatives to be Added
3 - 1 L plastic	Conventionals*, TSS and chlorophyll-a (hand filter)**	None
250 mL amber glass	TKN, Ammonia	1 vial of sulfuric acid
250 mL plastic	Total Metals	1 vial of nitric acid
250 mL plastic	Dissolved Metals (FILTER)	1 vial of nitric acid
125 mL amber glass	TOC	1 vial of hydrochloric acid
125 mL amber glass	DOC (FILTER)	1 vial of hydrochloric acid

* includes: hardness, conductivity, pH, TDS, TSS-low, anion scan (nitrate, nitrite, chloride, sulfate) orthophosphate and total phosphate, silicate, alkalinity (speciated).

** **do not use filtrate water** for any sample Use the in-line filters for collecting dissolved metals and dissolved organic carbon samples.

- Before and during sampling fill in the requested information on the field data form; complete one field data form in its entirety for each sampling station and sampling event. Forms are made of waterproof paper; print all information on the form using a lead pencil or a write-in-the-rain pen.
- With the aid of a GPS unit, navigate the boat to the sampling station using the UTM coordinates (in NAD 83) provided. Approach the station from downstream of the wind direction. Within a 5 m radius of the prescribed area, anchor the boat along the shore from two or three points to stabilize the boat during water sampling as much as possible. Choose a calm day. Record the exact **UTM coordinates** on the field data form.
- Water is to be sampled from 1 – 4 m depth and from within the pore spaces of the dike face. If needed, use the plexiglass box to view the bottom.
- Place the hose attached to the 4 m long metal pole in the water. Note that the pole extends about 5 cm beyond the end of the hose to minimize entrainment of sediment off of the rock surfaces. During water collection pinch the incurrent end of the hose to minimize and control flow. It is critical that the intake speed of the water sample is quite slow so that true dike pore water is withdrawn, not overlying surface water by drawing water in at too high a rate.
- Test the flow rate before sucking water from between dike rocks. Attach the alligator clips of the water pump to the battery and begin withdrawing surface water – allow to flush for at least 30 seconds. Turn off.
- Stick the incurrent end of the hose between the rocks and into the pore space, being careful not to embed the tubing into the bottom and suck up any fine sediment that may be present. Try to keep the pole steady so that any sediment draped on the rocks is not disturbed and drawn into the water sample.
- Once you have seated the pole and tubing into a dike pore space, turn pump on and allow pore water to flush through the tubing, displacing the surface water that is there. This will take about 15 seconds. Disconnect the battery and then place the excurrent hose into the bucket and then re-connect. Discharge water into a clean HDPE bucket at a rate of

approximately 0.5 L per minute or slower. Pump water for 10 – 15 seconds at this location. Disconnect the battery to stop the flow. Relocate the pole/tubing to a different spot and re-connect. Pump a further 10 – 15 seconds. REPEAT this procedure about 20 times or so, spotting the tubing around within reach of the anchored boat to composite pore water from a small radius and from 1 – 3 m depth. Don't forget to turn off the pump when you re-locate the tubing to avoid sucking in surface water.

10. Once about 5 L has been collected, turn off the pump and withdraw the pole. There should be very little sediment in the sample. Be careful not to disturb or suck up sediment that may be sitting in the pore spaces. If the water is cloudy, pour it out and start again.
11. Using a small hose place it into the bucket and from the bucket, pump water to the collecting vessels as listed in the table on p. 3.
12. Discharge water to all unfiltered sample bottles first; then, attach an inline groundwater filter and fill the dissolved metals and DOC bottles.
13. Consult the water collection SOP for further details if necessary.
14. Repeat this procedure at all five locations; place all sample bottles on ice in a cooler and ship the day following collection.
15. For **QAQC** purposes, a single field duplicate and an equipment blank will be collected during this event. In addition, a travel blank will be taken into the field during sampling and kept for the rest of the program. All parameters measured in the original sample are measured in the field duplicate that is randomly chosen from one of the five locations and labeled as station DUP-1. Record in the field log book the UTM coordinates, water depth and any other field observations of the water sampling exercise. Following the field collection, take an equipment blank using distilled water (excluding TSS).

PACKAGING & SHIPPING SAMPLES:

1. Ensure all **water samples** are **sealed** securely. Prior to shipping, it is advisable to wrap the label of each sample bottle with clear tape to make sure that the label does not come off during shipping and handling. Dry the water bottle and wrap with tape. **Pack** water sampling containers upright in coolers with ice packs, and packing material, to ensure samples do not spill or break during transport. (Ideal storage and transport temperature is 4°C).
2. Ensure the COC form is enclosed and then seal the cooler(s). **Label the cooler(s)** with the following address:

ALS Environmental
Suite 100, 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Attention: Natasha Marcovic-Mirovic

3. **Ship** the water **samples** to ALS Environmental as quickly as possible.
4. Send completed **COC forms** and **field data forms** to **Azimuth** Consulting Group Inc., attention the project coordinator – Maggie McConnell.

APPENDIX D:

ALS WATER CHEMISTRY LABORATORY CERTIFICATES OF ANALYSIS

FEBRUARY 2012



Agnico-Eagle - Meadowbank Division
ATTN: RYAN VANENGEN
Meadowbank Division
PO Box 540
Baker Lake NU X0X 0A0

Date Received: 19-AUG-11
Report Date: 07-SEP-11 13:42 (MT)
Version: FINAL

Client Phone: 867-793-4610

Certificate of Analysis

Lab Work Order #: L1047229
Project P.O. #: NOT SUBMITTED
Job Reference: MINE SITE
C of C Numbers:
Legal Site Desc:

Paul Nicolas
Account Manager

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

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-1 BG PW-1							
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:30							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia as N	<0.010		0.010	mg/L		26-AUG-11	R2242064
Chloride	0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon	2.0		1.0	mg/L		23-AUG-11	R2239479
Fluoride	0.066		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)	8.75		0.30	mg/L		24-AUG-11	
Hardness (as CaCO3)	7.67		0.20	mg/L		23-AUG-11	
Nitrate-N	0.0233		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	0.0255		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive	<0.0010		0.0010	mg/L		25-AUG-11	R2240580
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		23-AUG-11	R2239289
Sulfate	2.11		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.067		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.012		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.4		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.31		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0130		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total	0.00110		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total	0.00257		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.22		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00049		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.783		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00155		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00024		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.513		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00075		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.135		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.620		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00925		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-1 BG PW-1							
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:30							
Matrix: WATER							
Total Metals by ICP-MS							
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00022		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0049		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00096		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00253		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.92		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00033		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.696		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00111		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00021		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.448		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00064		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.107		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.586		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.00847		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Version: FINAL

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-1	BG PW-1							
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:30								
Matrix: WATER								
Alkalinity								
Alkalinity, Total (as CaCO3)		8.0		1.0	mg/L		24-AUG-11	R2240235
Bicarbonate (HCO3)		9.8		2.0	mg/L		24-AUG-11	R2240235
Carbonate (CO3)		<0.60		0.60	mg/L		24-AUG-11	R2240235
Hydroxide (OH)		<0.40		0.40	mg/L		24-AUG-11	R2240235
Conductivity								
Conductivity		21.5		0.40	umhos/cm		24-AUG-11	R2240235
pH								
pH		7.19		0.10	pH units		24-AUG-11	R2240235
L1047229-2	BG PW-2							
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:52								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		26-AUG-11	R2242064
Chloride		0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		2.1		1.0	mg/L		23-AUG-11	R2239479
Fluoride		0.066		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)		7.53		0.20	mg/L		23-AUG-11	
Hardness (as CaCO3)		8.95		0.30	mg/L		24-AUG-11	
Nitrate-N		0.0243		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N		<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total		0.0043		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total		<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive		<0.010		0.010	mg/L		22-AUG-11	R2238704
Phosphorus (P)-Total Reactive		<0.0010		0.0010	mg/L		24-AUG-11	R2239894
Sulfate		2.13		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen		0.065		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total		0.015		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total		<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon		2.0		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids		<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity		0.27		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS								
Aluminum (Al)-Total		0.0140		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total		0.00120		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total		0.00251		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total		<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total		<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total		2.25		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total		<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total		<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total		0.00069		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total		<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total		<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-2 BG PW-2							
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:52							
Matrix: WATER							
Total Metals by ICP-MS							
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.809		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00157		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00025		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.517		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00073		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.127		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.607		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00900		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00027		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0052		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00105		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00249		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.86		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00039		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.700		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00100		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00020		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.438		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00064		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.110		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.558		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-2 BG PW-2								
Sampled By: S GAUDREULT on 11-AUG-11 @ 16:52								
Matrix: WATER								
Dissolved Metals by ICP-MS								
Strontium (Sr)-Dissolved		0.00859		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved		<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved		<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity								
Alkalinity								
Alkalinity, Total (as CaCO3)		8.1		1.0	mg/L		24-AUG-11	R2240235
Bicarbonate (HCO3)		9.9		2.0	mg/L		24-AUG-11	R2240235
Carbonate (CO3)		<0.60		0.60	mg/L		24-AUG-11	R2240235
Hydroxide (OH)		<0.40		0.40	mg/L		24-AUG-11	R2240235
Conductivity								
Conductivity		22.1		0.40	umhos/cm		19-AUG-11	R2238806
pH								
pH		7.24		0.10	pH units		19-AUG-11	R2238806
L1047229-3 BG PW-3								
Sampled By: S GAUDREULT on 11-AUG-11 @ 17:00								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride		0.48		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		1.7		1.0	mg/L		23-AUG-11	R2239479
Fluoride		0.065		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)		8.90		0.30	mg/L		24-AUG-11	
Hardness (as CaCO3)		7.53		0.20	mg/L		23-AUG-11	
Nitrate-N		0.0249		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N		<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total		<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total		0.0047		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total Reactive		0.0017		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive		<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate		2.10		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen		0.067		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total		0.011		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total		<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon		1.8		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids		5.6		4.0	mg/L		06-SEP-11	R2246938
Turbidity		0.30		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS								
Aluminum (Al)-Total		0.0151		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-3 BG PW-3							
Sampled By: S GAUDREULT on 11-AUG-11 @ 17:00							
Matrix: WATER							
Total Metals by ICP-MS							
Arsenic (As)-Total	0.00120		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total	0.00262		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.22		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00062		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.816		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00155		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00025		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.524		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00077		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.122		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.636		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00971		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00021		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0051		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00100		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00259		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.88		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00032		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-4 BG PW-4							
Sampled By: S GAUDREULT on 12-AUG-11 @ 15:46							
Matrix: WATER							
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Phosphorus (P)-Total Reactive	<0.0010		0.0010	mg/L		24-AUG-11	R2239894
Sulfate	2.12		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.126		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.026		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	1.8		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids	4.8		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.32		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0155		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total	0.00092		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total	0.00263		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.17		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00065		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.779		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00163		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00025		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.499		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00076		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.125		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.578		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00923		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00039		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0058		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00074		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-4 BG PW-4 Sampled By: S GAUDREULT on 12-AUG-11 @ 15:46 Matrix: WATER							
Dissolved Metals by ICP-MS							
Barium (Ba)-Dissolved	0.00252		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.86		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00033		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.690		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00086		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00020		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.443		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00064		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.104		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.575		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.00831		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	8.1		1.0	mg/L		24-AUG-11	R2240235
Bicarbonate (HCO3)	9.8		2.0	mg/L		24-AUG-11	R2240235
Carbonate (CO3)	<0.60		0.60	mg/L		24-AUG-11	R2240235
Hydroxide (OH)	<0.40		0.40	mg/L		24-AUG-11	R2240235
Conductivity							
Conductivity	21.7		0.40	umhos/cm		19-AUG-11	R2238806
pH							
pH	7.28		0.10	pH units		19-AUG-11	R2238806
L1047229-5 BG PW-5 Sampled By: S GAUDREULT on 12-AUG-11 @ 16:11 Matrix: WATER							
Miscellaneous Parameters							
Ammonia as N	<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride	0.49		0.20	mg/L		22-AUG-11	R2240430

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-5 BG PW-5							
Sampled By: S GAUDREULT on 12-AUG-11 @ 16:11							
Matrix: WATER							
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon	2.0		1.0	mg/L		23-AUG-11	R2239479
Fluoride	0.066		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)	8.22		0.30	mg/L		24-AUG-11	
Hardness (as CaCO3)	7.32		0.20	mg/L		23-AUG-11	
Nitrate-N	0.0207		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total	0.0056		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total Reactive	<0.0010		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate	2.12		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.086		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.021		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.0		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.33		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0249		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total	0.00075		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total	0.00267		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.01		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00047		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.780		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00170		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.496		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00072		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.121		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.610		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00895		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-5 BG PW-5							
Sampled By: S GAUDREULT on 12-AUG-11 @ 16:11							
Matrix: WATER							
Total Metals by ICP-MS							
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00031		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0045		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00057		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00251		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.81		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00030		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.679		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00088		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00017		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.440		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00063		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.105		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.578		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.00822		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	7.8		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)	9.5		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)	<0.60		0.60	mg/L		25-AUG-11	R2241157

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-5	BG PW-5							
Sampled By:	S GAUDREAULT on 12-AUG-11 @ 16:11							
Matrix:	WATER							
Alkalinity								
Hydroxide (OH)		<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity								
Conductivity		21.4		0.40	umhos/cm		19-AUG-11	R2238806
pH								
pH		7.22		0.10	pH units		19-AUG-11	R2238806
L1047229-6	BG PW-6							
Sampled By:	S GAUDREAULT on 12-AUG-11 @ 16:32							
Matrix:	WATER							
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride		0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		1.8		1.0	mg/L		23-AUG-11	R2239479
Fluoride		0.065		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)		8.03		0.30	mg/L		24-AUG-11	
Hardness (as CaCO3)		7.33		0.20	mg/L		23-AUG-11	
Nitrate-N		0.0241		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N		<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total		<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total		0.0062		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total Reactive		0.0018		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive		<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate		2.19		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen		0.051		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total		0.039		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total		<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon		2.0		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids		<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity		0.30		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS								
Aluminum (Al)-Total		0.0157		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total		0.00085		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total		0.00264		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total		<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total		<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total		1.97		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total		<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total		<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total		0.00066		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total		<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total		<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total		<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total		0.754		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total		0.00207		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-6 BG PW-6							
Sampled By: S GAUDREULT on 12-AUG-11 @ 16:32							
Matrix: WATER							
Total Metals by ICP-MS							
Molybdenum (Mo)-Total	0.00024		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.515		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00074		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.125		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.640		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00917		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00031		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0049		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00063		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00252		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.81		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00030		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.681		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00105		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00018		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.443		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00066		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.105		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.585		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.00874		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-7 BG PW REF							
Sampled By: S GAUDREULT on 12-AUG-11 @ 16:49							
Matrix: WATER							
Total Metals by ICP-MS							
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.02		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00050		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.764		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00148		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00022		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.511		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00074		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.128		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.610		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00901		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00029		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0047		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00054		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00249		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	1.81		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00034		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.676		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-7 BG PW REF								
Sampled By: S GAUDREULT on 12-AUG-11 @ 16:49								
Matrix: WATER								
Dissolved Metals by ICP-MS								
Manganese (Mn)-Dissolved		0.00084		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved		0.00018		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved		<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved		<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved		0.436		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved		0.00065		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved		<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved		0.099		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved		0.562		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved		0.00818		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved		<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved		<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity								
Alkalinity								
Alkalinity, Total (as CaCO3)		7.9		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)		9.6		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)		<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)		<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity								
Conductivity		21.3		0.40	umhos/cm		19-AUG-11	R2238806
pH								
pH		7.23		0.10	pH units		19-AUG-11	R2238806
L1047229-8 BG DUP-1								
Sampled By: S GAUDREULT on 11-AUG-11								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride		0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		1.7		1.0	mg/L		23-AUG-11	R2239479
Fluoride		0.066		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)		7.45		0.20	mg/L		23-AUG-11	
Hardness (as CaCO3)		10.3		0.30	mg/L		24-AUG-11	
Nitrate-N		0.0264		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N		<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total		0.0045		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total		<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive		0.0032		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive		<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate		2.13		0.50	mg/L		22-AUG-11	R2240430

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-8 BG DUP-1							
Sampled By: S GAUDREAULT on 11-AUG-11							
Matrix: WATER							
Total Kjeldahl Nitrogen	0.063		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.021		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	1.8		1.0	mg/L		23-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.30		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0154		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Arsenic (As)-Total	0.00121		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Barium (Ba)-Total	0.00264		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2239143
Calcium (Ca)-Total	2.86		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Copper (Cu)-Total	0.00063		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Magnesium (Mg)-Total	0.775		0.010	mg/L	22-AUG-11	22-AUG-11	R2239143
Manganese (Mn)-Total	0.00170		0.00030	mg/L	22-AUG-11	22-AUG-11	R2239143
Molybdenum (Mo)-Total	0.00024		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2239143
Potassium (K)-Total	0.510		0.020	mg/L	22-AUG-11	22-AUG-11	R2239143
Rubidium (Rb)-Total	0.00077		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Silicon (Si)-Total	0.128		0.050	mg/L	22-AUG-11	22-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Sodium (Na)-Total	0.616		0.030	mg/L	22-AUG-11	22-AUG-11	R2239143
Strontium (Sr)-Total	0.00981		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Titanium (Ti)-Total	0.00028		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2239143
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2239143
Zirconium (Zr)-Total	0.00155		0.00040	mg/L	22-AUG-11	22-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0051		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00099		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00252		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-8 BG DUP-1								
Sampled By: S GAUDREULT on 11-AUG-11								
Matrix: WATER								
Dissolved Metals by ICP-MS								
Boron (B)-Dissolved		<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved		<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved		1.87		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved		<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved		0.00031		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved		<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved		<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved		<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved		0.675		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved		0.00098		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved		0.00019		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved		<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved		<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved		0.424		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved		0.00063		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved		<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved		0.104		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved		0.539		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved		0.00850		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved		<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved		<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved		<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved		<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity								
Alkalinity								
Alkalinity, Total (as CaCO3)		8.2		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)		10.0		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)		<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)		<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity								
Conductivity		22.1		0.40	umhos/cm		19-AUG-11	R2238806
pH								
pH		7.28		0.10	pH units		19-AUG-11	R2238806
L1047229-9 ED PW-1								
Sampled By: S GAUDREULT on 13-AUG-11 @ 16:30								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride		0.50		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		2.3		1.0	mg/L		24-AUG-11	R2239479
Fluoride		0.059		0.020	mg/L		22-AUG-11	R2240430

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-9 ED PW-1							
Sampled By: S GAUDREULT on 13-AUG-11 @ 16:30							
Matrix: WATER							
Hardness (as CaCO3)	11.3		0.30	mg/L		24-AUG-11	
Hardness (as CaCO3)	9.96		0.20	mg/L		23-AUG-11	
Nitrate-N	0.0087		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	0.0074		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive	0.0044		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate	2.22		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.086		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.022		0.010	mg/L		26-AUG-11	R2241372
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.3		1.0	mg/L		24-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.37		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0142		0.0050	mg/L	22-AUG-11	23-AUG-11	R2239143
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Arsenic (As)-Total	0.00038		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Barium (Ba)-Total	0.00286		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	23-AUG-11	R2239143
Cadmium (Cd)-Total	0.000012		0.000010	mg/L	22-AUG-11	23-AUG-11	R2239143
Calcium (Ca)-Total	2.97		0.10	mg/L	22-AUG-11	23-AUG-11	R2239143
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	23-AUG-11	R2239143
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Copper (Cu)-Total	0.00071		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	23-AUG-11	R2239143
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	23-AUG-11	R2239143
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	23-AUG-11	R2239143
Magnesium (Mg)-Total	0.933		0.010	mg/L	22-AUG-11	23-AUG-11	R2239143
Manganese (Mn)-Total	0.00207		0.00030	mg/L	22-AUG-11	23-AUG-11	R2239143
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	23-AUG-11	R2239143
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	23-AUG-11	R2239143
Potassium (K)-Total	0.449		0.020	mg/L	22-AUG-11	23-AUG-11	R2239143
Rubidium (Rb)-Total	0.00072		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	23-AUG-11	R2239143
Silicon (Si)-Total	0.259		0.050	mg/L	22-AUG-11	23-AUG-11	R2239143
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Sodium (Na)-Total	0.525		0.030	mg/L	22-AUG-11	23-AUG-11	R2239143
Strontium (Sr)-Total	0.0134		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Titanium (Ti)-Total	0.00025		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	23-AUG-11	R2239143

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-9 ED PW-1							
Sampled By: S GAUDREULT on 13-AUG-11 @ 16:30							
Matrix: WATER							
Total Metals by ICP-MS							
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	23-AUG-11	R2239143
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	23-AUG-11	R2239143
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	23-AUG-11	R2239143
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	23-AUG-11	R2239143
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0048		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00242		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.63		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00047		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.824		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00039		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.404		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00060		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.224		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.497		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.0120		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	10.4		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)	12.7		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)	<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)	<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity							
Conductivity	26.4		0.40	umhos/cm		19-AUG-11	R2238806
pH							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-9 ED PW-1 Sampled By: S GAUDREAULT on 13-AUG-11 @ 16:30 Matrix: WATER pH pH	7.39		0.10	pH units		19-AUG-11	R2238806
L1047229-10 ED PW-2 Sampled By: S GAUDREAULT on 13-AUG-11 @ 16:42 Matrix: WATER Miscellaneous Parameters							
Ammonia as N	<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride	0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon	2.2		1.0	mg/L		24-AUG-11	R2240195
Fluoride	0.059		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)	9.98		0.20	mg/L		23-AUG-11	
Hardness (as CaCO3)	9.98		0.30	mg/L		23-AUG-11	
Nitrate-N	0.0054		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	0.0101		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive	0.0014		0.0010	mg/L		24-AUG-11	R2239894
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Sulfate	2.21		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.079		0.050	mg/L		23-AUG-11	R2239386
Iron (Fe)-Total	0.024		0.010	mg/L		25-AUG-11	R2240718
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.2		1.0	mg/L		24-AUG-11	R2240195
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.38		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0115		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Arsenic (As)-Total	0.00036		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Barium (Ba)-Total	0.00273		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2238909
Calcium (Ca)-Total	2.66		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total	0.00063		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.866		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00222		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.424		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-10 ED PW-2							
Sampled By: S GAUDREULT on 13-AUG-11 @ 16:42							
Matrix: WATER							
Total Metals by ICP-MS							
Rubidium (Rb)-Total	0.00064		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.237		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.526		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0123		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00023		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.00010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0051		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00255		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.63		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00048		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.827		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00042		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.407		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00063		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.219		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.502		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.0123		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-11 ED PW-3							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:00							
Matrix: WATER							
Total Metals by ICP-MS							
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total	0.00070		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.887		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00236		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.438		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909
Rubidium (Rb)-Total	0.00065		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.259		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.550		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0120		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00041		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0044		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00253		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.57		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00044		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.804		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00043		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-12 ED PW-4							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:20							
Matrix: WATER							
Total Organic Carbon	2.1		1.0	mg/L		24-AUG-11	R2240195
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.42		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0124		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Arsenic (As)-Total	0.00036		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Barium (Ba)-Total	0.00263		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2238909
Calcium (Ca)-Total	2.67		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total	0.00069		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.836		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00199		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.430		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909
Rubidium (Rb)-Total	0.00066		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.238		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.515		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0120		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00031		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0050		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00248		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.68		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-12 ED PW-4 Sampled By: S GAUDREULT on 13-AUG-11 @ 17:20 Matrix: WATER							
Dissolved Metals by ICP-MS							
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00049		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.846		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00039		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.421		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00066		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.222		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.507		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.0126		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	10.6		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)	13.0		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)	<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)	<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity							
Conductivity	26.8		0.40	umhos/cm		19-AUG-11	R2238806
pH							
pH	7.40		0.10	pH units		19-AUG-11	R2238806
L1047229-13 ED PW-5 Sampled By: S GAUDREULT on 13-AUG-11 @ 17:34 Matrix: WATER							
Miscellaneous Parameters							
Ammonia as N	<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride	0.50		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon	2.2		1.0	mg/L		24-AUG-11	R2239479
Fluoride	0.060		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)	9.79		0.30	mg/L		23-AUG-11	
Hardness (as CaCO3)	9.79		0.20	mg/L		23-AUG-11	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-13 ED PW-5							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:34							
Matrix: WATER							
Nitrate-N	0.0082		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	0.0057		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Phosphorus (P)-Total Reactive	0.0014		0.0010	mg/L		24-AUG-11	R2239894
Sulfate	2.21		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.114		0.050	mg/L		24-AUG-11	R2239998
Iron (Fe)-Total	0.020		0.010	mg/L		25-AUG-11	R2240718
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.4		1.0	mg/L		24-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.36		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0109		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Arsenic (As)-Total	0.00039		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Barium (Ba)-Total	0.00260		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2238909
Calcium (Ca)-Total	2.63		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total	0.00070		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.830		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00218		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.422		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909
Rubidium (Rb)-Total	0.00068		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.243		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.527		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0121		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-13 ED PW-5							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:34							
Matrix: WATER							
Total Metals by ICP-MS							
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0058		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	0.00021		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00260		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.58		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00059		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.813		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00041		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00011		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.419		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00063		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.212		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.502		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.0120		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							
Alkalinity, Total (as CaCO3)	10.1		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)	12.4		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)	<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)	<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity							
Conductivity	25.9		0.40	umhos/cm		19-AUG-11	R2238806
pH							
pH	7.37		0.10	pH units		19-AUG-11	R2238806

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-14 ED DUP -1							
Sampled By: S GAUDREAULT on 13-AUG-11							
Matrix: WATER							
Miscellaneous Parameters							
Ammonia as N	<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride	0.50		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved	<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon	2.1		1.0	mg/L		24-AUG-11	R2239479
Fluoride	0.059		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)	9.90		0.20	mg/L		23-AUG-11	
Hardness (as CaCO3)	9.90		0.30	mg/L		23-AUG-11	
Nitrate-N	0.0060		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N	<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N	<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total	0.0056		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total	<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total Reactive	<0.010		0.010	mg/L		22-AUG-11	R2238704
Phosphorus (P)-Total Reactive	0.0011		0.0010	mg/L		24-AUG-11	R2239894
Sulfate	2.21		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen	0.124		0.050	mg/L		24-AUG-11	R2239998
Iron (Fe)-Total	0.020		0.010	mg/L		25-AUG-11	R2240718
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon	2.3		1.0	mg/L		24-AUG-11	R2239479
Total Suspended Solids	<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity	0.32		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS							
Aluminum (Al)-Total	0.0118		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Antimony (Sb)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Arsenic (As)-Total	0.00038		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Barium (Ba)-Total	0.00273		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Beryllium (Be)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Bismuth (Bi)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Boron (B)-Total	<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2238909
Calcium (Ca)-Total	2.78		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Cesium (Cs)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total	0.00084		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total	<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total	<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.884		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00227		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.434		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909
Rubidium (Rb)-Total	0.00066		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.246		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.547		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0121		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-14 ED DUP -1							
Sampled By: S GAUDREULT on 13-AUG-11							
Matrix: WATER							
Total Metals by ICP-MS							
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00029		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Zinc (Zn)-Total	0.0074		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0049		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00262		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.62		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00050		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.817		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00051		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	0.00011		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.404		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00060		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.224		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.491		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Strontium (Sr)-Dissolved	0.0120		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tellurium (Te)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Thallium (Tl)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Thorium (Th)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Tin (Sn)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Titanium (Ti)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Tungsten (W)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Uranium (U)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Vanadium (V)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zinc (Zn)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Zirconium (Zr)-Dissolved	<0.00040		0.00040	mg/L	19-AUG-11	22-AUG-11	R2238991
pH, Conductivity and Total Alkalinity							
Alkalinity							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-14	ED DUP -1							
Sampled By: S GAUDREULT on 13-AUG-11								
Matrix: WATER								
Alkalinity								
Alkalinity, Total (as CaCO3)		10.3		1.0	mg/L		25-AUG-11	R2241157
Bicarbonate (HCO3)		12.5		2.0	mg/L		25-AUG-11	R2241157
Carbonate (CO3)		<0.60		0.60	mg/L		25-AUG-11	R2241157
Hydroxide (OH)		<0.40		0.40	mg/L		25-AUG-11	R2241157
Conductivity								
Conductivity		26.0		0.40	umhos/cm		19-AUG-11	R2238806
pH								
pH		7.41		0.10	pH units		19-AUG-11	R2238806
L1047229-15	SP REF							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:50								
Matrix: WATER								
Miscellaneous Parameters								
Ammonia as N		<0.010		0.010	mg/L		29-AUG-11	R2242724
Chloride		0.49		0.20	mg/L		22-AUG-11	R2240430
Iron (Fe)-Dissolved		<0.010		0.010	mg/L		26-AUG-11	R2241368
Dissolved Organic Carbon		2.1		1.0	mg/L		24-AUG-11	R2239479
Fluoride		0.058		0.020	mg/L		22-AUG-11	R2240430
Hardness (as CaCO3)		9.24		0.20	mg/L		25-AUG-11	
Hardness (as CaCO3)		9.24		0.30	mg/L		25-AUG-11	
Nitrate-N		<0.0050		0.0050	mg/L		22-AUG-11	R2240430
Nitrate and Nitrite as N		<0.070		0.070	mg/L		19-AUG-11	
Nitrite-N		<0.0010		0.0010	mg/L		22-AUG-11	R2240430
Phosphorus (P)-Total		<0.010		0.010	mg/L		22-AUG-11	R2238710
Phosphorus (P)-Total		0.0051		0.0020	mg/L		27-AUG-11	R2241827
Phosphorus (P)-Total Reactive		<0.010		0.010	mg/L		22-AUG-11	R2238704
Phosphorus (P)-Total Reactive		0.0035		0.0010	mg/L		24-AUG-11	R2239894
Sulfate		2.18		0.50	mg/L		22-AUG-11	R2240430
Total Kjeldahl Nitrogen		0.156		0.050	mg/L		24-AUG-11	R2239998
Iron (Fe)-Total		0.022		0.010	mg/L		25-AUG-11	R2240718
Mercury (Hg)-Total		<0.000010		0.000010	mg/L		23-AUG-11	R2239284
Total Organic Carbon		2.3		1.0	mg/L		24-AUG-11	R2239479
Total Suspended Solids		<4.0		4.0	mg/L		06-SEP-11	R2246938
Turbidity		0.33		0.10	NTU		19-AUG-11	R2239779
Total Metals by ICP-MS								
Aluminum (Al)-Total		0.0103		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Antimony (Sb)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Arsenic (As)-Total		0.00032		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Barium (Ba)-Total		0.00248		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Beryllium (Be)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Bismuth (Bi)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Boron (B)-Total		<0.010		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cadmium (Cd)-Total		<0.000010		0.000010	mg/L	22-AUG-11	22-AUG-11	R2238909
Calcium (Ca)-Total		2.48		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Cesium (Cs)-Total		<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Chromium (Cr)-Total		<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Cobalt (Co)-Total		<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Copper (Cu)-Total		0.00070		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Iron (Fe)-Total		<0.10		0.10	mg/L	22-AUG-11	22-AUG-11	R2238909
Lead (Pb)-Total		<0.000090		0.000090	mg/L	22-AUG-11	22-AUG-11	R2238909

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1047229-15 SP REF							
Sampled By: S GAUDREULT on 13-AUG-11 @ 17:50							
Matrix: WATER							
Total Metals by ICP-MS							
Lithium (Li)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Magnesium (Mg)-Total	0.821		0.010	mg/L	22-AUG-11	22-AUG-11	R2238909
Manganese (Mn)-Total	0.00245		0.00030	mg/L	22-AUG-11	22-AUG-11	R2238909
Molybdenum (Mo)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	22-AUG-11	22-AUG-11	R2238909
Phosphorus (P)-Total	<0.20		0.20	mg/L	22-AUG-11	22-AUG-11	R2238909
Potassium (K)-Total	0.396		0.020	mg/L	22-AUG-11	22-AUG-11	R2238909
Rubidium (Rb)-Total	0.00062		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Selenium (Se)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Silicon (Si)-Total	0.245		0.050	mg/L	22-AUG-11	22-AUG-11	R2238909
Silver (Ag)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Sodium (Na)-Total	0.513		0.030	mg/L	22-AUG-11	22-AUG-11	R2238909
Strontium (Sr)-Total	0.0115		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tellurium (Te)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Thallium (Tl)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Thorium (Th)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Tin (Sn)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Titanium (Ti)-Total	0.00028		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Tungsten (W)-Total	<0.0010		0.0010	mg/L	22-AUG-11	22-AUG-11	R2238909
Uranium (U)-Total	<0.00010		0.00010	mg/L	22-AUG-11	22-AUG-11	R2238909
Vanadium (V)-Total	<0.00020		0.00020	mg/L	22-AUG-11	22-AUG-11	R2238909
Zinc (Zn)-Total	<0.0050		0.0050	mg/L	22-AUG-11	22-AUG-11	R2238909
Zirconium (Zr)-Total	<0.00040		0.00040	mg/L	22-AUG-11	22-AUG-11	R2238909
Dissolved Metals by ICP-MS							
Aluminum (Al)-Dissolved	0.0044		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Antimony (Sb)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Arsenic (As)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Barium (Ba)-Dissolved	0.00230		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Beryllium (Be)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Bismuth (Bi)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-AUG-11	22-AUG-11	R2238991
Calcium (Ca)-Dissolved	2.39		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Cesium (Cs)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Chromium (Cr)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Cobalt (Co)-Dissolved	<0.00020		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Copper (Cu)-Dissolved	0.00097		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Iron (Fe)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Lead (Pb)-Dissolved	<0.000090		0.000090	mg/L	19-AUG-11	22-AUG-11	R2238991
Lithium (Li)-Dissolved	<0.0020		0.0020	mg/L	19-AUG-11	22-AUG-11	R2238991
Magnesium (Mg)-Dissolved	0.793		0.010	mg/L	19-AUG-11	22-AUG-11	R2238991
Manganese (Mn)-Dissolved	0.00065		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Molybdenum (Mo)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Nickel (Ni)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	24-AUG-11	R2240489
Phosphorus (P)-Dissolved	<0.10		0.10	mg/L	19-AUG-11	22-AUG-11	R2238991
Potassium (K)-Dissolved	0.382		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991
Rubidium (Rb)-Dissolved	0.00060		0.00020	mg/L	19-AUG-11	22-AUG-11	R2238991
Selenium (Se)-Dissolved	<0.0010		0.0010	mg/L	19-AUG-11	22-AUG-11	R2238991
Silicon (Si)-Dissolved	0.222		0.050	mg/L	19-AUG-11	22-AUG-11	R2238991
Silver (Ag)-Dissolved	<0.00010		0.00010	mg/L	19-AUG-11	22-AUG-11	R2238991
Sodium (Na)-Dissolved	0.482		0.020	mg/L	19-AUG-11	22-AUG-11	R2238991

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-TOT-WP	Water	Alkalinity	APHA 2320B
Alkalinity of water is a measure of its acid neutralizing capacity. Alkalinity is imparted by bicarbonate, carbonate and hydroxide components of water. It is determined by titration with a standard solution of strong mineral acid to the successive HCO ₃ ⁻ and H ₂ CO ₃ endpoints indicated electrometrically.			
C-DIS-ORG-WP	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL-WP
This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.			
The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC. TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.			
C-TOT-ORG-WP	Water	Total Organic Carbon	APHA 5310 B-INSTRUMENTAL-WP
This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.			
The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC. TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.			
CL-L-IC-WP	Water	Chloride	EPA 300.1 IC
This analysis is carried out using procedures adapted from EPA Method 300.1 "Determination of Inorganic Anions in Drinking Water by Ion Chromatography".			
EC-WP	Water	Conductivity	APHA 2510B
Conductivity of an aqueous solution refers to its ability to carry an electric current. Conductance of a solution is measured between two spatially fixed and chemically inert electrodes.			
ETL-HARDNESS-DIS-WP	Water	Hardness Calculated	HARDNESS CALCULATED
ETL-HARDNESS-TOT-WP	Water	Hardness Calculated	HARDNESS CALCULATED
F-L-IC-WP	Water	Fluoride	EPA 300.1 IC
This analysis is carried out using procedures adapted from EPA Method 300.1 "Determination of Inorganic Anions in Drinking Water by Ion Chromatography".			
FE-D-L-ICP-ED	Water	Diss. Fe in Water by ICPOES (Low Level)	APHA 3120 B-ICP-OES
FE-T-L-ICP-ED	Water	Total Fe in Water by ICPOES (Low Level)	APHA 3120 B-ICP-OES
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
MET-D-L-MS-WP	Water	Dissolved Metals by ICP-MS	U.S. EPA 200.8-DL
Dissolved Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the Examination of Water and Wastewater method 3030B for filtration through a 0.45 um filter and analytical procedures adapted from U.S EPA Method 200.8 for analysis of metals by inductively coupled-mass spectrometry.			
MET-T-L-MS-WP	Water	Total Metals by ICP-MS	U.S. EPA 200.8-TL
Total Metals by ICP-MS: This analysis is carried out using sample preparation procedures adapted from Standard Methods for the examination of Water and Wastewater Method 3030E and analytical procedures adapted from U.S EPA Method 200.8 for analysis of metals by inductively coupled-mass			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
spectrometry.			
NH3-L-COL-WP	Water	Ammonia by colour	APHA 4500 NH3 F
Ammonia in water samples forms indophenol when reacted with hypochlorite and phenol. The intensity is amplified by the addition of sodium nitroprusside and measured colourmetrically.			
NO2+NO3-CALC-WP	Water	Nitrate+Nitrite	CALCULATION
NO2-L-IC-WP	Water	Nitrite as N	EPA 300.1 IC
NO3-L-IC-WP	Water	Nitrate as N	EPA 300.1 IC
P-T-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.			
P-T-L-COL-WP	Water	Phosphorus, Total	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.			
P-TR-COL-WP	Water	Phosphorus, Total Reactive in Water	APHA 4500 P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Reactive Phosphorus is determined colourimetrically.			
P-TR-L-COL-WP	Water	Phosphorus, Total Reactive in Water	APHA 4500 P PHOSPHORUS-L
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Reactive Phosphorus is determined colourimetrically.			
PH-WP	Water	pH	APHA 4500H
The pH of a sample is the determination of the activity of the hydrogen ions by potentiometric measurement using a standard hydrogen electrode and a reference electrode.			
SO4-IC-WP	Water	Sulfate	EPA 300.1 IC
This analysis is carried out using procedures adapted from EPA Method 300.1 "Determination of Inorganic Anions in Drinking Water by Ion Chromatography".			
TKN-COL-VA	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)
This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined using automated colourimetry.			
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			
TURBIDITY-WP	Water	Turbidity	APHA 2130B (modified)
Turbidity in aqueous matrices is determined by the nephelometric method.			

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

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
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
---------------	--------	------------------	--------------------

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 ww - 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.



Report to:				Report Format / Distribution				Service Requested:											
Company: Agnico-Eagle Mines Ltd.				☒ Standard ☐ Other				☒ Regular Service (Default)											
Contact: Ryan VanEngen				☒ PDF ☒ Excel ☐ Fax				☐ Rush Service (2-3 Days)											
Address: Meadowbank Division PO Box 540 Baker Lake Nun.				Email 1: rvanengen@agnico-eagle.com				☐ Priority Service (1 Day or ASAP)											
				Email 2: jeffery.pratt@agnico-eagle.com				☐ Emergency Service (<1 Day / Wkend) - Contact ALS											
Phone: 867 793 4610x6759 Fax:								Analysis Request											
Invoice To: ☒ Same as Report				Indicate Bottles: Filtered / Preserved (F/P) →→→															
Company: Agnico-Eagle Mining Ltd.				Client / Project Information:															
Contact: Accounts Payable-Meadowbank Division				Job #: Mine Site															
Address: email electronic invoice to rvanengen@agnico-eagle.com				PO/AFE:															
Sample				Legal Site Description:															
Phone: Fax:				Quote #: Q21514															
Lab Work Order # (lab use only)				ALS Contact: Chrisine Herrod				Sampler (Initials):											
Sample #	Sample Identification (This description will appear on the report)			Date dd-mm-yy	Time hh:mm	Sample Type (Select from drop-down list)	Cl, F, NO2, NO3, SO4	TOC/DOC	Metals & Hg (total)	Dissolved Metals	P-Total & Ortho	pH, EC, Alkalinity	Turbidity	TSS, TDS	TKN, NH3	Chloro-a	Hazardous?	Highly Contaminated?	Number of Containers
1	BG PW-1			11-Aug-11	16:30	Water	X	X	X	x	X	X	X	X	X				
2	BG PW-2			11-Aug-11	16:52	Water	X	X	X	x	X	X	X	X	X				
3	BG PW-3			11-Aug-11	17:00	Water	X	X	X	x	X	X	X	X	X				
4	BG PW-4			12-Aug-11	15:46	Water	X	X	X	x	X	X	X	X	X				
5	BG PW-5			12-Aug-11	16:11	Water	X	X	X	x	X	X	X	X	X				
6	BG PW-6			12-Aug-11	16:32	Water	X	X	X	x	X	X	X	X	X				
7	BG PW Ref			12-Aug-11	16:49	Water	X	X	X	x	X	X	X	X	X				
8	BG DUP-1			11-Aug-11	-	Water	X	X	X	x	X	X	X	X	X				
Guidelines / Regulations				Special Instructions / Hazardous Details															
				Please use "low range anion" analysis															
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																			
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.																			
Relinquished By:	S. Gaudreault	Date & Time:		Received By:		Date & Time:		Sample Condition (lab use only)											
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature	Samples Received in Good Condition? Y / N (if no provided details)										



L1047229

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC #

Page 2 of 2

Report to:		Report Format / Distribution		Service Requested:	
Company: Agnico-Eagle Mines Ltd.		☒ Standard ☐ Other		☒ Regular Service (Default)	
Contact: Ryan VanEngen		☒ PDF ☒ Excel ☐ Fax		☐ Rush Service (2-3 Days)	
Address: Meadowbank Division PO Box 540 Baker Lake Nun.		Email 1: rvanengen@agnico-eagle.com		☐ Priority Service (1 Day or ASAP)	
Phone: 867 793 4610x6759 Fax:		Email 2: jeffery.pratt@agnico-eagle.com		☐ Emergency Service (<1 Day / Wkend) - Contact ALS	
Invoice To: ☒ Same as Report		Indicate Bottles: Filtered / Preserved (F/P) →		Analysis Request	
Company: Agnico-Eagle Mining Ltd.		Client / Project Information:			
Contact: Accounts Payable-Meadowbank Division		Job #: Mine Site			
Address: email electronic invoice to rvanengen@agnico-eagle.com		PO/AFE:			
Sample		Legal Site Description:			
Phone: Fax:		Quote #: Q21514			
Lab Work Order # (lab use only)		ALS Contact: Chrissie Herrod		Sampler (Initials):	
Sample #	Sample Identification (This description will appear on the report)	Date dd-mm-yy	Time hh:mm	Sample Type (Select from drop-down list)	
9	ED PW-1	13-Aug-11	16:30	Water	X X X X X X X X X X
10	ED PW-2	13-Aug-11	16:42	Water	X X X X X X X X X X
11	ED PW-3	13-Aug-11	17:00	Water	X X X X X X X X X X
12	ED PW-4	13-Aug-11	17:20	Water	X X X X X X X X X X
13	ED PW-5	13-Aug-11	17:34	Water	X X X X X X X X X X
14	ED DUP-1	13-Aug-11	-	Water	X X X X X X X X X X
15	SP Ref	13-Aug-11	17:50	Water	X X X X X X X X X X
Guidelines / Regulations					Special Instructions / Hazardous Details
					Please use "low range anion" analysis
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.					
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the adjacent worksheet.					
Relinquished By:	S. Gaudreault	Date & Time:		Received By:	19 Aug 2011
Relinquished By:		Date & Time:		Received By:	1000
			Date & Time: 15°		
			Sample Condition (lab use only)		
			Temperature		
			Samples Received in Good Condition? Y / N (if no provided details)		

2nd carbon of BG-PW-2
broken by
time received

APPENDIX E:

DFO AUP LICENSE AND DFO LICENSE TO FISH FOR SCIENTIFIC PURPOSES

FEBRUARY 2012



Licence #: S-11/12-1015-NU

Ryan VanEngen
Agnico-Eagle Mines Ltd. P.O. Box 540
Baker Lake, NU, CA X0C 0A0

Dear Ryan VanEngen,

Enclosed is your Licence to Fish for Scientific Purposes issued pursuant to Section 52 of the Fishery (General) Regulations.

Please be advised that this licence only permits those activities stated on your licence. Any other activity may require approval under the Fisheries Act or other legislation. It is the Project Authority's responsibility to obtain any other approvals.

Failure to comply with any of the conditions specified on the attached licence may result in a contravention of the Fishery (General) Regulations.

Please ensure that you include the licence number and project title in any future correspondence and that you complete the Summary Harvest Report upon completion of activities under this licence.

Yours truly,

Chris Lewis
Fisheries Management Biologist
Eastern Arctic Area
Central and Arctic Region
Fisheries and Oceans Canada

Enclosure

Date



LICENCE TO FISH FOR SCIENTIFIC PURPOSES

S-11/12-1015-NU

Pursuant to Section 52 of the Fishery (General) Regulations, the Minister of Fisheries and Oceans hereby authorizes the individual(s) listed below to fish for scientific purposes, subject to the conditions specified.

Project Authority: Ryan VanEngen

Agnico-Eagle Mines Ltd. P.O. Box 540
Baker Lake, NU, CA X0C 0A0

Other Personnel: Ryan VanEngen

Philip Roy
Martin Theriault
Tom Thomson
Jessica Fang

Objectives:

Agnico-Eagle Mines Ltd. has received a NIRB Project Certificate for its Meadowbank gold project, located 70km north of Baker Lake, Nunavut. Environmental monitoring has been ongoing at this site since 1999.

The purpose of the monitoring program is to avoid or mitigate negative impacts from mine activities, and

to meet the conditions and commitments of the NIRB Project Certificate and DFO Authorization (NU-03-

0109) for the all-weather road and project lake area. Specific objectives of the aquatic sampling program

are to:

- conduct annual water, sediment, plankton, periphyton and benthic sampling of lakes immediately surrounding the mine site to provide baseline and operational data to inform the mine environmental management program,
- monitor fish utilization of habitat structures (within project lakes and along AWPAP)
- evaluate spawning productivity in recently constructed habitat compensation area.
- monitor bridge and culvert installations along the all-weather road to avoid increased sedimentation that may directly or indirectly affect fish or fish habitat, and
- evaluate fisheries status of crossings along the all-weather road to avoid accidental occurrence of barriers to fish migration

CONDITIONS

Waters:

Specific locations for unnamed stream crossings include:

R02 - 64d18'42"N; 96d00'04"W

R06 - 64d54'08"N; 96d21'30"W

R09 - 65d04'40"N; 96d07'41"W

R15 - 64d39'86"N; 96d22'16"W

Water Body: Unnamed Lake (Inuggugayualik Lake)

Point A: 65° 1' N, 96° 23' W

Species: Benthos

Gear: Ponar dredge



Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
						5		

Water Body: Unnamed Lake (Inuggugayualik Lake)

Point A: 65° 1' N, 96° 23' W

Species: Zooplankton

Gear: Plankton Net

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00						

Water Body: Unnamed Lake & System (Portage Lake system)

Point A: 65° 0' N, 96° 5' W

Species: Zooplankton

Gear: Plankton Net

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00						

Water Body: Unnamed Lake & System (Portage Lake system)

Point A: 65° 0' N, 96° 5' W

Species: Benthos

Gear: Ponar dredge

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
						20		

Water Body: Unnamed Lake (Pipedream Lake)

Point A: 65° 1' N, 96° 23' W

Species: Zooplankton

Gear: Plankton Net

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00						

Water Body: Unnamed Lake (Pipedream Lake)

Point A: 65° 1' N, 96° 23' W

Species: Benthos

Gear: Ponar dredge

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
						5		

Water Body: Baker Lake

Point A: 64° 19' N, 96° 3' W

Species: Zooplankton

Gear: Plankton Net



Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00						

Water Body: Baker Lake
Point A: 64° 19' N, 96° 3' W

Species: Benthos

Gear: Ponar dredge

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
						15		

Water Body: Tehek Lake
Point A: 64° 55' N, 95° 38' W

Species: Benthos

Gear: Ponar dredge

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
						5		

Water Body: Tehek Lake
Point A: 64° 55' N, 95° 38' W

Species: Zooplankton

Gear: Plankton Net

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00						

Water Body: Unnamed Lake (Wally Lake)
Point A: 65° 6' N, 95° 57' W

Species: Zooplankton

Gear: Plankton Net

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
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Water Body: Unnamed Lake (Wally Lake)
Point A: 65° 6' N, 95° 57' W

Species: Benthos

Gear: Ponar dredge

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
		2.00				5		

Water Body: Unnamed Stream Crossings
Point A: 64° 18' N, 96° 0' W

Species: Arctic Charr (SR OR LL)
Arctic Grayling
Sculpin, Slimy
Trout, Lake

Gear: Hoop Net



Species: Whitefish, Round

Gear:

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			400					

Water Body: Unnamed Stream Crossings

Point A: 64° 18' N, 96° 0' W

Species: Arctic Grayling

Gear: Electroshocker

Sculpin, Slimy

Larval Emergence Trap

Stickleback, Ninespine

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
				500				

Water Body: Unnamed Lake & System (Portage Lake system)

Point A: 65° 0' N, 96° 5' W

Species: Arctic Charr (SR OR LL)

Gear: 10 MM Mesh Gillnets and Larger

Burbot

Sculpin, Slimy

Trout, Lake

Whitefish, Round

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			100					

Fishing Period: June 15, 2011 to October 15, 2011

A copy of this licence must be available at the study site and produced at the request of a fishery officer.

Live fish may not be retained unless specified in the conditions of this licence.

The licence holder shall immediately cease fishing when the total fish killed or live sampled reaches any of the maximums set for any of the species listed.

Transportation:

Other approvals/permits may be necessary to collect or transport certain species, such as Marine Mammal Transportation Permits. For marine mammal parts, products and derivatives a Marine Mammal Transportation Licence is required for domestic transport and, for international transport a Canadian CITES Export Permit is also required.

Retention & Disposal of Fish Caught:

Fish not required for the purpose of dead sampling and/or retention MUST be returned to the water at the site of capture. Retained fish may be made available to the nearest settlement for domestic consumption or sold commercially within the Territory. Any dead fish for commercial sale beyond the Territory in which it was caught requires authorization under the Fish Inspection Regulations. Disposal of any fish remains must be in accordance with local land use regulations.



Report on Activities:

The Project Authority will submit to the Area Licensing Coordinator, Department of Fisheries and Oceans, within one month of the expiry date, a report stating:

- i) whether or not the field work was conducted; and if conducted
- ii) waterbody location, fishing coordinates, gear types used at each coordinate, numbers or amount of fish (by species) collected and/or marked and the date or period of collection.

A Summary Harvest Report template is provided by the Licensing Coordinator at time of issuance of this licence.

The Project Authority also will provide a copy of any published or public access documents which result from the project. Information supplied will be used for population management purposes by the Department of Fisheries and Oceans and becomes part of the public record.

All documents should be sent to:

Area Licensing Administrator
Fisheries and Oceans Canada
P.O. Box 358
Iqaluit, NU X0A 0H0
Email: XCA-NUpermit@dfo-mpo.gc.ca

Notification of Commencement:

Prior to the commencement of fishing the Project Authority will contact:

Area Licensing Administrator
Fisheries and Oceans Canada
Box 358
Iqaluit, NU X0A 0H0
email: XCA-NUpermit@dfo-mpo.gc.ca

Eric Kan
Area Director, Eastern Arctic Area
Central and Arctic Region
Fisheries and Oceans Canada

2011.06.16

Date

For the Minister of Fisheries and Oceans.

Pursuant to Section 52 of the Fishery (General) Regulations.



Canada

Date: June 17, 2011

To: Ryan VanEngen
Agnico-Eagle Mines Ltd.
Baker Lake, NU X0C 0A0

Subject: Animal Use Protocol - Letter of Approval

Dear Ryan,

Your 2011 Animal Use Protocol (AUP), number FWI-ACC-2011-025 entitled "Meadowbank Mine: Aquatic Ecosystem Monitoring Plan (AEMP) and All-Weather Private Access Road (AWPAR) HADD Crossing Monitoring", has been reviewed and approved by the Freshwater Institute Animal Care Committee. This AUP will expire on December 31, 2011.

Keep this signed letter of approval as well as the signed AUP approval form for your records. Please be advised that should there be a need to revise the protocol you are requested to contact the Freshwater Institute Animal Care Committee and obtain approval prior to proceeding.

In addition, you are required to submit a brief report within 30 days of completion of the project outlining the unexpected changes to the protocol, the number of animals used and any unanticipated results or mortalities. The report form is enclosed.

Feel free to contact me if you have any questions or concerns.

Sincerely,

Bernard LeBlanc FWISL-ACC Chairperson

*Freshwater Institute Science Laboratories Animal Care Committee
Arctic Aquatic Research
Central & Arctic / Région du Centre et de l'Arctique
Fisheries and Oceans Canada / Pêches et Océans Canada
501 University Crescent
Winnipeg, Manitoba R3T 2N6
Phone: 204 983-1327
Fax: 204 984-2403*

Enclosure



Pêches et Océans
Canada

Fisheries and Oceans
Canada



Canada

APPROVAL BY ANIMAL CARE COMMITTEE MEMBERS

AUP#: ACC-2011-025

Date: June 17, 2011

Signatures of ACC Members

Bernard LeBlanc, Chair

Theresa Carmichael

Dr. Ericka Anseeuw D.V.M.

Bob Artes

Cortney Watt

Kerry Wautier

Megan Desai

Interim Approval ☐

Final Approval ☒

**APPROVAL BY THE FWI ANIMAL CARE COMMITTEE IS FOR THE PERIOD STATED ON
YOUR ANIMAL USE PROTOCOL.**



Pêches et Océans
Canada

Fisheries and Oceans
Canada

APPENDIX F:

RAW FIELD FISH COLLECTION DATA

FEBRUARY 2012

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start		GPS - End		species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	-	-	-	-	-	-	-	-	-	Nets Set/Way Point 285/Depth 2.8m - 6.0m
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	1	90890	585	-	2000	4.6	102	LR	-
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	2	90891	605	-	2150	4.4	76	LR	Photo #69
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	3	-	540	-	1750	4.8	76	D	Dead
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	RWF	4	-	379	-	650	3.3	51	D	Dead
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	ARCH	5	-	243	-	250	3.1	38	D	Dead
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	6	-	210	-	150	2.7	38	D	Dead/Photo #74
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	7	90893	620	-	2360	2.5	25	LR	Caught 3m from Dyke Face/Photo #76/76/77
10-Aug-11	15:15	11-Aug-11	12:46	BGW3	1	638448	7211751	638486	7211808	LT	8	-	150	<	100	2.5	25	D	Caught 3m from Dyke Face
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	-	-	-	-	-	-	-	-	-	Start WPT 302, End WPT 303 Depths 4.9 - 6.0 - 2.5m
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	9	87367	521	-	1400	4.3	125	LR	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	10	87368	492	-	1225	4.7	102	LR	Red Colouring on Body and Fins
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	11	-	610	-	2475	4.7	102	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	RWF	12	-	365	-	650	3.7	76	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	13	87369	549	-	1750	3.1	51	LR	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	14	-	369	-	525	3.1	51	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	ARCH	15	-	239	-	125	3.1	51	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	16	-	205	<	100	2.5	38	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	17	-	145	<	100	2.5	25	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	18	-	123	<	100	2.5	25	D	-
11-Aug-11	13:20	12-Aug-11	12:54	BGW3	1	638448	7211751	638486	7211808	LT	19	-	134	<	100	2.5	25	LR	-
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	-	-	-	-	-	-	-	-	-	Nets Set/Way Point 286/Depth 2.5 - 6.0 - 5.0m
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	1	-	550	-	1750	4.7	76	D	Dead/F3/Parasites on Stomach/Empty Stomach/Scar near Anal Fin
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	2	-	-	-	-	4.7	76	-	Lost in Transfer
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	3	-	316	-	380	4.3	51	D	Dead/M6
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	RWF	4	-	245	-	200	4.3	51	D	Dead
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	5	-	272	-	250	4.3	51	D	Dead
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	6	90894	530	-	1550	4.3	51	LR	Live Release
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	7	90895	558	-	1700	4.3	51	LR	Live Release
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	8	90896	575	-	2050	4.3	51	LR	Live Release
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	9	90897	453	-	1000	2.5	38	LR	Live Release
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	LT	10	-	231	-	175	2.5	25	D	Dead
10-Aug-11	16:52	11-Aug-11	13:26	BGW2	2	638537	7211676	638560	7211764	RWF	11	-	165	<	100	2.5	25	D	Dead
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	-	-	-	-	-	-	-	-	-	Start WPT 300, End WPT 301 Depths 3.5, 4.0, 2.0
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	12	90897	453	-	1000	2.5	76	D	CYRC
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	13	-	236	-	225	1.9	51	D	-
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	RWF	14	-	280	-	325	1.9	51	D	-
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	RWF	15	-	390	-	800	1.5	38	D	-

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start		GPS - End		species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	RWF	16	-	212	-	250	1.8	38	LR	-	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	RWF	17	-	132	<	100	1.8	25	D	Caught within 1m of Dyke Face	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	18	-	130	<	100	2	25	D	Caught within 1m of Dyke Face, Photo 90	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	19	-	135	<	100	2	25	D	Caught within 1m of Dyke Face	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	20	-	137	<	100	2	25	D	Caught within 1m of Dyke Face	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	LT	21	-	137	<	100	2	25	D	Caught within 1m of Dyke Face	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	RWF	22	-	174	<	100	2	25	D	Caught within 1m of Dyke Face	
11-Aug-11	14:00	12-Aug-11	12:26	BGW2	2	638537	7211676	638560	7211764	ARCH	23	-	201	<	100	2	25	D	Caught within 1m of Dyke Face	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	-	-	-	-	-	-	-	-	-	Nets Set/Depth	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	1	-	543	-	1550	6	76	D	Way Point 290	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	2	-	-	-	-	6.2	76	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	3	87354	558	-	2050	6.2	76	LR	Live Release/Red Colouring on Fins/M7?	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	4	-	520	-	1500	6.2	76	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	5	-	563	-	2000	3.9	76	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	6	-	731	-	3450	3.8	76	D	Dead/Parasites observed/F3	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	7	87355	300	-	300	3.9	51	LR	Juvenile	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	8	-	255	-	300	3.9	51	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	9	-	273	-	375	3.7	51	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	10	-	314	-	400	3.8	51	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	11	-	340	-	450	3.8	51	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	12	-	244	-	200	3.9	38	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	RWF	13	-	365	-	600	3.9	38	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	14	87356	683	-	3200	3.9	38	LR	Live Release/Great Condition	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	15	87357	647	-	2850	3.9	38	LR	Live Release	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	16	-	356	-	600	3.6	25	D	Dead	
10-Aug-11	14:00	11-Aug-11	15:04	BGW1	3	639066	7212705	638994	7212725	LT	17	-	280	-	250	3.6	25	D	Dead/Way Point 291 End	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	-	-	-	-	-	-	-	-	-	Start WPT 296, End WPT 297 Depths 8.4 - 10 - 2.1m	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	18	87358	665	-	3250	9.6	76	LR	Stomach Contents contained 300mm Lake Trout	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	RWF	19	-	405	-	880	5.1	76	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	20	-	251	-	200	4.3	51	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	RWF	21	-	336	-	500	4.3	51	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	ARCH	22	-	290	-	300	4.3	51	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	RWF	23	-	404	-	850	4.3	51	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	24	-	321	-	375	4.3	51	LR	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	25	87360	573	-	2150	4.3	51	LR	Photo 85, 86, 87	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	26	-	254	-	225	3.9	51	D	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	27	87361	760	-	4200	3.1	38	LR	-	
11-Aug-11	15:45	12-Aug-11	11:00	BGW1	3	639711	7212666	638991	7212709	LT	28	-	125	-	-	2.5	25	D	YOY, Photo 84	
					19.25															

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start		GPS - End		species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	-	-	-	-	-	-	-	-	-	Nets Set/Way Point 287/Depth 2.8 - 4.0m
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	1	-	290	-	350	2.8	51	D	Dead
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	2	90899	570	-	1950	2.9	51	LR	Live Release
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	3	90900	441	-	950	2.9	51	LR	Live Release
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	4	90898	509	-	1400	2.8	76	LR	Live Release
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	5	-	536	-	1750	3.9	76	D	Dead
10-Aug-11	16:00	11-Aug-11	14:42	BGWREF	4	639289	7210860	639387	7210958	LT	6	-	764	-	5000	2.3	126	D	Dead/M7/No Parasites/Stomach Empty/Photo #79
					23														
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	-	-	-	-	-	-	-	-	-	Start WPT 298, End WPT 299 Depths 3.7, 4.0, 2.5
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	LT	7	-	135	-	-	4.2	25	LR	YOY
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	LT	8	-	190	-	150	4	38	D	-
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	LT	9	87363	560	-	2050	3.7	51	LR	Photo 88, 89
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	ARCH	10	-	243	-	225	3.7	51	D	-
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	ARCH	11	-	253	-	250	3.7	51	D	-
11-Aug-11	14:45	12-Aug-11	11:55	BGWREF2	4	639298	7210860	639386	7210964	LT	12	87364	618	-	2350	2.5	125	LR	-
					22														
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	-	-	-	-	-	-	-	-	-	Start WPT 308, End WPT 309 Depths 3.3 - 7.4 - 5.3
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	1	87341	443	-	900	7.6	102	LR	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	2	86880	700	-	3900	7.6	102	D	PYRC (M8)
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	3	87370	426	-	750	8	102	LR	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	4	-	296	-	300	6.9	51	LR	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	5	-	180	<	100	6	38	LR	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	RWF	6	-	240	-	150	5.8	38	D	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	7	-	324	-	350	4.8	38	D	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	8	-	181	<	100	5.1	38	D	Red Colouring on Body and Fins
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	9	-	201	<	100	5.1	38	D	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	10	-	192	<	100	4.6	38	D	-
12-Aug-11	17:38	13-Aug-11	11:00	ED3	1	639364	7214282	639429	7214290	LT	11	-	182	<	100	1.8	25	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	LT	12	-	371	-	500	8.2	76	D	Start WPT 329
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	13	-	362	-	500	8.1	76	LR	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	14	-	251	-	150	7	51	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	LT	15	-	295	-	300	6.8	51	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	16	-	282	-	300	6.2	51	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	17	-	263	-	250	6.8	51	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	LT	18	-	217	-	150	6.1	51	LR	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	19	-	254	-	200	6.1	51	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	20	-	231	-	125	5	38	LR	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	21	-	201	<	100	4.9	38	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	LT	22	-	190	<	100	3.7	38	D	-
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	23	-	208	<	100	3.7	38	D	-

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start		GPS - End		species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes
13-Aug-11	11:30	14-Aug-11	10:30	ED3	1	639365	7214289	639435	7213417	RWF	24	-	243	<	100	3.7	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	1	87374	542	-	1500	4.8	76	LR	Start WPT 310, End WPT 311 Depths 2.5 - 6.0 - 4.9m
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	2	-	265	-	200	4.3	51	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	3	-	300	-	300	4.3	51	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	4	-	354	-	500	5.2	51	D	F1, Empty Stomach, Good Condition
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	ARCH	5	-	230	<	100	4.6	38	LR	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	6	87373	488	-	1250	4.9	38	LR	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	7	-	252	-	200	4.7	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	8	-	424	-	650	5.3	38	D	F1, Parasites on Stomach
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	9	-	152	<	100	5.3	38	LR	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	ARCH	10	-	282	-	250	5.3	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	11	-	245	-	200	5.1	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	LT	12	-	265	-	200	5.1	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	13	-	307	-	350	4.1	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	14	-	286	-	200	4.1	38	D	-
12-Aug-11	17:51	13-Aug-11	13:30	ED2	2	639377	7213916	639430	7213909	RWF	15	-	300	-	400	4.1	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	16	-	364	-	550	3.8	76	LR	Start WPT 330, End WPT 331
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	17	-	251	-	150	3.7	76	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	18	-	297	-	250	3.7	76	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	LT	19	-	231	-	100	5.1	76	LR	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	ARCH	20	-	340	-	350	5.1	38	LR	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	21	-	325	-	300	6.1	38	D	F1, Good Condition
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	22	-	255	<	100	6.1	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	23	-	252	<	100	6	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	24	-	260	-	150	6.2	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	25	-	270	-	250	6.3	38	D	M6, Good Condition
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	26	-	331	-	500	6.3	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	RWF	27	-	380	-	600	6.4	38	D	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	ARCH	28	-	329	-	400	6.4	25	LR	-
13-Aug-11	14:00	14-Aug-11	11:30	ED2	2	639385	7213933	639433	7213926	LT	29	-	235	-	250	4.8	25	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	LT	1	-	416	-	750	3.5	102	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	LT	2	-	496	-	1850	4.5	76	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	RWF	3	-	345	-	500	4.7	76	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	LT	4	-	627	-	2750	4.9	51	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	LT	5	-	248	-	200	4.9	51	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	LT	6	-	221	-	150	5.2	51	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	RWF	7	-	256	-	200	5.2	51	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859	639422	7213813	RWF	8	-	254	-	200	5.2	51	D	-

F1- Immature F2-ripe and spawning F3-waiting F4-spent F5- unknown; M6-Immature M7-ripe and spawning M8-waiting, M9- spent M10-unknown

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start	GPS - End	species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	9	87375	482	-	1100	5.2	51	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	10	-	682	-	3400	5.2	51	LR	Good Condition, LTF before we could tag
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	ARCH	11	-	458	-	1105	4.8	51	D	F2, Full Stomach, Good Condition
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	12	-	231	-	200	5	51	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	13	87379	416	-	750	4.4	38	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	14	-	226	-	150	4.4	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	15	-	173	<	100	4.4	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	16	-	246	-	150	4.4	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	RWF	17	-	214	<	100	4.4	38	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	RWF	18	-	212	<	100	4.4	38	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	RWF	19	-	195	<	100	4.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	ARCH	20	-	226	-	200	3.9	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	21	-	195	-	100	3.9	38	LR	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	ARCH	22	-	186	-	100	3.9	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	23	-	205	-	100	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	24	-	178	<	100	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	25	-	195	<	100	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	26	-	202	<	100	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	27	-	186	<	100	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	RWF	28	-	240	-	150	3.1	38	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	29	-	136	<	100	2.5	25	D	-
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	ARCH	30	-	312	-	425	2.5	25	D	M6, Good Condition, Stomach Full of Zooplankton
12-Aug-11	18:14	13-Aug-11	14:30	ED1	3	639375	7213859 639422 7213813	LT	31	87380	475	-	1000	2.5	25	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	32	-	350	-	600	8	102	D	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	33	87382	505	-	1450	6.5	76	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	34	87375	485	-	1150	5.9	51	LR	CYRC
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	35	-	394	-	750	5.3	51	D	Good Condition, Full Stomach of Benthos, Red Colouring on Body and Fin
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	36	-	256	-	250	5.3	51	D	F1, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	37	-	264	-	250	5.3	51	D	M6, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	38	-	221	-	150	5.3	51	D	F1, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	39	-	322	-	450	5.3	51	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	40	-	190	-	100	4.7	51	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	41	-	226	-	200	4	38	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	42	-	-	-	-	-	-	-	Lost in Transfer
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	43	-	240	-	150	3.9	38	D	F1, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	44	-	255	-	200	3.9	38	D	M6, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	LT	45	-	180	-	100	3.9	38	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	46	-	220	-	150	3.1	38	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	47	-	267	-	250	3.1	38	LR	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853 639418 7213799	RWF	48	-	225	-	150	3.1	38	D	M6, Good Condition

Appendix F- Raw data collected during HCF habitat monitoring

Start Date	Start Time	Finish Date	Finish Time	Lake ID	Net Set ID	GPS - Start		GPS - End	species	Fish #	Tag #	Fork Length (mm)	< / >	Weight (g)	Depth of catch (m)	Mesh Type	LR/D	Notes
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	49	-	179	-	100	3.1	38	D	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	50	-	321	-	450	3.1	38	D	M6, Good Condition, Full Stomach of Benthos
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	51	-	188	-	100	2.8	38	D	M6, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	52	-	188	<	100	2.8	38	D	M6, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	53	-	176	<	100	2.8	38	D	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	RWF	54	-	215	<	100	2.8	38	D	F1, Good Condition
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	55	-	168	<	100	2.1	25	D	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	56	-	118	<	100	2.1	25	D	-
13-Aug-11	15:30	14-Aug-11	12:30	ED1	3	639363	7213853	639418 7213799	LT	57	-	167	<	100	2.1	25	D	Photo #101
12-Aug-11	6:30	13-Aug-11	13:00	EDREF1	4	640444	7213368	640355 7213422	LT	1	-	137	<	100	1.8	25	D	Start WPT 318, End WPT 319 Depths 1.5 - 5.0 - 4.7m
12-Aug-11	6:30	13-Aug-11	13:00	EDREF1	4	640444	7213368	640355 7213422	LT	2	-	128	<	100	1.8	25	D	-
12-Aug-11	6:30	13-Aug-11	13:00	EDREF1	4	640444	7213368	640355 7213422	LT	3	87372	386	-	800	2.4	38	LR	Red Colouring on Body and Fins
12-Aug-11	6:30	13-Aug-11	13:00	EDREF1	4	640444	7213368	640355 7213422	LT	4	-	187	<	100	2.9	51	D	-
12-Aug-11	6:30	13-Aug-11	13:00	EDREF1	4	640444	7213368	640355 7213422	RWF	5	-	339		500	4	76	D	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	1	-	714		3950	3.8	76	D	F3, Good Condition, Full Stomach of Fish
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	RWF	2	-	394		750	3.8	76	D	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	3	-	271		250	3.9	51	LR	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	4	87383	519		1200	4.9	51	LR	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	RWF	5	-	296		400	4.9	51	D	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	6	87386	338		450	7.5	38	LR	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	7	-	292		250	7.5	38	LR	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	8	-	345		450	7.5	38	D	F1, Good Condition
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	9	-	110		-	6.7	38	D	-
13-Aug-11	12:45	14-Aug-11	16:00	EDREF2	4	640535	7213255	640559 7213206	LT	10	-	114		-	5.3	25	D	Photo #102