Appendix 14-B

2014 Fish Tissue Metals Memo

Memorandum

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Date: October 22, 2014

To: Frank Wheatley and Charlene Higgins, CEO and Vice President of Environment, Community & First Nations Relations, Yellowhead Mining Inc.

From: Robyn Pollock

Cc: Mark Branson, Anne Currie

Subject: **Harper Creek Field Monitoring Program – June 2014 Fish and Aquatic Tissue Metal Concentrations**

1. INTRODUCTION

The collection of tissue metal samples from aquatic food web components (e.g., periphyton, benthic invertebrates, and fish) is becoming increasingly required in British Columbia (BC) biomonitoring programs (BC MOE 2014), and is required for assessing fish health under the *Fisheries Act* (1985) Metal Mining Effluent Regulations (SOR/2002-222). This data provides important information on how metals are partitioned and accumulated through aquatic foods webs and aims to protect the consumers (e.g., wildlife and humans) that feed on lower trophic level organisms.

Under the conditions of their approved Additional Information Request (AIR; BC EAO 2011), Yellowhead Mining Inc. is required to collect relevant tissue metal samples to support their Environmental Assessment application for the proposed Harper Creek Project (the Project). Prior to 2014, fish tissue samples were collected from T Creek and P Creek in the mine site area, from lower Harper Creek downstream of the mine site area, and from Jones, Baker, and Lute creeks downstream of the Project site and confluent with the North Thompson River (BC EAO 2011; Knight Piésold 2014). No tissue samples were collected for periphyton or benthic invertebrates prior to 2014.

To fulfill the requirements of the AIR and to strengthen the overall tissue metal program, additional tissue samples were collected in 2014 for fish and benthic invertebrates in North Barrière Lake, lower Harper Creek, and at a stream and lake reference sites. These samples were collected concurrently with water and sediment quality sampling to facilitate direct comparisons and enable food-web bioaccumulation modelling. More broadly, this information will inform baseline conditions, allow the assessment of proposed Project activities related to food web metal dynamics, and provide baseline information to assess potential Project effects that will be required as part of the Aquatic Effects Monitoring Program (AEMP) and Selenium Management Program (SeMP).

The purpose of this memo is to present tissue metals and water and sediment quality baseline data collected in 2014 from the sites mentioned above. Full reporting of these data will follow in the future aquatics baseline report.

2. METHODS

2.1 Sampling Overview

Tissue metal samples were collected concurrently with water and sediment quality samples downstream of the mine site area in Harper Creek and North Barrière Lake, and in Dunn Creek and Dunn Lake (except fish tissues), which acted as reference sites (Figure 2-1; Table 2-1). Tissue metal samples were collected for fish and benthic invertebrates, with all benthic invertebrate sampling being conducted in June 2014. Fish tissue samples were collected from North Barrière Lake in June, and lower Harper Creek and Dunn Creek in late July. High stream flow prevented safe fish collection in these creeks in June and early July. Fish tissue samples were unable to be collected from Dunn Lake due to low catch rates despite intense angling and gillnetting effort. All sampling methodologies, results, and raw data from the June 2014 survey are provided within this memo. All information collected during the July and August 2014 surveys will be included in a subsequent baseline report. Exact sampling locations from the June survey are listed below in Table 2-1 and shown in Figure 2-1. Photos of sampling sites are shown in Plates 2-1 and 2-2.

Table 2-1. Location of Sampling Sites, June 2014

Site	Samples	Date	Zone	Easting	Northing	Notes
Harper Creek (H1)	BMI, WQ, SQ	24-Jun	11 U	298699	5698115	at active WQ station
Dunn Creek (D1)	BMI, WQ, SQ	26-Jun	10 U	699898	5699575	new reference site 100 m from discharge into Dunn Lake
North Barrière Lake	Fish tissues	June 16 to 19	11 U	299602	5689269	collected from the west end near the Harper Creek inlet
North Barrière Lake	BMI	25-Jun	11 U	Sampled from the margins of the north west end of the lake, see Figure 2-1		
North Barrière Lake	WQ, SQ rep 1	25-Jun	11 U	300556	5690422	historical sampling site
North Barrière Lake	SQ rep 2	25-Jun	11 U	299489	5689218	between NB SQ1 site and the Harper Creek Inflow; captured sediment chemistry in the area near lake margins where benthic invertebrates were collected
North Barrière Lake	SQ rep 3	25-Jun	11 U	300210	5689668	

Note: BMI = benthic invertebrate tissues, WQ = water quality, SQ=sediment quality

2.2 Fish Tissues

Fish collection and lethal sampling for this project was authorized under BC Fish Collection Permit No. KA14-148480. Rainbow Trout (*Oncorhynchus mykiss*) were the target species in North Barrière Lake, and were captured by angling from June 16 to 19, 2014 (Figure 2-1). These fish were sorted by size and fish of similar length (and therefore assumed age) and were selected for lethal sampling. Fish not selected for lethal sampling were released alive. Overall, eight Rainbow Trout were collected from North Barrière Lake. These fish were euthanized by a sharp blow to the head with the gills severed prior to sampling for tissues. The lethally sampled fish were given a unique sample number and detailed biological data were collected, including length (mm), wet weight (g), age, gonad wet weight (g), liver wet weight (g), sex, maturity, and general physical observations (e.g., colour, scars, deformities, erosions, lesions, and tumours).

Figure 2-1

Tissue Metals Program Sampling Sites, 2014

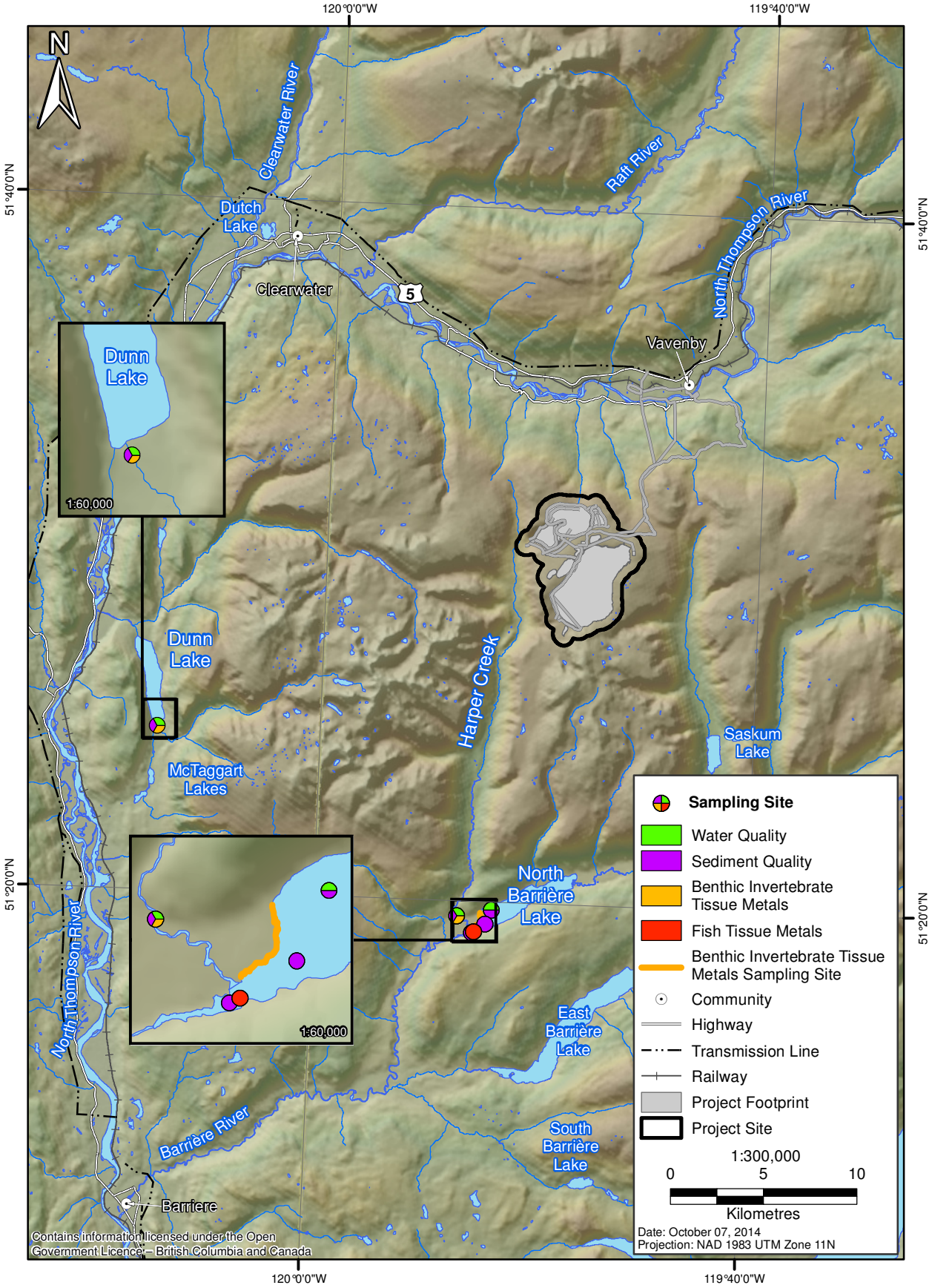

Plate 2-1. Harper Creek (looking upstream) and Dunn Creek (looking downstream) during sampling, June 2014.

Length was measured to the nearest 1 mm with a measuring board. Wet weight was collected with an Ohaus Scout Pro 3,000 g scale (to the nearest 1 g). Observations were recorded on the appearance of each fish; noting the presence of deformities, erosions, lesions, and tumours (DELTs). Calcified structures, including otoliths and fin rays, were collected for age determination. Otoliths were collected using a fillet knife, scissors or pliers, and forceps. Two to three rays of the left pelvic fin were also collected with scissors or pliers. Aging structures were placed in envelopes labelled with the site, date, species, and sample number. Preparation and aging of structures was performed by North/South Consultants Inc., Winnipeg, MB.

Individual muscle and liver tissue samples from the Rainbow Trout were collected by dissection. To obtain the tissue samples, the fish were filleted and a 3 to 8 g section of epaxial muscle was retained as the muscle tissue sample. The fish were then dissected and the liver was extracted for use as the liver tissue sample. Each individual muscle and liver sample was washed and placed in a separate, uniquely numbered and labelled Whirl-pak bag. Samples were temporarily held in an ice-filled cooler while in the field. After each field day, all samples were stored frozen in a -20^{o}C freezer. Frozen tissue samples were then shipped to ALS Environmental Services (ALS) in

Burnaby, BC for metals analyses. The holding times for the frozen samples were well under the acceptable standard of 180 days used by ALS.

Plate 2-2. North Barrière Lake, looking southwest towards Harper Creek.

Tissue samples were analyzed for metal concentrations by ALS according to procedures adapted from the United States Environmental Protection Agency (US EPA 1995). Samples were divided into two parts: one part for measurement of metal concentrations (on a wet weight basis) and a second part for measurement of percent moisture to facilitate conversion to mg/kg dry weight.

Each sample was homogenized either mechanically or manually prior to digestion at ALS. Each homogenized sample was digested using hotplate digestion methods, which involved the use of nitric acid followed by repeated additions of hydrogen peroxide. Total concentrations of 34 metals were measured by Inductively Coupled Plasma – Mass Spectroscopy (or ICPMS). The 34 metals and their analytical detection limits are shown in Table 2-2.

Table 2-2. Metals and Detection Limits for Tissue Analysis, June 2014

Parameter	Unit	Fish Tissues	Benthic Invertebrate Tissues
Aluminum (Al)	mg/kg ww	1	1
Antimony (Sb)	mg/kg ww	0.002	0.002
Arsenic (As)	mg/kg ww	0.006	0.006
Barium (Ba)	mg/kg ww	0.01	0.01
Beryllium (Be)	mg/kg ww	0.002	0.002

(continued)

Table 2-2. Metals and Detection Limits for Tissue Analysis, June 2014 (completed)

Parameter	Unit	Fish Tissues	Benthic Invertebrate Tissues
Bismuth (Bi)	mg/kg ww	0.002	0.002
Boron (B)	mg/kg ww	0.2	0.2
Cadmium (Cd)	mg/kg ww	0.002	0.002
Calcium (Ca)	mg/kg ww	4	4
Cesium (Cs)	mg/kg ww	0.001	0.001
Chromium (Cr)	mg/kg ww	0.04	0.04
Cobalt (Co)	mg/kg ww	0.004	0.004
Copper (Cu)	mg/kg ww	0.04	0.04
Iron (Fe)	mg/kg ww	1	1
Lead (Pb)	mg/kg ww	0.01	0.01
Lithium (Li)	mg/kg ww	0.1	0.1
Magnesium (Mg)	mg/kg ww	0.4	0.4
Manganese (Mn)	mg/kg ww	0.01	0.01
Mercury (Hg)	mg/kg ww	0.013	0.001 - 0.002
Molybdenum (Mo)	mg/kg ww	0.008	0.008
Nickel (Ni)	mg/kg ww	0.04	0.04
Phosphorus (P)	mg/kg ww	2	2
Potassium (K)	mg/kg ww	4	4
Rubidium (Rb)	mg/kg ww	0.01	0.01
Selenium (Se)	mg/kg ww	0.02	0.02
Sodium (Na)	mg/kg ww	4	4
Strontium (Sr)	mg/kg ww	0.02	0.02
Tellurium (Te)	mg/kg ww	0.004	0.004
Thallium (Tl)	mg/kg ww	0.0004	0.0004
Tin (Sn)	mg/kg ww	0.02	0.02
Uranium (U)	mg/kg ww	0.0004	0.0004
Vanadium (V)	mg/kg ww	0.02	0.02
Zinc (Zn)	mg/kg ww	0.2	0.2
Zirconium (Zr)	mg/kg ww	0.04	0.04

Note: mg/kg ww = milligrams per kilogram of wet weight.

2.3 Benthic Invertebrate Tissues

At Harper Creek and Dunn Creek, a 400 µm kick net was used to collect the benthic invertebrate samples until the sample replicate was greater than 0.3 g. Eight replicates were collected at Harper Creek and seven replicates at Dunn Creek (due to biomass, time, and logistical constraints). At North Barrière Lake, benthic invertebrates were collected from the littoral zone in the west end of the lake, near the Harper Creek inflow, by agitating submerged vegetation and lake sediments with a 400 µm kick net until 0.3 g of benthic invertebrates were collected.

Eight replicates were collected from the North Barrière Lake site. Samples were placed in pre-labelled Whirl-Pack bags, sealed (no air bubbles), and frozen.

Tissue samples were analyzed for metals concentrations by ALS as outlined above for fish tissues. The 34 metals and their analytical detection limits are shown in Table 2-2.

2.4 Water Quality

Sampling procedures and data analyses followed the principles and procedures outlined in the *British Columbia Field Sampling Manual* (Clark 2003). Stream samples were collected by wading into mid-channel (when safe) and facing upstream to avoid potential contamination from sediment disturbance. Samples were collected by submerging bottles approximately 10 cm beneath the surface water to avoid collecting debris travelling on the surface. Water quality samples were collected from North Barrière Lake at 1 m and 25 m depth by boat using an acid-washed 5 L Teflon-lined GO-FLO sampling bottle. The GO-FLO was lowered on a metred line to a depth 0.5 m below the desired sampling depth and then raised to the sampling depth and closed using a weighted messenger. The collected water was used to fill the sample containers.

All water quality samples were collected at each sampling site using laboratory-certified, clean bottle sets. The scientist wore powder-free, nitrile gloves during sample handling. Samples were preserved with the recommended preservatives and were kept refrigerated before being sent to ALS in Burnaby, BC for analysis.

Water quality samples were analyzed for physicochemical parameters (pH, hardness, turbidity), major anions, nutrients, cyanides (total and weak acid dissociable), total organic carbon (TOC), and total and dissolved metals at the lowest feasible method detection limit. Some parameters could not be measured reliably below a specified detection limit and were reported by the analytical laboratory as less than that detection limit.

Chain of custody forms were used for all water quality samples as part of the quality assurance and quality control (QA/QC) program. Equipment, travel, and field blanks were included as part of the field QA/QC program.

2.5 Sediment Quality

Three replicate sediment quality samples were collected from both Harper Creek and Dunn Creek, concurrent with water quality and benthic invertebrate tissue samples, with the replicates being collected from distinct areas of each stream. For each replicate, sediment was spooned from the top 3 to 5 cm in depositional zones (areas of slow moving water). The subsamples were pooled until sufficient sample was obtained for a complete replicate suitable for metals analysis. Excess water was drained and the sample was manually homogenized and then placed in pre-labelled Whirl-Pack bags. Samples were then sealed (no air bubbles) and kept cool in the dark until analyzed by ALS.

Three replicate sediment samples were collected from North Barrière Lake using an Ekman grab sampler (surface area = 0.023 m^2). Samples were collected along a transect at the west end of the lake near the Harper Creek inflow; exact locations are listed in Table 2-1. Each replicate consisted

of two Ekman grabs pooled together to form a composite sample. The top 2 to 3 cm of each grab were spooned off the surface of the sample into a clean bowl, homogenized, and placed into a pre-labelled Whirl-Pak bag as described above for shipment to ALS.

Whole sediment samples in streams and lakes were analyzed for pH, particle size, nutrients, and TOC at the lowest possible detection limit. Metal analyses were conducted on the < 63 µm fraction of the sample because this fraction is more bioavailable to benthic organisms and tends to contain greater concentrations of metals than the coarse sediment fraction (BC MOE 2012).

Chain of custody forms were used for all sediment quality samples as part of the quality assurance and quality control (QA/QC) program. A field split was collected at Dunn Creek, where one replicate was homogenized then split into two samples for lab analysis.

3. RESULTS AND CONCLUSIONS

3.1 Fish Tissues

Rainbow Trout were selected as the sentinel species to examine changes in baseline tissue metals concentrations for North Barrière Lake. Appendix A-1 presents Rainbow Trout biological data and Appendix A-2 presents the concentrations of 34 metals measured in Rainbow Trout muscle and liver tissue samples collected from North Barrière Lake. Table 3-1 presents a summary of Rainbow Trout biological data sampled for tissue metals from North Barrière Lake. Table 3-2 presents summary statistics for 34 metals analyzed in the North Barrière Lake Rainbow Trout. Fish tissue analytical results for the lower Harper Creek and Dunn Creek samples collected in July were not available at the time of this memorandum. These results will be included in a subsequent baseline report.

3.2 Benthic Invertebrate Tissues

Benthic invertebrates sampled in Harper and Dunn Creeks tended to be dominated by stoneflies (Plecoptera) and mayflies (Ephemeroptera; Plate 3-1), while North Barrière Lake yielded a wide variety of invertebrates including damselflies, mayflies, snails and flatworms. Results for benthic invertebrate tissue analysis are presented in Appendices B and C. Table 3-3 summarizes the data collected at the three sites.

3.3 Water Quality

Water quality results are presented in Appendices D and E.

3.4 Sediment Quality

Sediment quality results are presented in Appendices F and G.

Table 3-1. Length, Weight and Condition Summary Statistics for Rainbow Trout collected from North Barrière Lake, June 2014

Water Body	Species	n	Mean Length (mm)	Min	Max	SE	Mean Weight (g)	Min	Max	SE	Mean Condition	Min	Max	SE	Mean Age (years)	Min	Max	SE
North Barrière Lake	RB	8	296[F]	265	364	13	276	196	475	34.5	1.04	0.96	1.16	0.02	2.9	2.0	4.0	0.3

Notes: Fish species codes: RB = Rainbow Trout; F = Fork length (mm); SE = standard error of the mean.

Table 3-2. Summary of Mean Tissue Metal Concentrations in Rainbow Trout collected from North Barrière Lake, June 2014

Parameter	Detection Limit	Unit	Muscle					Liver				
			n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Moisture	0.1	%	8	76.7	76.3	77.1	0.1	8	75.0	73.3	77.6	0.5
Aluminum (Al)	1	mg/kg ww	8	below DL				8	0.988	<1.0	1.70	0.16
Antimony (Sb)	0.002	mg/kg ww	8	below DL				8	below DL			
Arsenic (As)	0.006	mg/kg ww	8	0.0387	0.0194	0.133	0.014	8	0.0906	0.0492	0.209	0.0193
Barium (Ba)	0.01	mg/kg ww	8	0.020	<0.01	0.038	0.004	8	below DL			
Beryllium (Be)	0.002	mg/kg ww	8	below DL				8	below DL			
Bismuth (Bi)	0.002	mg/kg ww	8	below DL				8	below DL			
Boron (B)	0.2	mg/kg ww	8	below DL				8	below DL			
Cadmium (Cd)	0.002	mg/kg ww	8	below DL				8	0.0967	0.0750	0.129	0.0072
Calcium (Ca)	4	mg/kg ww	8	309	67.2	612	183	8	64.2	56.8	72.4	2.25
Cesium (Cs)	0.001	mg/kg ww	8	0.035	0.021	0.057	0.005	8	0.0148	0.0082	0.0266	0.0027
Chromium (Cr)	0.04	mg/kg ww	8	below DL				8	below DL			
Cobalt (Co)	0.004	mg/kg ww	8	below DL				8	0.0159	0.0142	0.0189	0.0005
Copper (Cu)	0.04	mg/kg ww	8	0.236	0.205	0.288	0.010	8	42.4	7.65	58.4	5.79
Iron (Fe)	1	mg/kg ww	8	3.23	2.30	4.60	0.25	8	279	217	384	18.5
Lead (Pb)	0.01	mg/kg ww	8	0.009	<0.01	0.032	0.01	8	0.0133	<0.01	0.0330	0.0038

(continued)

Table 3-2. Summary of Mean Tissue Metal Concentrations in Rainbow Trout collected from North Barrière Lake, June 2014 (completed)

			Muscle					Liver				
Parameter	Detection Limit	Unit	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Lithium (Li)	0.1	mg/kg ww	8	below DL				8	below DL			
Magnesium (Mg)	0.4	mg/kg ww	8	288	278	300	3.0	8	177	149	194	6.27
Manganese (Mn)	0.01	mg/kg ww	8	0.118	0.063	0.167	0.014	8	1.17	0.91	1.41	0.07
Mercury (Hg)	0.013	mg/kg ww	8	0.203	0.129	0.331	0.026	8	0.214	0.130	0.393	0.030
Molybdenum (Mo)	0.008	mg/kg ww	8	below DL				8	0.273	0.217	0.380	0.019
Nickel (Ni)	0.04	mg/kg ww	8	below DL				8	below DL			
Phosphorus (P)	2	mg/kg ww	8	2,674	2,490	2,960	53.2	8	3,436	3,080	3,680	76.9
Potassium (K)	4	mg/kg ww	8	4,653	4,500	4,890	44.8	8	3,314	2,910	3,880	123
Rubidium (Rb)	0.01	mg/kg ww	8	4.41	2.90	7.19	0.59	8	4.46	2.46	10.8	1.00
Selenium (Se)	0.02	mg/kg ww	8	0.250	0.204	0.320	0.013	8	7.11	4.71	9.62	0.68
Sodium (Na)	4	mg/kg ww	8	254	211	315	16.1	8	1,222	878	1,590	96.5
Strontium (Sr)	0.02	mg/kg ww	8	0.250	0.026	0.481	0.058	8	0.0698	0.0590	0.0810	0.0022
Tellurium (Te)	0.004	mg/kg ww	8	below DL				8	below DL			
Thallium (Tl)	0.0004	mg/kg ww	8	0.00639	0.00371	0.0161	0.00144	8	0.0372	0.0188	0.0987	0.0092
Tin (Sn)	0.02	mg/kg ww	8	below DL				8	below DL			
Uranium (U)	0.0004	mg/kg ww	8	0.00064	0.00020	0.00144	0.00015	8	0.00804	0.00476	0.0201	0.0018
Vanadium (V)	0.02	mg/kg ww	8	below DL				8	0.0158	<0.02	0.0330	0.0031
Zinc (Zn)	0.2	mg/kg ww	8	3.29	2.96	3.83	0.09	8	23.4	20.0	26.8	0.77
Zirconium (Zr)	0.04	mg/kg ww	8	below DL				8	below DL			

Notes: mg/kg ww = milligrams per kilogram of wet weight; SE = standard error of the mean; Summary statistics were calculated using half the detection limit value if a particular replicate was below analytical detection levels; thus, derived mean values could be less than the actual analytical detection limit.

Table 3-3. Summary of Mean Tissue Metal Concentrations in Benthic Invertebrates, June 2014

Parameter	Detection Limit	Unit	Harper Creek					North Barrière Lake					Dunn Creek				
			n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Moisture	0.1	%	8	77.9	72.7	82.1	1.3	8	68.7	53.4	85.1	3.3	7	82.7	74.8	86.3	1.7
Aluminum (Al)	1	mg/kg ww	8	144	15.0	448	51	8	90.6	8.5	276	29.3	7	248	161	328	25.1
Antimony (Sb)	0.002	mg/kg ww	8	0.00264	<0.002	0.0062	0.0007	8	0.00264	0.001	0.0046	0.0004	7	0.0043	0.0024	0.0069	0.0005
Arsenic (As)	0.006	mg/kg ww	8	0.242	0.047	0.952	0.104	8	0.439	0.067	0.816	0.103	7	0.189	0.097	0.284	0.022
Barium (Ba)	0.01	mg/kg ww	8	3.38	0.80	12.7	1.43	8	11.1	0.5	18.1	1.9	7	3.30	1.59	6.14	0.61
Beryllium (Be)	0.002	mg/kg ww	8	0.0241	<0.002	0.127	0.015	8	0.0095	<0.002	0.0205	0.0022	7	0.0251	0.0090	0.0390	0.0044
Bismuth (Bi)	0.002	mg/kg ww	8	0.0035	<0.002	0.0087	0.0008	8	0.0075	0.0030	0.0117	0.0010	7	0.0025	<0.002	0.0037	0.0004
Boron (B)	0.2	mg/kg ww	8	0.121	<0.2	0.270	0.021	8	below DL				7	0.126	<0.2	0.280	0.026
Cadmium (Cd)	0.002	mg/kg ww	8	0.414	0.180	0.666	0.068	8	0.095	0.034	0.206	0.022	7	0.401	0.110	0.744	0.080
Calcium (Ca)	4	mg/kg ww	8	542	196	1,010	85.6	8	94,436	87.6	209,000	21,880	7	327	236	511	35.2
Cesium (Cs)	0.001	mg/kg ww	8	0.0489	0.0058	0.1540	0.0165	8	0.0223	0.0073	0.0619	0.0063	7	0.219	0.057	0.357	0.040
Chromium (Cr)	0.04	mg/kg ww	8	0.410	0.042	0.960	0.096	8	0.499	0.102	1.06	0.107	7	1.39	0.63	2.19	0.24
Cobalt (Co)	0.004	mg/kg ww	8	0.233	0.034	0.809	0.090	8	0.177	0.068	0.385	0.039	7	0.355	0.222	0.436	0.031
Copper (Cu)	0.04	mg/kg ww	8	5.45	2.52	7.05	0.57	8	7.97	0.98	34.7	4.18	7	4.44	3.14	6.00	0.42
Iron (Fe)	1	mg/kg ww	8	364	23.1	1,850	216	8	525	200	847	73.8	7	369	204	527	48.0
Lead (Pb)	0.01	mg/kg ww	8	0.292	0.082	0.902	0.096	8	0.150	0.042	0.368	0.039	7	0.071	0.031	0.120	0.012
Lithium (Li)	0.1	mg/kg ww	8	0.228	<0.1	0.980	0.112	8	0.178	<0.1	0.550	0.060	7	0.240	0.110	0.440	0.047
Magnesium (Mg)	0.4	mg/kg ww	8	335	181	544	40.0	8	205	71.9	399	38.4	7	284	201	348	21.3
Manganese (Mn)	0.01	mg/kg ww	8	43.9	9.0	215	24.8	8	50.0	7.8	168	18.9	7	21.0	12.4	31.3	2.4
Mercury (Hg)	0.001 - 0.002	mg/kg ww	8	0.00923	0.0045	0.0135	0.0011	8	0.0147	0.0037	0.0331	0.0034	7	0.0105	0.0077	0.0150	0.0009
Molybdenum (Mo)	0.008	mg/kg ww	8	0.445	0.196	0.948	0.096	8	0.171	0.036	0.285	0.030	7	0.512	0.400	0.684	0.037
Nickel (Ni)	0.04	mg/kg ww	8	0.277	0.02	0.768	0.079	8	0.278	0.109	0.43	0.0428	7	0.998	0.336	1.62	0.160
Phosphorus (P)	2	mg/kg ww	8	1,500	757	2,740	224	8	758	485	1,040	71.4	7	997	644	1,530	121
Potassium (K)	4	mg/kg ww	8	1,260	647	2,080	152	8	667	374	1,090	91	7	987	462	2,100	220
Rubidium (Rb)	0.01	mg/kg ww	8	1.97	0.32	4.89	0.49	8	1.31	0.85	1.95	0.14	7	4.60	1.49	7.45	0.84

(continued)

Table 3-3. Summary of Mean Tissue Metal Concentrations in Benthic Invertebrates, June 2014 (completed)

Parameter	Detection Limit	Unit	Harper Creek					North Barrière Lake					Dunn Creek				
			n	Mean	Min	Max	SE	n	Mean	Min	Max	SE	n	Mean	Min	Max	SE
Selenium (Se)	0.02	mg/kg ww	8	0.268	0.174	0.357	0.023	8	0.137	0.087	0.208	0.016	7	0.483	0.226	0.787	0.067
Sodium (Na)	4	mg/kg ww	8	969	466	1,780	147	8	924	612	1,420	92.9	7	562	245	1,370	144
Strontium (Sr)	0.02	mg/kg ww	8	2.21	0.86	4.22	0.35	8	130	0.27	308	32.8	7	0.90	0.41	1.81	0.17
Tellurium (Te)	0.004	mg/kg ww	8	below DL				8	below DL				7	below DL			
Thallium (Tl)	0.0004	mg/kg ww	8	0.00672	0.00111	0.0306	0.00349	8	0.00854	0.00301	0.0211	0.00213	7	0.00527	0.00370	0.00731	0.00053
Tin (Sn)	0.02	mg/kg ww	8	0.0123	<0.02	0.0280	0.0023	8	below DL				7	below DL			
Uranium (U)	0.0004	mg/kg ww	8	1.08	0.19	3.04	0.37	8	2.21	0.078	5.24	0.63	7	0.64	0.26	0.96	0.10
Vanadium (V)	0.02	mg/kg ww	8	0.374	0.023	1.50	0.173	8	0.516	0.029	1.01	0.128	7	0.889	0.444	1.41	0.155
Zinc (Zn)	0.2	mg/kg ww	8	36.6	26.6	54.4	3.32	8	7.55	3.19	13.2	1.27	7	25.4	12.8	44.4	4.52
Zirconium (Zr)	0.04	mg/kg ww	8	0.0418	<0.04	0.1250	0.0132	8	0.0396	<0.04	0.0680	0.0076	7	0.0940	<0.04	0.1320	0.0163

Notes: mg/kg ww = milligrams per kilogram of wet weight; SE = standard error of the mean; Summary statistics were calculated using half the detection limit value if a particular replicate was below analytical detection levels; thus, derived mean values could be less than the actual analytical detection limit.

Plate 3-1. Benthic tissue metal samples at Harper and Dunn creeks were dominated by stoneflies and mayflies. Harper Creek, June 24, 2014.

3.5 Future Analysis

Historical data, concentrations of mercury and selenium, and other metals of interest will be further analyzed and discussed within future detailed baseline reports. Fish tissue analytical results for the lower Harper Creek and Dunn Creek samples collected in July were not available at the time of this memorandum. These results will be included in a subsequent baseline report.

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REFERENCES

1985. *Fisheries Act*, RSC. C. F-14.

Metal Mining Effluent Regulations, SOR/2002-222.

BC EAO. 2011. *Harper Creek Copper-Gold-Silver Project: Application Information Requirements for Yellowhead Mining Inc.'s Application for an Environmental Assessment Certificate.* Prepared by the British Columbia Environmental Assessment Office: Victoria, BC.

BC MOE. 2012. Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators. Ministry of Environment. Province of British Columbia.

Clark, M.J.R. (editor). 2003. British Columbia Field Sampling Manual. Water, Air and Climate Change Branch, Ministry of Water, Land and Air Protection, Victoria, BC, Canada. 312 pp.

Knight Piésold. 2014. Harper Creek Project: Fish and aquatic habitat baseline. Prepared for Harper Creek Mining Corporation, Vancouver, BC.

US EPA. 1995. *Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment and Tissue Samples*. Seattle, WA, United States Environmental Protection Agency and Puget Sound Water Quality Authority.

APPENDIX LIST

Appendix A-1. Rainbow Trout Biological Data, 2014

Appendix A-2. Rainbow Trout Muscle and Liver Metals Concentrations, Analytical Results, 2014

Appendix B. Benthic Invertebrate Metals Data, Analytical Results, 2014

Appendix C. Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

Appendix D. Water Quality Data, Analytical Results, 2014

Appendix E. Water Quality Detection Limits, Analytical Results, 2014

Appendix F. Sediment Quality Data, Analytical Results, 2014

Appendix G. Sediment Quality Detection Limits, Analytical Results, 2014

— Appendix A-1 —

Rainbow Trout Biological Data, 2014

Appendix A-1. Rainbow Trout Biological Data, 2014

Waterbody Name	Sample ID	Sample No.	Method	Species Code	Length (mm)	Weight (g)	Condition (g/mm^3)	Sex	Maturity	Liver Weight (g)
North Barriere Lake	NBL1	1	AN	RB	307	279.0	0.96	F	I	2.00
North Barriere Lake	NBL2	2	AN	RB	265	198.0	1.06	F	I	1.70
North Barriere Lake	NBL3	3	AN	RB	268	198.0	1.03	F	I	1.90
North Barriere Lake	NBL4	4	AN	RB	267	196.0	1.03	F	I	1.60
North Barriere Lake	NBL5	5	AN	RB	265	215.0	1.16	M	I	2.00
North Barriere Lake	NBL6	6	AN	RB	321	326.0	0.99	F	I	3.60
North Barriere Lake	NBL7	7	AN	RB	310	323.0	1.08	F	I	3.20
North Barriere Lake	NBL8	8	AN	RB	364	475.0	0.98	M	I	4.20

							Aging Structures			
Waterbody Name	Sample ID	Sample No.	H.S.I	Gonad Weight (g)	G.S.I.	Muscle Weight (g)	Pelvic Fin Rays	Otoliths	Age	Comment
North Barriere Lake	NBL1	1	0.007	–	–	7.30	Y	Y	3	–
North Barriere Lake	NBL2	2	0.009	–	–	11.70	Y	Y	2	–
North Barriere Lake	NBL3	3	0.010	–	–	8.30	Y	Y	2	–
North Barriere Lake	NBL4	4	0.008	–	–	8.80	Y	Y	3	–
North Barriere Lake	NBL5	5	0.009	–	–	9.00	Y	Y	2	–
North Barriere Lake	NBL6	6	0.011	–	–	13.10	Y	Y	4	–
North Barriere Lake	NBL7	7	0.010	–	–	7.30	Y	Y	4	–
North Barriere Lake	NBL8	8	0.009	0.50	0.001	9.30	Y	Y	3	–

Notes:

Methods: AN = angling, EF = backpack electrofisher

Sex and Maturity Codes: F = female, M = male, U = unkonwn, I = immature

H.S.I. = hepatosomatic index, G.S.I. = gonadosomatic index

Fish Species Codes: BT = Bull Trout, RB = Rainbow Trout, SC = Sculpin spp.

Y = collected

Dashes (–) = no data

— Appendix A-2 —

Rainbow Trout Muscle and Liver Metals Concentrations, Analytical Results, 2014

Appendix A-2. North Barriere Lake Rainbow Trout Muscle and Liver Metals Concentrations, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID	Unit	Realized Detection Limit	NBL FISH 1-LIVER	NBL FISH 1-MUSCLE	NBL FISH 2-LIVER	NBL FISH 2-MUSCLE	NBL FISH 3-LIVER	NBL FISH 3-MUSCLE	NBL FISH 4-LIVER	NBL FISH 4-MUSCLE	NBL FISH 5-LIVER	NBL FISH 5-MUSCLE	NBL FISH 6-LIVER	NBL FISH 6-MUSCLE	NBL FISH 7-LIVER	NBL FISH 7-MUSCLE	NBL FISH 8-LIVER	NBL FISH 8-MUSCLE
Date Sampled			15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	17-Jun-14	17-Jun-14	19-Jun-14	19-Jun-14
Time Sampled			16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00
ALS Sample ID			L1480351-1	L1480351-2	L1480351-3	L1480351-4	L1480351-5	L1480351-6	L1480351-7	L1480351-8	L1480351-9	L1480351-10	L1480351-11	L1480351-12	L1480351-13	L1480351-14	L1480351-15	L1480351-16
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests																		
% Moisture	%	0.1	73.6	76.6	76.1	76.4	74.1	76.3	74.8	77.0	73.8	76.8	76.3	77.1	77.6	76.8	73.3	76.3
Metals																		
Aluminum (Al)-Total	mg/kg	5	6.5	<5.0	<5.0	<5.0	<5.0	<5.0	5.8	<5.0	<5.0	<5.0	<5.0	<5.0	5.2	<5.0	<5.0	<5.0
Aluminum (Al)-Total	mg/kg wwt	1	1.7	<1.0	<1.0	<1.0	1.1	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	1.0	<1.0
Antimony (Sb)-Total	mg/kg	0.01	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Antimony (Sb)-Total	mg/kg wwt	0.002	<0.0020	<0.0020	0.0040	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Arsenic (As)-Total	mg/kg	0.03	0.233	0.109	0.299	0.114	0.519	0.113	0.831	0.084	0.303	0.124	0.208	0.100	0.248	0.114	0.243	0.562
Arsenic (As)-Total	mg/kg wwt	0.006	0.0615	0.0254	0.0715	0.0268	0.134	0.0267	0.209	0.0194	0.0795	0.0288	0.0492	0.0230	0.0555	0.0265	0.0647	0.133
Barium (Ba)-Total	mg/kg	0.05	0.104	0.164	<0.050	0.075	<0.050	0.109	<0.050	0.130	<0.050	<0.050	<0.050	0.094	<0.050	<0.050	<0.050	0.068
Barium (Ba)-Total	mg/kg wwt	0.01	0.027	0.038	<0.010	0.018	<0.010	0.026	<0.010	0.030	<0.010	<0.010	<0.010	0.022	<0.010	<0.010	<0.010	0.016
Beryllium (Be)-Total	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium (Be)-Total	mg/kg wwt	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Bismuth (Bi)-Total	mg/kg	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Bismuth (Bi)-Total	mg/kg wwt	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Boron (B)-Total	mg/kg	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron (B)-Total	mg/kg wwt	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)-Total	mg/kg	0.01	0.353	<0.010	0.317	<0.010	0.290	<0.010	0.501	<0.010	0.347	<0.010	0.401	<0.010	0.575	<0.010	0.332	<0.010
Cadmium (Cd)-Total	mg/kg wwt	0.002	0.0932	<0.0020	0.0758	<0.0020	0.0750	<0.0020	0.126	<0.0020	0.0910	<0.0020	0.0949	<0.0020	0.129	<0.0020	0.0885	<0.0020
Calcium (Ca)-Total	mg/kg	20	222	2620	237	1030	273	1380	248	1630	224	344	302	2020	278	290	271	1270
Calcium (Ca)-Total	mg/kg wwt	4	58.7	612	56.8	244	70.6	327	62.4	375	58.7	79.8	71.5	462	62.1	67.2	72.4	301
Cesium (Cs)-Total	mg/kg	0.005	0.0719	0.198	0.0389	0.106	0.0330	0.0937	0.0444	0.134	0.0311	0.0886	0.106	0.218	0.0463	0.133	0.0997	0.239
Cesium (Cs)-Total	mg/kg wwt	0.001	0.0190	0.0463	0.0093	0.0249	0.0085	0.0222	0.0112	0.0308	0.0082	0.0206	0.0252	0.0499	0.0104	0.0307	0.0266	0.0567
Chromium (Cr)-Total	mg/kg	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.34	<0.20	<0.20	0.52	<0.20	<0.20	<0.20	<0.20	<0.20
Chromium (Cr)-Total	mg/kg wwt	0.04	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.309	<0.040	<0.040	0.123	<0.040	<0.040	<0.040	<0.040	<0.040
Cobalt (Co)-Total	mg/kg	0.02	0.054	<0.020	0.070	<0.020	0.061	<0.020	0.058	<0.020	0.060	<0.020	0.069	<0.020	0.065	<0.020	0.071	<0.020
Cobalt (Co)-Total	mg/kg wwt	0.004	0.0142	<0.0040	0.0167	<0.0040	0.0157	<0.0040	0.0147	<0.0040	0.0158	<0.0040	0.0165	<0.0040	0.0146	<0.0040	0.0189	<0.0040
Copper (Cu)-Total	mg/kg	0.2	198	1.05	171	0.98	217	0.89	197	0.89	156	1.15	143	0.99	261	1.24	28.6	0.91
Copper (Cu)-Total	mg/kg wwt	0.04	52.2	0.246	40.9	0.231	56.1	0.210	49.6	0.205	40.7	0.267	33.9	0.227	58.4	0.288	7.65	0.216
Iron (Fe)-Total	mg/kg	5	892	13.3	906	14.3	1030	11.8	1280	20.1	1020	11.9	1120	9.9	1210	15.9	1440	12.9
Iron (Fe)-Total	mg/kg wwt	1	235	3.1	217	3.4	265	2.8	322	4.6	268	2.8	266	2.3	271	3.7	384	3.1
Lead (Pb)-Total	mg/kg	0.05	0.123	<0.050	<0.050	<0.050	0.075	<0.050	0.092	<0.050	<0.050	0.136	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead (Pb)-Total	mg/kg wwt	0.01	0.033	<0.010	0.011	<0.010	0.019	0.012	0.023	<0.010	<0.010	0.032	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lithium (Li)-Total	mg/kg	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Lithium (Li)-Total	mg/kg wwt	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Magnesium (Mg)-Total	mg/kg	2	734	1270	761	1270	662	1250	751	1240	739	1210	643	1220	667	1200	677	1220
Magnesium (Mg)-Total	mg/kg wwt	0.4	194	296	182	300	171	297	189	285	194	282	152	279	149	278	181	289
Manganese (Mn)-Total	mg/kg	0.05	5.09	0.713	5.09	0.535	4.08	0.630	5.19	0.650	5.37	0.271	3.82	0.461	4.27	0.288	4.25	0.485
Manganese (Mn)-Total	mg/kg wwt	0.01	1.34	0.167	1.22	0.126	1.06	0.150	1.31	0.150	1.41	0.063	0.906	0.105	0.956	0.067	1.13	0.115
Mercury (Hg)-Total	mg/kg	0.05	1.49	1.19	0.541	0.578	0.598	0.620	0.804	0.558	0.564	0.690	1.12	1.08	0.821	0.852	0.880	1.40
Mercury (Hg)-Total	mg/kg wwt	0.013	0.393	0.279	0.130	0.136	0.155	0.147	0.202	0.129	0.148	0.160	0.265	0.246	0.184	0.197	0.235	0.331
Molybdenum (Mo)-Total	mg/kg	0.04	1.44	<0.040	0.942	<0.040	0.965	<0.040	0.949	<0.040	0.829	<0.040	1.10	<0.040	1.40	<0.040	1.13	<0.040
Molybdenum (Mo)-Total	mg/kg wwt	0.008	0.380	<0.0080	0.226	<0.0080	0.250	<0.0080	0.239	<0.0080	0.217	<0.0080	0.260	<0.0080	0.313	<0.0080	0.302	<0.0080
Nickel (Ni)-Total	mg/kg	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nickel (Ni)-Total	mg/kg wwt	0.04	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Phosphorus (P)-Total	mg/kg	10	13900	12700	14700	11000	13400	11400	13800	11200	14000	11000	13300	12100	13800	10700	13100	11600
Phosphorus (P)-Total	mg/kg wwt	2	3670	2960	3510	2590	3460	2700	3460	2580	3680	2560	3150	2770	3080	2490	3480	2740

Appendix A-2. North Barriere Lake Rainbow Trout Muscle and Liver Metals Concentrations, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID	Unit	Realized Detection Limit	NBL FISH 1-LIVER	NBL FISH 1-MUSCLE	NBL FISH 2-LIVER	NBL FISH 2-MUSCLE	NBL FISH 3-LIVER	NBL FISH 3-MUSCLE	NBL FISH 4-LIVER	NBL FISH 4-MUSCLE	NBL FISH 5-LIVER	NBL FISH 5-MUSCLE	NBL FISH 6-LIVER	NBL FISH 6-MUSCLE	NBL FISH 7-LIVER	NBL FISH 7-MUSCLE	NBL FISH 8-LIVER	NBL FISH 8-MUSCLE
Date Sampled			15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	16-Jun-14	17-Jun-14	17-Jun-14	19-Jun-14	19-Jun-14
Time Sampled			16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00	16:00
ALS Sample ID			L1480351-1	L1480351-2	L1480351-3	L1480351-4	L1480351-5	L1480351-6	L1480351-7	L1480351-8	L1480351-9	L1480351-10	L1480351-11	L1480351-12	L1480351-13	L1480351-14	L1480351-15	L1480351-16
Matrix			Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Metals *(cont'd)*																		
Potassium (K)-Total	mg/kg	20	14700	20400	13100	20800	11800	19700	12900	19600	13800	19900	12300	20400	13600	19400	13600	19400
Potassium (K)-Total	mg/kg wwt	4	3880	4760	3130	4890	3050	4680	3260	4530	3620	4610	2910	4660	3040	4500	3620	4590
Rubidium (Rb)-Total	mg/kg	0.05	21.5	22.7	12.1	14.4	9.49	12.9	11.6	14.6	9.98	12.5	21.5	28.2	14.3	15.8	40.6	30.3
Rubidium (Rb)-Total	mg/kg wwt	0.01	5.68	5.30	2.89	3.38	2.46	3.06	2.93	3.37	2.61	2.90	5.08	6.44	3.19	3.66	10.8	7.19
Selenium (Se)-Total	mg/kg	0.1	36.4	1.18	20.7	0.86	32.2	0.98	20.3	0.97	28.9	1.05	32.4	1.07	39.9	1.11	17.6	1.35
Selenium (Se)-Total	mg/kg wwt	0.02	9.62	0.275	4.96	0.204	8.34	0.232	5.10	0.224	7.57	0.243	7.66	0.244	8.93	0.258	4.71	0.320
Sodium (Na)-Total	mg/kg	20	3330	1300	5470	1040	5030	900	4070	1000	4520	1310	6650	928	7130	1360	3450	888
Sodium (Na)-Total	mg/kg wwt	4	878	304	1310	246	1300	213	1020	230	1190	303	1570	212	1590	315	920	211
Strontium (Sr)-Total	mg/kg	0.1	0.22	2.06	0.30	0.80	0.31	1.14	0.27	1.76	0.27	0.18	0.30	1.55	0.30	0.11	0.26	0.96
Strontium (Sr)-Total	mg/kg wwt	0.02	0.059	0.481	0.073	0.190	0.081	0.270	0.067	0.405	0.070	0.042	0.071	0.354	0.068	0.026	0.069	0.228
Tellurium (Te)-Total	mg/kg	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.054	<0.020
Tellurium (Te)-Total	mg/kg wwt	0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	0.0145	<0.0040
Thallium (Tl)-Total	mg/kg	0.002	0.150	0.0292	0.119	0.0168	0.0855	0.0184	0.0914	0.0211	0.103	0.0160	0.168	0.0278	0.0842	0.0212	0.370	0.0679
Thallium (Tl)-Total	mg/kg wwt	0.0004	0.0395	0.00683	0.0286	0.00396	0.0221	0.00435	0.0230	0.00486	0.0271	0.00371	0.0399	0.00635	0.0188	0.00492	0.0987	0.0161
Tin (Sn)-Total	mg/kg	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin (Sn)-Total	mg/kg wwt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Uranium (U)-Total	mg/kg	0.002	0.0247	0.0046	0.0327	<0.0020	0.0271	0.0025	0.0241	0.0025	0.0198	<0.0020	0.0201	0.0026	0.0306	<0.0020	0.0752	0.0061
Uranium (U)-Total	mg/kg wwt	0.0004	0.00652	0.00107	0.00782	0.00041	0.00702	0.00060	0.00606	0.00058	0.00520	<0.00040	0.00476	0.00060	0.00684	<0.00040	0.0201	0.00144
Vanadium (V)-Total	mg/kg	0.1	<0.10	<0.10	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Vanadium (V)-Total	mg/kg wwt	0.02	<0.020	<0.020	<0.020	<0.020	0.033	<0.020	0.022	<0.020	0.021	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Zinc (Zn)-Total	mg/kg	1	102	16.4	83.5	13.9	86.6	13.8	96.1	13.6	88.9	12.7	96.1	13.7	98.7	14.2	97.2	14.6
Zinc (Zn)-Total	mg/kg wwt	0.2	26.8	3.83	20.0	3.28	22.4	3.28	24.2	3.13	23.3	2.96	22.8	3.13	22.1	3.28	25.9	3.46
Zirconium (Zr)-Total	mg/kg	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Zirconium (Zr)-Total	mg/kg wwt	0.04	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040

— Appendix B —

Benthic Invertebrate Metals Data, Analytical Results, 2014

Appendix B. Benthic Invertebrate Metals Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	HC1 REP 4	HC1 REP 5	HC1 REP 6	HC1 REP 7	HC1 REP 8	NB REP 1	NB REP 2	NB REP 3	NB REP 4	NB REP 5	NB REP 6	NB REP 7	NB REP 8
Site			Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-1	L1477751-2	L1477751-3	L1477751-4	L1477751-5	L1477751-6	L1477751-7	L1477751-8	L1477751-9	L1477751-10	L1477751-11	L1477751-12	L1477751-13	L1477751-14	L1477751-15	L1477751-16
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests																		
% Moisture	%	0.1	81.6	79.6	82.1	79.3	72.7	73.5	75.7	78.4	85.1	73.8	65.0	67.8	53.4	73.5	62.7	68.4
Metals																		
Aluminum (Al)-Total	mg/kg	5	1150	73.6	896	305	65.5	693	1840	256	57.1	472	74.1	856	144	302	159	269
Aluminum (Al)-Total	mg/kg wwt	1	211	15.0	160	63.2	17.9	184	448	55.5	8.5	123	25.9	276	67.3	79.9	59.3	84.9
Antimony (Sb)-Total	mg/kg	0.01	0.027	<0.010	<0.010	0.011	<0.010	0.014	0.025	<0.010	<0.010	0.015	0.013	<0.010	<0.010	<0.010	<0.010	<0.010
Antimony (Sb)-Total	mg/kg wwt	0.002	0.0049	<0.0020	<0.0020	0.0022	<0.0020	0.0038	0.0062	<0.0020	<0.0020	0.0040	0.0046	0.0027	0.0022	0.0026	<0.0020	0.0029
Arsenic (As)-Total	mg/kg	0.03	1.37	0.232	0.842	0.609	0.340	0.664	3.92	0.636	0.447	2.73	0.512	2.53	0.458	2.92	0.980	1.22
Arsenic (As)-Total	mg/kg wwt	0.006	0.252	0.0473	0.151	0.126	0.0929	0.176	0.952	0.138	0.0668	0.714	0.179	0.816	0.213	0.772	0.366	0.386
Barium (Ba)-Total	mg/kg	0.05	29.5	3.94	6.31	11.6	4.63	9.06	52.4	4.20	3.45	60.4	23.5	56.1	26.8	39.2	28.1	40.3
Barium (Ba)-Total	mg/kg wwt	0.01	5.42	0.803	1.13	2.41	1.26	2.40	12.7	0.909	0.515	15.8	8.23	18.1	12.5	10.4	10.5	12.7
Beryllium (Be)-Total	mg/kg	0.01	0.138	<0.010	0.046	0.029	<0.010	0.074	0.523	0.020	<0.010	0.058	<0.010	0.064	0.020	0.034	0.020	0.035
Beryllium (Be)-Total	mg/kg wwt	0.002	0.0253	<0.0020	0.0083	0.0060	<0.0020	0.0197	0.127	0.0043	<0.0020	0.0151	0.0028	0.0205	0.0093	0.0091	0.0076	0.0109
Bismuth (Bi)-Total	mg/kg	0.01	0.021	<0.010	0.012	0.011	<0.010	0.013	0.036	0.019	0.020	0.026	0.028	0.026	0.017	0.044	0.020	0.015
Bismuth (Bi)-Total	mg/kg wwt	0.002	0.0039	<0.0020	0.0021	0.0023	0.0026	0.0034	0.0087	0.0042	0.0030	0.0069	0.0098	0.0083	0.0079	0.0117	0.0076	0.0046
Boron (B)-Total	mg/kg	1	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron (B)-Total	mg/kg wwt	0.2	0.27	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)-Total	mg/kg	0.01	3.46	2.70	2.30	0.876	0.978	1.60	2.75	0.832	0.516	0.674	0.216	0.637	0.090	0.253	0.092	0.256
Cadmium (Cd)-Total	mg/kg wwt	0.002	0.636	0.550	0.411	0.181	0.267	0.423	0.666	0.180	0.0770	0.176	0.0757	0.206	0.0419	0.0669	0.0343	0.0808
Calcium (Ca)-Total	mg/kg	20	2880	2510	1090	2040	3690	1450	2480	3120	587	800000	295000	230000	307000	216000	262000	226000
Calcium (Ca)-Total	mg/kg wwt	4	530	512	196	422	1010	384	602	676	87.6	209000	103000	74000	143000	57200	97900	71300
Cesium (Cs)-Total	mg/kg	0.005	0.364	0.0286	0.182	0.160	0.0650	0.208	0.634	0.122	0.0489	0.121	0.0235	0.192	0.0303	0.0760	0.0322	0.0721
Cesium (Cs)-Total	mg/kg wwt	0.001	0.0669	0.0058	0.0325	0.0331	0.0177	0.0551	0.154	0.0264	0.0073	0.0316	0.0082	0.0619	0.0141	0.0201	0.0120	0.0228
Chromium (Cr)-Total	mg/kg	0.2	2.37	0.21	1.49	2.63	0.79	1.68	3.95	1.73	7.08	2.31	0.29	2.05	0.79	1.54	0.51	1.87
Chromium (Cr)-Total	mg/kg wwt	0.04	0.435	0.042	0.266	0.545	0.214	0.444	0.960	0.375	1.06	0.604	0.102	0.661	0.370	0.409	0.190	0.592
Cobalt (Co)-Total	mg/kg	0.02	1.69	0.165	0.863	0.548	0.180	1.05	3.33	0.516	1.75	0.905	0.327	1.20	0.168	0.422	0.182	0.501
Cobalt (Co)-Total	mg/kg wwt	0.004	0.311	0.0336	0.154	0.113	0.0491	0.279	0.809	0.112	0.261	0.237	0.114	0.385	0.0781	0.112	0.0678	0.158
Copper (Cu)-Total	mg/kg	0.2	35.4	12.4	21.7	32.6	22.3	17.1	25.6	32.6	19.0	5.81	15.4	107	2.11	58.7	2.65	5.95
Copper (Cu)-Total	mg/kg wwt	0.04	6.52	2.52	3.87	6.76	6.08	4.54	6.23	7.05	2.84	1.52	5.38	34.7	0.982	15.5	0.990	1.88
Iron (Fe)-Total	mg/kg	5	1850	113	1530	529	177	729	7640	351	1340	3240	1020	2010	1160	1400	1850	1730
Iron (Fe)-Total	mg/kg wwt	1	341	23.1	274	110	48.4	193	1850	76.0	200	847	357	648	541	370	690	548
Lead (Pb)-Total	mg/kg	0.05	2.40	0.400	0.755	0.881	0.710	1.10	3.71	0.474	0.279	1.41	0.218	0.800	0.252	0.430	0.157	0.534
Lead (Pb)-Total	mg/kg wwt	0.01	0.442	0.082	0.135	0.182	0.194	0.293	0.902	0.103	0.042	0.368	0.076	0.258	0.117	0.114	0.059	0.169
Lithium (Li)-Total	mg/kg	0.5	1.43	<0.50	0.91	<0.50	<0.50	0.85	4.05	<0.50	<0.50	1.10	<0.50	1.71	<0.50	0.59	<0.50	<0.50
Lithium (Li)-Total	mg/kg wwt	0.1	0.26	<0.10	0.16	<0.10	<0.10	0.22	0.98	<0.10	<0.10	0.29	<0.10	0.55	0.14	0.16	<0.10	0.13
Magnesium (Mg)-Total	mg/kg	2	1660	1440	1550	1560	1990	683	1230	2110	692	1530	206	610	296	878	512	983
Magnesium (Mg)-Total	mg/kg wwt	0.4	305	293	278	323	544	181	298	456	103	399	71.9	197	138	233	191	311
Manganese (Mn)-Total	mg/kg	0.05	233	113	50.2	67.5	55.0	83.4	885	45.3	52.3	641	59.2	270	48.6	92.6	72.8	133
Manganese (Mn)-Total	mg/kg wwt	0.01	42.9	23.0	8.98	14.0	15.0	22.1	215	9.82	7.80	168	20.7	87.1	22.6	24.5	27.2	42.1
Mercury (Hg)-Total	mg/kg	0.01 - 0.02	0.036	0.066	0.050	0.048	0.0489	0.017	0.031	0.044	0.025	0.0505	0.0462	0.103	0.0200	0.0933	0.0230	0.0284
Mercury (Hg)-Total	mg/kg wwt	0.001 - 0.002	0.0066	0.0135	0.0090	0.0099	0.0133	0.0045	0.0075	0.0095	0.0037	0.0132	0.0161	0.0331	0.0093	0.0247	0.0086	0.0090
Molybdenum (Mo)-Total	mg/kg	0.04	2.05	2.21	1.48	0.948	2.81	0.913	3.90	1.46	0.241	0.791	0.537	0.862	0.275	0.463	0.328	0.901
Molybdenum (Mo)-Total	mg/kg wwt	0.008	0.376	0.450	0.265	0.196	0.767	0.242	0.948	0.317	0.0360	0.207	0.188	0.278	0.128	0.123	0.123	0.285
Nickel (Ni)-Total	mg/kg	0.2	1.80	<0.20	1.02	1.36	0.42	1.11	3.16	1.02	2.87	1.34	0.31	1.33	0.44	0.96	0.40	0.94
Nickel (Ni)-Total	mg/kg wwt	0.04	0.331	<0.040	0.182	0.282	0.114	0.294	0.768	0.221	0.428	0.350	0.109	0.430	0.204	0.254	0.149	0.296
Phosphorus (P)-Total	mg/kg	10	7580	7800	7260	8270	10100	2860	3140	8110	3770	3230	1830	2480	1040	3930	1820	3190
Phosphorus (P)-Total	mg/kg wwt	2	1390	1590	1300	1710	2740	757	762	1750	562	845	640	800	485	1040	680	1010

Note: Values below detection limit were replaced by 0.5 x the detection limit for summary statistics

Appendix B. Benthic Invertebrate Metals Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	HC1 REP 4	HC1 REP 5	HC1 REP 6	HC1 REP 7	HC1 REP 8	NB REP 1	NB REP 2	NB REP 3	NB REP 4	NB REP 5	NB REP 6	NB REP 7	NB REP 8
Site			Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-1	L1477751-2	L1477751-3	L1477751-4	L1477751-5	L1477751-6	L1477751-7	L1477751-8	L1477751-9	L1477751-10	L1477751-11	L1477751-12	L1477751-13	L1477751-14	L1477751-15	L1477751-16
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Metals *(cont'd)*																		
Potassium (K)-Total	mg/kg	20	7160	6970	6070	6690	7640	2440	3520	5910	6610	2390	1330	1940	803	2750	1170	3460
Potassium (K)-Total	mg/kg wwt	4	1320	1420	1090	1390	2080	647	856	1280	986	625	465	627	374	728	439	1090
Rubidium (Rb)-Total	mg/kg	0.05	15.5	1.55	8.83	7.84	4.21	6.87	20.1	7.09	5.99	6.04	3.13	6.06	1.81	6.35	2.79	4.47
Rubidium (Rb)-Total	mg/kg wwt	0.01	2.85	0.315	1.58	1.62	1.15	1.82	4.89	1.53	0.893	1.58	1.09	1.95	0.845	1.68	1.04	1.41
Selenium (Se)-Total	mg/kg	0.1	1.94	0.86	1.29	1.34	1.03	0.72	1.40	1.35	0.72	0.55	0.27	0.57	0.24	0.79	0.23	0.51
Selenium (Se)-Total	mg/kg wwt	0.02	0.357	0.174	0.231	0.277	0.282	0.192	0.339	0.291	0.108	0.143	0.094	0.183	0.114	0.208	0.087	0.162
Sodium (Na)-Total	mg/kg	20	4720	8720	6060	4010	4790	2870	1920	3020	5830	5430	1750	3240	2170	3850	2070	2020
Sodium (Na)-Total	mg/kg wwt	4	868	1780	1080	831	1310	761	466	653	870	1420	612	1050	1010	1020	775	637
Strontium (Sr)-Total	mg/kg	0.1	14.4	9.29	4.82	8.40	9.78	7.00	17.4	8.27	1.78	1180	428	297	435	275	312	291
Strontium (Sr)-Total	mg/kg wwt	0.02	2.64	1.89	0.863	1.74	2.67	1.85	4.22	1.79	0.265	308	149	95.7	203	72.9	117	92.0
Tellurium (Te)-Total	mg/kg	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Tellurium (Te)-Total	mg/kg wwt	0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Thallium (Tl)-Total	mg/kg	0.002	0.0417	0.0116	0.0144	0.0119	0.0041	0.0193	0.126	0.0087	0.0385	0.0378	0.0198	0.0653	0.0088	0.0483	0.0081	0.0150
Thallium (Tl)-Total	mg/kg wwt	0.0004	0.00767	0.00237	0.00258	0.00246	0.00111	0.00512	0.0306	0.00188	0.00574	0.00989	0.00693	0.0211	0.00408	0.0128	0.00301	0.00475
Tin (Sn)-Total	mg/kg	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tin (Sn)-Total	mg/kg wwt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.028	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Uranium (U)-Total	mg/kg	0.002	11.5	0.943	3.21	2.63	0.905	5.43	12.5	2.08	0.521	15.8	1.24	16.2	4.42	7.55	3.06	8.26
Uranium (U)-Total	mg/kg wwt	0.0004	2.12	0.192	0.574	0.544	0.247	1.44	3.04	0.450	0.0777	4.14	0.434	5.24	2.06	2.00	1.14	2.61
Vanadium (V)-Total	mg/kg	0.1	2.83	0.11	2.28	0.68	0.12	0.98	6.18	0.49	0.19	3.86	0.29	3.02	1.45	1.43	1.46	1.31
Vanadium (V)-Total	mg/kg wwt	0.02	0.521	0.023	0.407	0.141	0.033	0.260	1.50	0.107	0.029	1.01	0.100	0.974	0.675	0.377	0.547	0.415
Zinc (Zn)-Total	mg/kg	1	296	130	166	216	148	111	140	155	80.3	20.2	23.5	22.0	6.8	29.2	9.9	41.6
Zinc (Zn)-Total	mg/kg wwt	0.2	54.4	26.6	29.7	44.8	40.5	29.4	33.9	33.5	12.0	5.29	8.20	7.09	3.19	7.73	3.70	13.2
Zirconium (Zr)-Total	mg/kg	0.2	0.33	<0.20	<0.20	<0.20	<0.20	<0.20	0.51	<0.20	<0.20	<0.20	<0.20	0.21	<0.20	<0.20	<0.20	<0.20
Zirconium (Zr)-Total	mg/kg wwt	0.04	0.061	<0.040	<0.040	<0.040	<0.040	0.048	0.125	<0.040	<0.040	<0.040	<0.040	0.068	0.054	<0.040	0.062	0.053

Note: Values below detection limit were replaced by 0.5 x the detection limit for summary statistics

Appendix B. Benthic Invertebrate Metals Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			DC1 REP 1	DC1 REP 2	DC1 REP 3	DC1 REP 4	DC1 REP 5	DC1 REP 6	DC1 REP 7
Site			Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek
Date Sampled			26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-17	L1477751-18	L1477751-19	L1477751-20	L1477751-21	L1477751-22	L1477751-23
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests									
% Moisture	%	0.1	85.2	86.1	84.3	84.0	78.0	74.8	86.3
Metals									
Aluminum (Al)-Total	mg/kg	5	1090	2090	1230	1920	848	1070	2380
Aluminum (Al)-Total	mg/kg wwt	1	161	290	194	308	187	269	328
Antimony (Sb)-Total	mg/kg	0.01	0.034	0.026	0.044	0.022	0.011	0.017	0.030
Antimony (Sb)-Total	mg/kg wwt	0.002	0.0051	0.0036	0.0069	0.0036	0.0024	0.0044	0.0041
Arsenic (As)-Total	mg/kg	0.03	0.939	0.698	1.81	1.36	0.923	0.789	1.34
Arsenic (As)-Total	mg/kg wwt	0.006	0.139	0.0967	0.284	0.218	0.203	0.199	0.185
Barium (Ba)-Total	mg/kg	0.05	10.8	44.3	21.2	14.2	11.7	19.2	17.0
Barium (Ba)-Total	mg/kg wwt	0.01	1.59	6.14	3.33	2.28	2.58	4.83	2.34
Beryllium (Be)-Total	mg/kg	0.01	0.060	0.199	0.215	0.071	0.177	0.136	0.152
Beryllium (Be)-Total	mg/kg wwt	0.002	0.0090	0.0276	0.0339	0.0113	0.0390	0.0342	0.0209
Bismuth (Bi)-Total	mg/kg	0.01	<0.010	0.026	0.020	0.014	<0.010	0.014	0.020
Bismuth (Bi)-Total	mg/kg wwt	0.002	<0.0020	0.0037	0.0032	0.0022	<0.0020	0.0035	0.0028
Boron (B)-Total	mg/kg	1	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0
Boron (B)-Total	mg/kg wwt	0.2	<0.20	<0.20	0.28	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd)-Total	mg/kg	0.01	2.19	2.10	0.697	2.14	3.38	2.40	2.85
Cadmium (Cd)-Total	mg/kg wwt	0.002	0.325	0.290	0.110	0.342	0.744	0.605	0.391
Calcium (Ca)-Total	mg/kg	20	1590	1830	3250	2010	1240	1450	2380
Calcium (Ca)-Total	mg/kg wwt	4	236	253	511	322	272	365	327
Cesium (Cs)-Total	mg/kg	0.005	1.22	0.909	0.360	1.59	1.62	1.01	2.23
Cesium (Cs)-Total	mg/kg wwt	0.001	0.181	0.126	0.0566	0.254	0.357	0.254	0.307
Chromium (Cr)-Total	mg/kg	0.2	4.26	12.6	4.88	12.9	4.21	5.57	15.9
Chromium (Cr)-Total	mg/kg wwt	0.04	0.631	1.74	0.768	2.07	0.926	1.40	2.19
Cobalt (Co)-Total	mg/kg	0.02	1.50	2.28	1.84	2.72	1.78	1.58	3.17
Cobalt (Co)-Total	mg/kg wwt	0.004	0.222	0.315	0.289	0.436	0.391	0.398	0.436
Copper (Cu)-Total	mg/kg	0.2	24.7	29.5	19.9	25.2	27.3	23.5	30.6
Copper (Cu)-Total	mg/kg wwt	0.04	3.66	4.09	3.14	4.04	6.00	5.93	4.20
Iron (Fe)-Total	mg/kg	5	1810	2660	1300	3290	1230	1690	3750
Iron (Fe)-Total	mg/kg wwt	1	269	369	204	527	271	426	516
Lead (Pb)-Total	mg/kg	0.05	0.206	0.561	0.669	0.342	0.183	0.478	0.500
Lead (Pb)-Total	mg/kg wwt	0.01	0.031	0.078	0.105	0.055	0.040	0.120	0.069
Lithium (Li)-Total	mg/kg	0.5	0.73	2.11	0.77	1.78	0.58	1.73	2.17
Lithium (Li)-Total	mg/kg wwt	0.1	0.11	0.29	0.12	0.29	0.13	0.44	0.30
Magnesium (Mg)-Total	mg/kg	2	1360	1820	1490	2080	1320	1380	2400
Magnesium (Mg)-Total	mg/kg wwt	0.4	201	253	234	333	290	348	330
Manganese (Mn)-Total	mg/kg	0.05	140	176	155	77.5	84.0	124	110
Manganese (Mn)-Total	mg/kg wwt	0.01	20.7	24.4	24.3	12.4	18.5	31.3	15.1
Mercury (Hg)-Total	mg/kg	0.01 - 0.02	0.052	0.063	0.077	0.057	0.048	0.060	0.075
Mercury (Hg)-Total	mg/kg wwt	0.001 - 0.002	0.0077	0.0087	0.0122	0.0092	0.0105	0.0150	0.0103
Molybdenum (Mo)-Total	mg/kg	0.04	2.70	3.16	4.34	2.80	2.61	1.94	4.00
Molybdenum (Mo)-Total	mg/kg wwt	0.008	0.400	0.438	0.684	0.448	0.575	0.490	0.550
Nickel (Ni)-Total	mg/kg	0.2	2.27	11.7	6.46	7.08	3.05	3.44	9.65
Nickel (Ni)-Total	mg/kg wwt	0.04	0.336	1.62	1.02	1.14	0.671	0.867	1.33
Phosphorus (P)-Total	mg/kg	10	5800	4650	5750	5400	6190	6060	5920
Phosphorus (P)-Total	mg/kg wwt	2	859	644	905	865	1360	1530	814

Note: Values below detection limit were replaced by 0.5 x the detection limit for summary statistics

Appendix B. Benthic Invertebrate Metals Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			DC1 REP 1	DC1 REP 2	DC1 REP 3	DC1 REP 4	DC1 REP 5	DC1 REP 6	DC1 REP 7
Site			Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek
Date Sampled			26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-17	L1477751-18	L1477751-19	L1477751-20	L1477751-21	L1477751-22	L1477751-23
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Metals *(cont'd)*									
Potassium (K)-Total	mg/kg	20	3290	3340	13400	4400	5200	5160	5180
Potassium (K)-Total	mg/kg wwt	4	488	462	2100	704	1140	1300	713
Rubidium (Rb)-Total	mg/kg	0.05	25.8	15.1	9.50	35.7	33.9	20.9	46.3
Rubidium (Rb)-Total	mg/kg wwt	0.01	3.82	2.09	1.49	5.72	7.45	5.26	6.36
Selenium (Se)-Total	mg/kg	0.1	3.06	2.51	1.43	3.11	2.70	3.12	3.46
Selenium (Se)-Total	mg/kg wwt	0.02	0.454	0.347	0.226	0.499	0.595	0.787	0.476
Sodium (Na)-Total	mg/kg	20	2100	1770	8680	2540	2780	2410	2790
Sodium (Na)-Total	mg/kg wwt	4	312	245	1370	407	612	606	383
Strontium (Sr)-Total	mg/kg	0.1	2.73	6.71	11.5	4.00	2.92	4.25	6.08
Strontium (Sr)-Total	mg/kg wwt	0.02	0.405	0.929	1.81	0.641	0.642	1.07	0.836
Tellurium (Te)-Total	mg/kg	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Tellurium (Te)-Total	mg/kg wwt	0.004	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Thallium (Tl)-Total	mg/kg	0.002	0.0264	0.0324	0.0465	0.0231	0.0262	0.0270	0.0359
Thallium (Tl)-Total	mg/kg wwt	0.0004	0.00391	0.00448	0.00731	0.00370	0.00576	0.00679	0.00494
Tin (Sn)-Total	mg/kg	0.1	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10
Tin (Sn)-Total	mg/kg wwt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Uranium (U)-Total	mg/kg	0.002	1.76	4.44	6.09	2.18	3.62	3.49	4.32
Uranium (U)-Total	mg/kg wwt	0.0004	0.261	0.615	0.959	0.349	0.797	0.879	0.594
Vanadium (V)-Total	mg/kg	0.1	2.99	6.94	3.47	8.68	2.22	3.91	10.3
Vanadium (V)-Total	mg/kg wwt	0.02	0.444	0.961	0.545	1.39	0.488	0.985	1.41
Zinc (Zn)-Total	mg/kg	1	119	182	81.2	107	178	176	154
Zinc (Zn)-Total	mg/kg wwt	0.2	17.6	25.2	12.8	17.2	39.2	44.4	21.1
Zirconium (Zr)-Total	mg/kg	0.2	0.25	0.77	0.68	0.82	0.52	<0.20	0.96
Zirconium (Zr)-Total	mg/kg wwt	0.04	<0.040	0.106	0.107	0.131	0.114	0.048	0.132

Note: Values below detection limit were replaced by 0.5 x the detection limit for summary statistics

– Appendix C –

Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

Appendix C. Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	HC1 REP 4	HC1 REP 5	HC1 REP 6	HC1 REP 7	HC1 REP 8	NB REP 1	NB REP 2	NB REP 3	NB REP 4	NB REP 5	NB REP 6	NB REP 7	NB REP 8
Site			Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-1	L1477751-2	L1477751-3	L1477751-4	L1477751-5	L1477751-6	L1477751-7	L1477751-8	L1477751-9	L1477751-10	L1477751-11	L1477751-12	L1477751-13	L1477751-14	L1477751-15	L1477751-16
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests																		
% Moisture	%	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Metals																		
Aluminum (Al)-Total	mg/kg	5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Aluminum (Al)-Total	mg/kg wwt	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Antimony (Sb)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Antimony (Sb)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Arsenic (As)-Total	mg/kg	0.03	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Arsenic (As)-Total	mg/kg wwt	0.006	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Barium (Ba)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Barium (Ba)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Beryllium (Be)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Beryllium (Be)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Bismuth (Bi)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Bismuth (Bi)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Boron (B)-Total	mg/kg	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Boron (B)-Total	mg/kg wwt	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Cadmium (Cd)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Cadmium (Cd)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Calcium (Ca)-Total	mg/kg	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Calcium (Ca)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Cesium (Cs)-Total	mg/kg	0.005	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Cesium (Cs)-Total	mg/kg wwt	0.001	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Chromium (Cr)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Chromium (Cr)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Cobalt (Co)-Total	mg/kg	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Cobalt (Co)-Total	mg/kg wwt	0.004	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
Copper (Cu)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Copper (Cu)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Iron (Fe)-Total	mg/kg	5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Iron (Fe)-Total	mg/kg wwt	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead (Pb)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Lead (Pb)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Lithium (Li)-Total	mg/kg	0.5	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Lithium (Li)-Total	mg/kg wwt	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Magnesium (Mg)-Total	mg/kg	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Magnesium (Mg)-Total	mg/kg wwt	0.4	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Manganese (Mn)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Manganese (Mn)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Mercury (Hg)-Total	mg/kg	0.01 - 0.02	0.010	0.010	0.010	0.010	0.0050	0.010	0.010	0.010	0.015	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Mercury (Hg)-Total	mg/kg wwt	0.001 - 0.002	0.0020	0.0020	0.0020	0.0020	0.0010	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Molybdenum (Mo)-Total	mg/kg	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Molybdenum (Mo)-Total	mg/kg wwt	0.008	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080
Nickel (Ni)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Nickel (Ni)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040

Appendix C. Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	HC1 REP 4	HC1 REP 5	HC1 REP 6	HC1 REP 7	HC1 REP 8	NB REP 1	NB REP 2	NB REP 3	NB REP 4	NB REP 5	NB REP 6	NB REP 7	NB REP 8
Site			Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake	North Barriere Lake
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477751-1	L1477751-2	L1477751-3	L1477751-4	L1477751-5	L1477751-6	L1477751-7	L1477751-8	L1477751-9	L1477751-10	L1477751-11	L1477751-12	L1477751-13	L1477751-14	L1477751-15	L1477751-16
Matrix	Unit	Limit	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Metals *(cont'd)*																		
Phosphorus (P)-Total	mg/kg	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Phosphorus (P)-Total	mg/kg wwt	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Potassium (K)-Total	mg/kg	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Potassium (K)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Rubidium (Rb)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Rubidium (Rb)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Selenium (Se)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Selenium (Se)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Sodium (Na)-Total	mg/kg	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Sodium (Na)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Strontium (Sr)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Strontium (Sr)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Tellurium (Te)-Total	mg/kg	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Tellurium (Te)-Total	mg/kg wwt	0.004	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
Thallium (Tl)-Total	mg/kg	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Thallium (Tl)-Total	mg/kg wwt	0.0004	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040
Tin (Sn)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Tin (Sn)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Uranium (U)-Total	mg/kg	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Uranium (U)-Total	mg/kg wwt	0.0004	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040
Vanadium (V)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vanadium (V)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Zinc (Zn)-Total	mg/kg	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)-Total	mg/kg wwt	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Zirconium (Zr)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Zirconium (Zr)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040

Appendix C. Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			DC1 REP 1	DC1 REP 2	DC1 REP 3	DC1 REP 4	DC1 REP 5	DC1 REP 6	DC1 REP 7
Site			**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**
Date Sampled			26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		**Realized**	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		**Detection**	L1477751-17	L1477751-18	L1477751-19	L1477751-20	L1477751-21	L1477751-22	L1477751-23
Matrix	**Unit**	**Limit**	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Physical Tests									
% Moisture	%	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Metals									
Aluminum (Al)-Total	mg/kg	5	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Aluminum (Al)-Total	mg/kg wwt	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Antimony (Sb)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Antimony (Sb)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Arsenic (As)-Total	mg/kg	0.03	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Arsenic (As)-Total	mg/kg wwt	0.006	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Barium (Ba)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Barium (Ba)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Beryllium (Be)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Beryllium (Be)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Bismuth (Bi)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Bismuth (Bi)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Boron (B)-Total	mg/kg	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Boron (B)-Total	mg/kg wwt	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Cadmium (Cd)-Total	mg/kg	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Cadmium (Cd)-Total	mg/kg wwt	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Calcium (Ca)-Total	mg/kg	20	20	20	20	20	20	20	20
Calcium (Ca)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Cesium (Cs)-Total	mg/kg	0.005	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Cesium (Cs)-Total	mg/kg wwt	0.001	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Chromium (Cr)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Chromium (Cr)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Cobalt (Co)-Total	mg/kg	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Cobalt (Co)-Total	mg/kg wwt	0.004	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
Copper (Cu)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Copper (Cu)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Iron (Fe)-Total	mg/kg	5	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Iron (Fe)-Total	mg/kg wwt	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead (Pb)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Lead (Pb)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Lithium (Li)-Total	mg/kg	0.5	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Lithium (Li)-Total	mg/kg wwt	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Magnesium (Mg)-Total	mg/kg	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Magnesium (Mg)-Total	mg/kg wwt	0.4	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Manganese (Mn)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Manganese (Mn)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Mercury (Hg)-Total	mg/kg	0.01 - 0.02	0.015	0.015	0.015	0.015	0.010	0.010	0.020
Mercury (Hg)-Total	mg/kg wwt	0.001 - 0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Molybdenum (Mo)-Total	mg/kg	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Molybdenum (Mo)-Total	mg/kg wwt	0.008	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080
Nickel (Ni)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Nickel (Ni)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040

Appendix C. Benthic Invertebrate Metals Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			**DC1 REP 1**	**DC1 REP 2**	**DC1 REP 3**	**DC1 REP 4**	**DC1 REP 5**	**DC1 REP 6**	**DC1 REP 7**
Site			**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**	**Dunn Creek**
Date Sampled			26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		**Realized**	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		**Detection**	L1477751-17	L1477751-18	L1477751-19	L1477751-20	L1477751-21	L1477751-22	L1477751-23
Matrix	**Unit**	**Limit**	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue	Tissue
Metals *(cont'd)*									
Phosphorus (P)-Total	mg/kg	10	10	10	10	10	10	10	10
Phosphorus (P)-Total	mg/kg wwt	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Potassium (K)-Total	mg/kg	20	20	20	20	20	20	20	20
Potassium (K)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Rubidium (Rb)-Total	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Rubidium (Rb)-Total	mg/kg wwt	0.01	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Selenium (Se)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Selenium (Se)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Sodium (Na)-Total	mg/kg	20	20	20	20	20	20	20	20
Sodium (Na)-Total	mg/kg wwt	4	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Strontium (Sr)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Strontium (Sr)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Tellurium (Te)-Total	mg/kg	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Tellurium (Te)-Total	mg/kg wwt	0.004	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040
Thallium (Tl)-Total	mg/kg	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Thallium (Tl)-Total	mg/kg wwt	0.0004	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040
Tin (Sn)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Tin (Sn)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Uranium (U)-Total	mg/kg	0.002	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020
Uranium (U)-Total	mg/kg wwt	0.0004	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040	0.00040
Vanadium (V)-Total	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Vanadium (V)-Total	mg/kg wwt	0.02	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Zinc (Zn)-Total	mg/kg	1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)-Total	mg/kg wwt	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Zirconium (Zr)-Total	mg/kg	0.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Zirconium (Zr)-Total	mg/kg wwt	0.04	0.040	0.040	0.040	0.040	0.040	0.040	0.040

— Appendix D —

Water Quality Data, Analytical Results, 2014

Appendix D. Water Quality Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			HC1	NB (1M)	NB (25M)	DC1	FIELD BLANK	TRAVEL BLANK	EQUIPMENT BLANK
Site			Harper Creek	North Barriere Lake	North Barriere Lake	Dunn Creek			
Date Sampled			24-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14
Time Sampled		Realized	11:30	09:55	10:12	09:45	16:00	00:00	16:30
ALS Sample ID		Detection	L1477742-1	L1477742-5	L1477742-6	L1477742-7	L1477742-2	L1477742-3	L1477742-4
Matrix	Unit	Limit	Water	Water	Water	Water	Water	Water	Water
Physical Tests									
Conductivity	uS/cm	2	25.9	40.6	53.5	15.2	<2.0	<2.0	<2.0
Hardness (as $CaCO_3$)	mg/L	0.5	9.98	17.4	22.9	5.99	-	-	-
pH	pH	0.1	7.28	7.49	7.61	7.12	5.53	5.55	5.50
Total Suspended Solids	mg/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Dissolved Solids	mg/L	10	21	35	44	17	<10	<10	<10
Turbidity	NTU	0.1	0.24	0.31	0.43	0.28	<0.10	<0.10	<0.10
Anions and Nutrients									
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	2	10.6	19.1	25.3	6.6	<2.0	<2.0	<2.0
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Alkalinity, Total (as $CaCO_3$)	mg/L	2	10.6	19.1	25.3	6.6	<2.0	<2.0	<2.0
Ammonia, Total (as N)	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0058	<0.0050	<0.0050
Bromide (Br)	mg/L	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	<0.50	0.59	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.02	0.026	0.039	0.050	0.022	<0.020	<0.020	<0.020
Nitrate (as N)	mg/L	0.005	0.0177	0.0111	0.0663	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.05	0.089	0.142	0.121	0.084	<0.050	<0.050	<0.050
Orthophosphate-Dissolved (as P)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.002	0.0027	0.0028	0.0031	0.0025	<0.0020	<0.0020	<0.0020
Sulfate (SO_4)	mg/L	0.5	1.59	1.60	2.10	1.03	<0.50	<0.50	<0.50
Cyanides									
Cyanide, Weak Acid Diss	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Thiocyanate (SCN)	mg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cyanide, Free	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon									
Total Organic Carbon	mg/L	0.5	1.86	3.89	3.90	1.65	<0.50	<0.50	<0.50
Total Metals									
Aluminum (Al)	mg/L	0.003	0.0591	0.0796	0.0520	0.0655	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.0001	0.00015	0.00012	0.00013	0.00013	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.00005 - 0.0005	0.00352	0.00447	0.00508	0.00300	<0.000050	<0.000050	<0.00050
Beryllium (Be)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.02	3.36	5.83	7.47	1.82	<0.020	<0.020	<0.020
Chromium (Cr)	mg/L	0.0001	<0.00010	0.00014	<0.00010	0.00013	<0.00010	<0.00010	<0.00010
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.0005	0.00050	0.00063	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)	mg/L	0.03	0.044	0.039	0.054	<0.030	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.00005	0.000051	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.0005	0.00071	0.00124	0.00159	<0.00050	<0.00050	<0.00050	<0.00050
Magnesium (Mg)	mg/L	0.005	0.432	0.751	1.04	0.416	<0.0050	<0.0050	<0.0050
Manganese (Mn)	mg/L	0.00005	0.00156	0.00186	0.00309	0.00159	<0.000050	<0.000050	<0.000050
Mercury (Hg)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)	mg/L	0.00005	0.00157	0.000838	0.00102	0.00146	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)	mg/L	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)	mg/L	0.05	0.342	0.498	0.606	0.138	<0.050	<0.050	<0.050
Selenium (Se)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)	mg/L	0.05	2.65	3.58	4.14	2.36	<0.050	<0.050	<0.050
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium (Sr)	mg/L	0.0002	0.0183	0.0308	0.0402	0.00606	<0.00020	<0.00020	<0.00020
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)	mg/L	0.0001	<0.00010	0.00059	<0.00010	<0.00010	<0.00010	<0.00010	0.00018
Titanium (Ti)	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.00001	0.000967	0.00132	0.00138	0.000717	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Appendix D. Water Quality Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			HC1	NB (1M)	NB (25M)	DC1	FIELD BLANK	TRAVEL BLANK	EQUIPMENT BLANK
Site			Harper Creek	North Barriere Lake	North Barriere Lake	Dunn Creek			
Date Sampled			24-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14
Time Sampled		Realized	11:30	09:55	10:12	09:45	16:00	00:00	16:30
ALS Sample ID		Detection	L1477742-1	L1477742-5	L1477742-6	L1477742-7	L1477742-2	L1477742-3	L1477742-4
Matrix	Unit	Limit	Water	Water	Water	Water	Water	Water	Water
Dissolved Metals									
Dissolved Mercury Filtration Location	-	-	FIELD	FIELD	FIELD	FIELD	-	-	-
Dissolved Metals Filtration Location	-	-	LAB	LAB	LAB	LAB	-	-	-
Aluminum (Al)	mg/L	0.003	0.0378	0.0649	0.0310	0.0449	-	-	-
Antimony (Sb)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Arsenic (As)	mg/L	0.0001	<0.00010	<0.00010	0.00011	0.00011	-	-	-
Barium (Ba)	mg/L	0.00005	0.00325	0.00432	0.00478	0.00289	-	-	-
Beryllium (Be)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Bismuth (Bi)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Boron (B)	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	-	-	-
Cadmium (Cd)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Calcium (Ca)	mg/L	0.02	3.31	5.73	7.47	1.76	-	-	-
Chromium (Cr)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Cobalt (Co)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Copper (Cu)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Iron (Fe)	mg/L	0.03	<0.030	<0.030	<0.030	<0.030	-	-	-
Lead (Pb)	mg/L	0.00005	<0.000050	<0.000050	<0.000050	<0.000050	-	-	-
Lithium (Li)	mg/L	0.0005	0.00058	0.00113	0.00159	<0.00050	-	-	-
Magnesium (Mg)	mg/L	0.005	0.419	0.739	1.04	0.389	-	-	-
Manganese (Mn)	mg/L	0.00005	0.000227	0.000514	0.000405	0.000359	-	-	-
Mercury (Hg)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Molybdenum (Mo)	mg/L	0.00005	0.00153	0.000823	0.000969	0.00137	-	-	-
Nickel (Ni)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	-	-	-
Phosphorus (P)	mg/L	0.3	<0.30	<0.30	<0.30	<0.30	-	-	-
Potassium (K)	mg/L	0.05	0.347	0.491	0.620	0.137	-	-	-
Selenium (Se)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-
Silicon (Si)	mg/L	0.05	2.56	3.53	4.12	2.27	-	-	-
Silver (Ag)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Sodium (Na)	mg/L	2	<2.0	<2.0	<2.0	<2.0	-	-	-
Strontium (Sr)	mg/L	0.0002	0.0178	0.0298	0.0397	0.00578	-	-	-
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	-	-	-
Tin (Sn)	mg/L	0.0001	<0.00010	0.00053	<0.00010	<0.00010	-	-	-
Titanium (Ti)	mg/L	0.01	<0.010	<0.010	<0.010	<0.010	-	-	-
Uranium (U)	mg/L	0.00001	0.000782	0.00119	0.00120	0.000618	-	-	-
Vanadium (V)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-
Zinc (Zn)	mg/L	0.003	<0.0030	<0.0030	<0.0030	<0.0030	-	-	-

— Appendix E —

Water Quality Detection Limits, Analytical Results, 2014

Appendix E. Water Quality Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			HC1	NB (1M)	NB (25M)	DC1	FIELD BLANK	TRAVEL BLANK	EQUIPMENT BLANK
Site			Harper Creek	North Barriere Lake	North Barriere Lake	Dunn Creek			
Date Sampled			24-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14
Time Sampled		Realized	11:30	09:55	10:12	09:45	16:00	00:00	16:30
ALS Sample ID		Detection	L1477742-1	L1477742-5	L1477742-6	L1477742-7	L1477742-2	L1477742-3	L1477742-4
Matrix	Unit	Limit	Water	Water	Water	Water	Water	Water	Water
Physical Tests									
Conductivity	uS/cm	2	2	2	2	2	2	2	2
Hardness (as $CaCO_3$)	mg/L	0.5	0.5	0.5	0.5	0.5	-	-	-
pH	pH	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Suspended Solids	mg/L	1	1	1	1	1	1	1	1
Total Dissolved Solids	mg/L	10	10	10	10	10	10	10	10
Turbidity	NTU	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients									
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2	2
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2	2
Alkalinity, Total (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2	2
Ammonia, Total (as N)	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide (Br)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrate (as N)	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Orthophosphate-Dissolved (as P)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Phosphorus (P)-Total	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Sulfate (SO_4)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cyanides									
Cyanide, Weak Acid Diss	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Cyanide, Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Thiocyanate (SCN)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Cyanide, Free	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Organic / Inorganic Carbon									
Total Organic Carbon	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Metals									
Aluminum (Al)	mg/L	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Antimony (Sb)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)	mg/L	0.00005 - 0.0005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.0005
Beryllium (Be)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Bismuth (Bi)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Calcium (Ca)	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Cobalt (Co)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Iron (Fe)	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Magnesium (Mg)	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)	mg/L	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)	mg/L	2	2	2	2	2	2	2	2
Strontium (Sr)	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Thallium (Tl)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Tin (Sn)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Dissolved Metals									
Dissolved Mercury Filtration Location	-	-	-	-	-	-	-	-	-
Dissolved Metals Filtration Location	-	-	-	-	-	-	-	-	-
Aluminum (Al)	mg/L	0.003	0.003	0.003	0.003	0.003	-	-	-
Antimony (Sb)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Arsenic (As)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Barium (Ba)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-
Beryllium (Be)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Bismuth (Bi)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-
Boron (B)	mg/L	0.01	0.01	0.01	0.01	0.01	-	-	-
Cadmium (Cd)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-
Calcium (Ca)	mg/L	0.02	0.02	0.02	0.02	0.02	-	-	-
Chromium (Cr)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Cobalt (Co)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-

Appendix E. Water Quality Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			HC1	NB (1M)	NB (25M)	DC1	FIELD BLANK	TRAVEL BLANK	EQUIPMENT BLANK
Site			Harper Creek	North Barriere Lake	North Barriere Lake	Dunn Creek			
Date Sampled			24-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	24-Jun-14	24-Jun-14	24-Jun-14
Time Sampled		Realized	11:30	09:55	10:12	09:45	16:00	00:00	16:30
ALS Sample ID		Detection	L1477742-1	L1477742-5	L1477742-6	L1477742-7	L1477742-2	L1477742-3	L1477742-4
Matrix	Unit	Limit	Water	Water	Water	Water	Water	Water	Water
Dissolved Metals *(cont'd)*									
Copper (Cu)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-
Iron (Fe)	mg/L	0.03	0.03	0.03	0.03	0.03	-	-	-
Lead (Pb)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-
Lithium (Li)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-
Magnesium (Mg)	mg/L	0.005	0.005	0.005	0.005	0.005	-	-	-
Manganese (Mn)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-
Mercury (Hg)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-
Molybdenum (Mo)	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	-	-	-
Nickel (Ni)	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	-	-	-
Phosphorus (P)	mg/L	0.3	0.3	0.3	0.3	0.3	-	-	-
Potassium (K)	mg/L	0.05	0.05	0.05	0.05	0.05	-	-	-
Selenium (Se)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Silicon (Si)	mg/L	0.05	0.05	0.05	0.05	0.05	-	-	-
Silver (Ag)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-
Sodium (Na)	mg/L	2	2	2	2	2	-	-	-
Strontium (Sr)	mg/L	0.0002	0.0002	0.0002	0.0002	0.0002	-	-	-
Thallium (Tl)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-
Tin (Sn)	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-
Titanium (Ti)	mg/L	0.01	0.01	0.01	0.01	0.01	-	-	-
Uranium (U)	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	-	-	-
Vanadium (V)	mg/L	0.001	0.001	0.001	0.001	0.001	-	-	-
Zinc (Zn)	mg/L	0.003	0.003	0.003	0.003	0.003	-	-	-

— Appendix F —

Sediment Quality Data, Analytical Results, 2014

Appendix F. Sediment Quality Data, Analytical Results, 2014

RESULTS OF ANALYSIS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	NB REP 1	NB REP 2	NB REP 3	DC1 REP 1	DC1 REP 1 FIELD SPLIT	DC1 REP 2	DC1 REP 3
Site			Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477754-1	L1477754-2	L1477754-3	L1477754-4	L1477754-5	L1477754-6	L1477754-7	L1477754-10	L1477754-8	L1477754-9
Matrix	Unit	Limit	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests												
Moisture	%	0.25	21.4	16.4	22.9	83.7	53.7	74.3	18.8	19.9	23.3	16.1
pH (1:2 soil:water)	pH	0.1	7.03	6.94	7.10	6.00	5.58	5.72	7.01	7.14	7.12	7.00
Particle Size												
% Gravel (>2mm)	%	0.1	37.9	33.0	1.98	<0.10	<0.10	<0.10	19.3	19.5	26.2	50.3
% Sand (2.0mm - 0.063mm)	%	0.1	61.3	65.6	94.9	1.16	51.2	12.6	77.8	77.3	71.6	48.3
% Silt (0.063mm - 4um)	%	0.1	0.45	0.91	2.59	69.0	46.5	79.1	2.53	3.04	1.97	0.98
% Clay (<4um)	%	0.1	0.33	0.43	0.49	29.8	2.25	8.35	0.36	0.14	0.22	0.38
Texture	-	-	Sand	Sand	Sand	Silt loam	Sandy loam	Silt	Sand	Sand	Sand	Sand
Anions and Nutrients												
Total Nitrogen by LECO	%	0.02	<0.020	<0.020	<0.020	0.544	0.169	0.332	<0.020	<0.020	<0.020	<0.020
Cyanides												
Cyanide, Total	mg/kg	0.05 - 0.5	<0.050	<0.050	<0.050	<0.50	<0.50	<0.50	<0.050	<0.050	<0.050	<0.050
Organic / Inorganic Carbon												
Total Organic Carbon	%	0.1	0.17	0.11	<0.10	7.75	3.18	5.59	0.14	0.11	0.20	0.16
Plant Available Nutrients												
Available Phosphate-P	mg/kg	2	<2.0	<2.0	2.1	2.7	<2.0	<2.0	2.3	2.1	<2.0	2.5
Metals												
Aluminum (Al)	mg/kg	50	15900	17200	17600	33100	14700	21700	22300	22100	21800	22700
Antimony (Sb)	mg/kg	0.1	0.57	0.44	0.44	0.35	0.22	0.44	0.50	0.54	0.53	0.54
Arsenic (As)	mg/kg	0.05 - 0.06	31.5	18.9	18.3	15.3	8.72	15.2	10.1	9.64	9.27	9.97
Barium (Ba)	mg/kg	0.5	93.2	103	100	245	73.1	119	219	210	202	222
Beryllium (Be)	mg/kg	0.1	0.64	0.84	0.79	2.34	0.76	1.22	1.70	1.73	1.83	2.07
Bismuth (Bi)	mg/kg	0.1	2.75	1.10	1.15	0.97	0.57	0.70	0.54	0.64	0.55	0.50
Boron (B)	mg/kg	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	mg/kg	0.05	0.627	0.651	0.565	0.970	0.273	0.687	0.429	0.419	0.444	0.502
Calcium (Ca)	mg/kg	50	8910	7060	6600	6270	4330	5430	10600	10600	10600	10900
Chromium (Cr)	mg/kg	0.5	40.0	32.1	24.8	35.1	17.5	28.4	163	166	162	151
Cobalt (Co)	mg/kg	0.1	14.3	12.6	12.1	16.2	6.55	14.3	26.1	25.8	25.4	24.9
Copper (Cu)	mg/kg	0.5	112	95.0	94.2	72.4	49.0	70.3	60.8	59.5	59.3	63.7
Iron (Fe)	mg/kg	50	41500	35000	35700	53300	28800	42900	37500	37900	37700	36500
Lead (Pb)	mg/kg	0.1	92.0	67.8	56.6	35.7	16.8	50.7	8.33	7.62	8.62	9.99
Lithium (Li)	mg/kg	5	23.2	26.2	26.2	58.6	24.8	36.8	27.3	27.5	26.5	28.4
Magnesium (Mg)	mg/kg	10	9970	9360	9160	7740	6070	7450	19200	19100	18900	17300
Manganese (Mn)	mg/kg	0.2	791	759	674	1180	245	544	1110	1090	1100	1310
Mercury (Hg)	mg/kg	0.005	0.0315	0.0310	0.0824	0.272	0.0388	0.124	0.0527	0.0556	0.0556	0.0641
Molybdenum (Mo)	mg/kg	0.1	5.26	9.19	4.19	12.1	3.14	4.55	5.69	5.64	6.84	7.35
Nickel (Ni)	mg/kg	0.5	20.3	18.4	12.9	26.4	10.4	28.7	109	108	107	99.8
Phosphorus (P)	mg/kg	50	1370	1190	1280	1380	1080	1460	711	669	650	787
Potassium (K)	mg/kg	100	1990	1790	1880	3260	1470	2230	1140	1110	1060	1160
Selenium (Se)	mg/kg	0.1	1.61	0.94	0.95	1.56	0.40	0.85	0.85	0.83	0.90	1.08
Silver (Ag)	mg/kg	0.05	0.538	0.301	0.326	0.648	0.150	0.529	0.100	0.096	0.107	0.129
Sodium (Na)	mg/kg	100	380	330	350	320	210	230	720	730	710	710
Strontium (Sr)	mg/kg	0.1	37.5	29.3	31.3	46.9	21.4	35.1	31.3	30.7	30.8	33.7
Thallium (Tl)	mg/kg	0.05	0.191	0.178	0.170	0.464	0.158	0.268	0.154	0.138	0.149	0.181
Tin (Sn)	mg/kg	0.2	38.4	25.9	1.31	1.81	0.97	1.13	0.75	0.85	0.91	1.01
Titanium (Ti)	mg/kg	1	773	654	797	839	621	661	1870	1850	1870	1680
Uranium (U)	mg/kg	0.05	19.1	22.2	21.8	115	27.4	53.4	27.8	28.2	30.4	36.8
Vanadium (V)	mg/kg	0.2	66.5	60.1	60.3	64.4	37.6	46.5	95.2	95.9	94.0	90.4
Zinc (Zn)	mg/kg	1	165	168	167	168	90.2	163	90.2	92.6	91.6	98.5

— Appendix G —

Sediment Quality Detection Limits, Analytical Results, 2014

Appendix G. Sediment Quality Detection Limits, Analytical Results, 2014

DETECTION LIMITS

Sample ID			HC1 REP 1	HC1 REP 2	HC1 REP 3	NB REP 1	NB REP 2	NB REP 3	DC1 REP 1	FIELD SPLIT	DC1 REP 2	DC1 REP 3
Site			Harper Creek	Harper Creek	Harper Creek	North Barriere Lake	North Barriere Lake	North Barriere Lake	Dunn Creek	Dunn Creek	Dunn Creek	Dunn Creek
Date Sampled			24-Jun-14	24-Jun-14	24-Jun-14	25-Jun-14	25-Jun-14	25-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Time Sampled		Realized	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		Detection	L1477754-1	L1477754-2	L1477754-3	L1477754-4	L1477754-5	L1477754-6	L1477754-7	L1477754-10	L1477754-8	L1477754-9
Matrix	Unit	Limit	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests												
Moisture	%	0.25	00.3	00.3	00.3	00.3	00.3	00.3	00.3	00.3	00.3	00.3
pH (1:2 soil:water)	pH	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Particle Size												
% Gravel (>2mm)	%	0.1	00.1	00.1	0.10	0.1	0.1	0.1	00.1	00.1	00.1	00.1
% Sand (2.0mm - 0.063mm)	%	0.1	00.1	00.1	00.1	0.10	00.1	00.1	00.1	00.1	00.1	00.1
% Silt (0.063mm - 4um)	%	0.1	0.10	0.10	0.10	00.1	00.1	00.1	0.10	0.10	0.10	0.10
% Clay (<4um)	%	0.1	0.10	0.10	0.10	00.1	0.10	0.10	0.10	0.10	0.10	0.10
Texture	-	-	-	-	-	-	-	-	-	-	-	-
Anions and Nutrients												
Total Nitrogen by LECO	%	0.02	0.02	0.02	0.02	0.020	0.020	0.020	0.02	0.02	0.02	0.02
Cyanides												
Cyanide, Total	mg/kg	0.05 - 0.5	0.05	0.05	0.05	0.5	0.5	0.5	0.05	0.05	0.05	0.05
Organic / Inorganic Carbon												
Total Organic Carbon	%	0.1	0.10	0.10	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Plant Available Nutrients												
Available Phosphate-P	mg/kg	2	2	2	2.0	2.0	2	2	2.0	2.0	2	2.0
Metals												
Aluminum (Al)	mg/kg	50	00050	00050	00050	00050	00050	00050	00050	00050	00050	00050
Antimony (Sb)	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Arsenic (As)	mg/kg	0.05 - 0.06	00.1	00.1	00.1	00.1	0.05	00.1	00.1	0.05	0.05	0.05
Barium (Ba)	mg/kg	0.5	00.5	001	001	001	00.5	001	001	001	001	001
Beryllium (Be)	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Bismuth (Bi)	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Boron (B)	mg/kg	10	10	10	10	10	10	10	10	10	10	10
Cadmium (Cd)	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Calcium (Ca)	mg/kg	50	0050	0050	0050	0050	0050	0050	00050	00050	00050	00050
Chromium (Cr)	mg/kg	0.5	00.5	00.5	00.5	00.5	00.5	00.5	001	001	001	001
Cobalt (Co)	mg/kg	0.1	00.1	00.1	00.1	00.1	0.10	00.1	00.1	00.1	00.1	00.1
Copper (Cu)	mg/kg	0.5	001	00.5	00.5	00.5	00.5	00.5	00.5	00.5	00.5	00.5
Iron (Fe)	mg/kg	50	00050	00050	00050	00050	00050	00050	00050	00050	00050	00050
Lead (Pb)	mg/kg	0.1	00.1	00.1	00.1	00.1	00.1	00.1	0.10	0.10	0.10	0.10
Lithium (Li)	mg/kg	5	05.0	05.0	05.0	05.0	05.0	05.0	05.0	05.0	05.0	05.0
Magnesium (Mg)	mg/kg	10	0010	0010	0010	0010	0010	0010	00010	00010	00010	00010
Manganese (Mn)	mg/kg	0.2	000	000	000	0000	000	000	0000	0000	0000	0000
Mercury (Hg)	mg/kg	0.005	0.0050	0.0050	0.0050	0.005	0.0050	0.005	0.0050	0.0050	0.0050	0.0050
Molybdenum (Mo)	mg/kg	0.1	0.10	0.10	0.10	00.1	0.10	0.10	0.10	0.10	0.10	0.10
Nickel (Ni)	mg/kg	0.5	00.5	00.5	00.5	00.5	00.5	00.5	001	001	001	00.5
Phosphorus (P)	mg/kg	50	0050	0050	0050	0050	0050	0050	050	050	050	050
Potassium (K)	mg/kg	100	0100	0100	0100	0100	0100	0100	0100	0100	0100	0100
Selenium (Se)	mg/kg	0.1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Silver (Ag)	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Sodium (Na)	mg/kg	100	100	100	100	100	100	100	100	100	100	100
Strontium (Sr)	mg/kg	0.1	00.1	00.1	00.1	00.1	00.1	00.1	00.1	00.1	00.1	00.1
Thallium (Tl)	mg/kg	0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Tin (Sn)	mg/kg	0.2	00.2	00.2	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Titanium (Ti)	mg/kg	1	001	001	001	001	001	001	0001	0001	0001	0001
Uranium (U)	mg/kg	0.05	00.1	00.1	00.1	000	00.1	00.1	00.1	00.1	00.1	00.1
Vanadium (V)	mg/kg	0.2	00.2	00.2	00.2	00.2	00.2	00.2	00.2	00.2	00.2	00.2
Zinc (Zn)	mg/kg	1	001	001	001	001	01.0	001	01.0	01.0	01.0	01.0